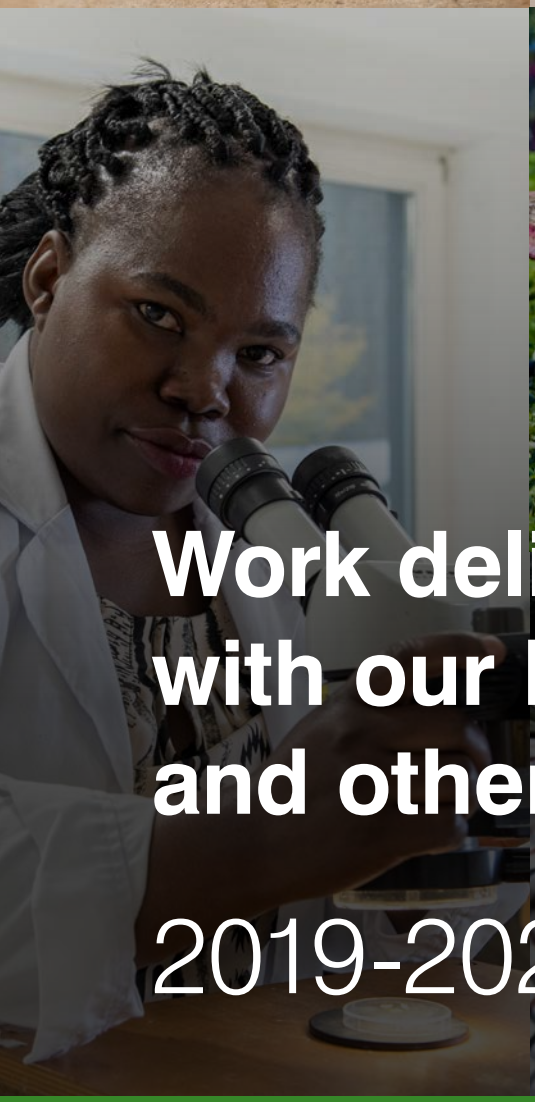
CABI




Work delivered in partnership with our Member Countries and other stakeholders

2019-2022

KNOWLEDGE FOR LIFE

Projects and activities by country

Global and regional

Afghanistan

Anguilla

Australia

Bahamas

Bangladesh

Barbados

Bermuda

Botswana

Brazil

British Virgin Islands

Brunei Darussalam

Burundi

Canada

Chile

China

Colombia

Cote d'Ivoire

Democratic People's Republic of Korea

Ethiopia

Gambia

Ghana

Grenada

Guyana

India

Jamaica

Kenya

Malawi

Malaysia

Mauritius

Montserrat

Myanmar

New Zealand

Nigeria

Pakistan

Papua New Guinea

Philippines

Rwanda

Sierra Leone

Solomon Islands

South Africa

The Netherlands

Trinidad and Tobago

Uganda

UK

USA

Vietnam

Zambia

Zimbabwe

Project index

Introduction

As an intergovernmental organization, CABI's strategies, programmes and projects are driven by the concerns and needs of its 49 Member Countries and other stakeholders.

CABI's triennial Regional Consultations, traditionally attended in person, serve as a mechanism for the organization to listen and engage directly with its Member Countries. Due to COVID-19 restrictions, CABI consulted its Member Countries and other stakeholders regarding the next Medium-Term Strategy (MTS) for 2023-2025 virtually, through an online stakeholder survey in the first quarter of 2022, and during three virtual Regional Consultation meetings in quarter two of the same year.

The valuable feedback from these consultations have been considered while drafting the new MTS, which will be presented at CABI's Review Conference on 27-28 September. Following further dialogue at the Review Conference, a final version of the MTS will be submitted for Executive Council approval by the end of December 2022.

The consultation process enables CABI to align its work effectively with national and regional needs. The last three years saw continued joint efforts and close partnerships between CABI and its Member Countries on priority areas identified at the previous Regional Consultations, contributing towards common goals to help farmers grow more and lose less, combat threats to agriculture and the environment and improve access to scientific information and knowledge.

Much effort and increased investment have also been put into further strengthening Member Country engagements through the development and implementation of joint action plans; the launch and delivery of the revised membership benefits package; responses to Member Countries' requests for support and consultancy; and bridging the funding gaps of some larger projects.

This document summarizes CABI's work on projects, programmes, initiatives and activities in our Member Countries and beyond since last the Review Conference held in September 2019. It includes some updates to the version shared before the virtual Regional Consultation meetings from April-May 2022.

CABI values the partnership with our Member Countries and appreciates the contributions from all funders and partners who support our work globally, and in different regions and countries, as described in the document. In particular, we gratefully acknowledge the core financial support from our Member Countries (and lead agencies) including:

UKaid from the British people

Ministry of Agriculture and Rural Affairs (MARA) People's Republic of China

Australian Government Australian Centre for International Agricultural Research

Agriculture and Agri-Food Canada

Ministry of Foreign Affairs of the Netherlands

Schweizerische Eidgenossenschaft Confédération suisse Confederazione Svizzera Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

9th International Workshop on Biological Control and Management of Eupatorieae and other Invasive Weeds

Location: Malaysia

Dates: 19/03/2019 – 22/03/2019

CABI Project Manager: Sathis Sri Thanarajoo

Donors: International Organisation for Biological and Integrated Control (IOBC)

Partners: International Organisation for Biological and Integrated Control (IOBC)

CABI Southeast Asia, in collaboration with International Organisation for Biological and Integrated Control (IOBC), organized a four-day Workshop on Biological Control and Management of Eupatorieae and other Invasive Weeds, where the latest research on invasive weeds and their biological control agents were shared amongst delegates from 13 countries, including Australia, New Zealand, South Africa, Fiji, India, Pakistan and other South East Asia countries.

This series of workshops have come a long way since its initiation in 1988 to facilitate the management and biological control of *Chromolaena odorata* in resource-poor tropical and subtropical countries. In 2003, the scope of the workshop was expanded to include closely related species such as *Mikania micrantha*, while retaining an emphasis on the tropics.

A diagnostic tool for the identification and quantification of potato cyst nematode

Location: Kenya

Dates: 01/11/2019 – 31/07/2021

CABI Project Manager: Alan Buddie

Donors: Innovate UK

Partners: CHAP; CABI; PES Technologies; International Centre of Insect Physiology and Ecology (ICIPE)

In Kenya, the potato is an economically important staple crop. Around 800,000 people benefit directly from its production. The aim of this project is to develop a Potato Cyst Nematode Assessment Tool that is based on measuring the volatile organic compounds produced by the nematode.

The signals detected by the novel sensor will be correlated with conventional and novel analyses of potato cyst nematode levels using morphological analysis, next-generation sequencing and MALDI-TOF MS (matrix-assisted laser desorption ionization-time of flight mass spectrometry). On-farm detection of the pest would aid farmers in their agronomic decision making, leading to increased potato productivity and better crop rotation.

A study of the key drivers and barriers to domestic coffee consumption in selected IACO Member Countries

Location: Selected Inter-African Coffee Organization (IACO) **Member Countries**: Ethiopia, Ghana, Kenya, Nigeria, Tanzania, Uganda and Zambia.

Dates: 2021

CABI Project Manager: MaryLucy Oronje

A study was conducted to provide an understanding of coffee consumption drivers and barriers in selected IACO Member Countries and to formulate recommendations for improving local coffee consumption. Although consumption is on the rise in the countries covered, it is critical to put in place mechanisms for sustaining the growth rate.

The study aimed to identify the factors underpinning domestic coffee consumption and the bottlenecks to increasing this. It involved analysing information on the installed roasting capacity in the coffee-producing countries, the existing market landscape, and the policy and regulatory framework governing local coffee roasting and marketing.

The study found that while restrictions on green coffee imports into some of the countries are intended to protect the industry, these can impede the development of the local roasting industries. Establishing an updated register of roasters in a searchable central repository is recommended for each of the countries.

Access to CABI Resources for University of the South Pacific

Location: Australia; Cook Islands; Fiji; Kiribati; Marshall Islands; Nauru; Niue; Samoa; Solomon Islands; Tokelau; Tonga; Tuvalu; Vanuatu

Dates: 01/01/2022 – 31/12/2023

CABI Project Manager: Sally Stone

CABI Project Team: Qiaoqiao Zhang

Donors: Australian Centre for International Agricultural Research (ACIAR)

Partners: University of the South Pacific

As a CABI member benefit, ACIAR is able to nominate a partner organization to receive free access to a number of CABI resources.

Following an invitation from ACIAR, the University of the South Pacific (USP) has agreed to partner with ACIAR's Pacific Agriculture Scholarship Support and Climate Resilience Program, CABI, the University of Sunshine Coast (Uni SC) and Southern Queensland University (SQU) to roll-out free access at campuses across the Pacific, for researchers, faculty and students.

Resources will be delivered online and training will be provided to cover use of the resources in teaching and research.

With the help of library staff at the university, a range of CABI resources including CAB Abstracts, Crop Protection Compendium and CABI eBooks were made available to all users via the library network in December 2021.

USP, ACIAR, CABI, Uni SC and SQU are working together to encourage access and support users.

Action on Invasives

Location: Global (Focus countries: Ghana, Kenya, Pakistan, Zambia, Rwanda, Bangladesh, Burkina Faso)

Dates: 02/01/2018 – 31/03/2021

CABI Project Manager: Roger Day

CABI Project Team: Marc Kenis, Ivan Rwomushana, Monica Kansiime, Abdul Rehman, Julien Godwin and many others in the in-country teams

Donors: Foreign, Commonwealth & Development Office (FCDO); Netherlands Directorate-General for International Cooperation (DGIS)

Partners: National and regional partners in target regions; international research and development organizations

Action on Invasives was a programme led by CABI with a purpose of addressing the growing problem of invasive species in agriculture and the natural environment. With national, regional and international stakeholders in the public and private sector, the programme strengthened system capacity to prevent, eradicate, control and manage priority invasive species at local, national and regional levels.

The overall technical approach to managing invasive species comprises of three tiers: prevention; early detection and rapid response; and – for species that become permanently established – control and mitigation of the impacts.

Action on Invasives was designed to enable countries and regions to adopt this three-tiered approach through four interrelated work packages:

- Stakeholder Engagement – Fostering the Right Partnerships
- Best Practice Solutions – For Prevention, Control and Mitigation
- Community Action – Bringing Information and Action to Scale
- Knowledge and Data – Creating and Using Information

The first participating countries were Ghana, Kenya, Pakistan and Zambia, and in 2019 activities were initiated in Rwanda and Bangladesh. In 2020, activities were initiated in Burkina Faso. Focus species included fall armyworm, tomato pinworm, parthenium, papaya mealybug, Prosopis juliflora, fusarium wilt, apple snail and the desert locust.

In 2021, Action on Invasives merged into CABI's new global programme, PlantwisePlus. Major elements of Action on Invasives will become part of PlantwisePlus. Highlights from the programme follow.

Action on Invasives: programme highlights

Stakeholder Engagement

Fostering linkages and partnerships through which policy, plans and practices can be developed and implemented:

- 2 national invasive strategies being implemented
- 1 regional strategy developed
- 6 species response plans being implemented
- 2 national invasives coordination mechanisms established
- 4 companies facilitated to register lower-risk control products
- 3 sets of biological control regulations developed/supported
- 8 evidence notes published on impacts and management of invasives

Best Practice Solutions

Delivering technologies and methods for risk assessment, diagnostics, surveillance and control:

- 3 horizon scanning exercises conducted
- 6 surveillance programmes conducted
- 13 countries' fall armyworm samples identified
- 8 fall armyworm IPM methods tested
- 6 fall armyworm biocontrol agents assessed
- 3 parthenium agents assessed
- 3 biocontrol agent species shipped

Community Action

Adapting best practice solutions to local contexts and needs:

- 10.3m people reached
- 192 communities supported in Pakistan
- 18 community trials in Africa
- 15 communication campaigns conducted
- 11 household assessments undertaken

Knowledge and Data

Creating and availing information tools and resources:

- 3.4m users of Invasive Species Compendium
- 30,000 visits to Horizon Scanning Tool
- 27,000 visits to PRA Tool
- 22,000 visits to Research Collaboration Portal
- 165 datasheets created (2,500 updated)
- 5 invasive species information portals created

www.cabi.org/aoi

Addressing scale insect threats in Kenya

Location: Kenya

Dates: 01/07/2018 – 31/03/2022

CABI Project Manager: Monica Kansiime

CABI Project Team: Joseph Mulema, James Watiti, Abigael Mchana

Donors: Darwin Institute

Partners: Natural History Museum (UK); National Museums of Kenya (NMK); Kenya Agricultural and Livestock Research Organization (KALRO); Kenya Forestry Research Institute (KEFRI); Kenya Plant Health Inspectorate Service (KEPHIS)

In Kenya, scale insect pests are damaging native trees and crops, causing yield losses of up to 91%. Smallholders' awareness of the threat is low because the pests are small, while local entomologists cannot easily identify them. Pesticides are therefore misused, killing other beneficial organisms and creating more pest problems. CABI is creating information packages for stakeholders that will improve responses to pest invasions.

Partners will deliver objectives associated with the identification and collection of scale insects. Fifteen taxonomists have been trained in scale insect collection and handling and identification. A photo guide on identification was produced by CABI and was shared with extension workers and partner institutions.

Factsheets for farmers have been produced, while a radio campaign on the management of scale insects was launched, with a particular focus on the papaya mealybug. It was estimated that over 45,000 farmers were reached via the radio campaign.

www.cabi.org/scale-insects

Advancing knowledge and applications to help mitigate climate change

Location: Australia, China, New Zealand

Dates: 10/01/2022 – 30/12/2023

CABI Project Manager: Jinping Zhang

Donors: Plant and Food Research, New Zealand

Partners: Institute of Plant Protection, Chinese Academy of Agricultural Sciences (IPPCAAS); The University of Queensland, Australia

Our level of understanding of how climate change will disrupt biocontrol systems is crucial to providing important services to growers on sustainable pest control methods. In this project, a multidisciplinary collaborative team of experts from China, Australia, and New Zealand will share, develop and enhance this understanding.

The team will share their combined expertise in climate change, insect pest ecology, species distribution modelling, chemical ecology, and biocontrol to measure the effects of heatwaves on a model biocontrol system and to build on their mutual knowledge.

Their findings could lead to significant science-based advances in our knowledge of how climate-change-driven events could affect the structure and functioning of agricultural systems using biocontrol as part of an integrated pest management approach. The information generated by this project is also expected to provide baseline data for future projects on climate change seeking to facilitate the creation of preparedness, mitigation, and adaptation measures in New Zealand to the potential effects of climate change.

Affordable sentinel networks to fight invasive alien species in India

Location: India

Dates: 01/12/2021 – 01/03/2022

CABI Project Manager: Vinod Pandit

CABI Project Team: Malvika Chaudhary, Gopi Ramasamy, Kritika Khanna

Donors: Foreign, Commonwealth & Development Office (FCDO)

Partners: CHAP UK; MS Swaminathan Research Foundation (MSSRF)

This project was a highly innovative feasibility study to develop an affordable, inclusive and scalable monitoring and alert system for invasive alien species (IAS) to prevent and minimize crop damage in India. The project aimed to deliver a sentinel network to alert smallholder farmers of the presence of IAS, with fall armyworm used as a model organism.

Sensor nodes and data science will be combined to deliver an affordable approach to alert smallholder farmers of IAS threats in India. Four work packages were defined with CABI leading "Field deployment of automated traps and smallholder feedback (especially related to cultural, behavioral, language and gender challenges)."

A test trap was installed in a maize field in the state of Tamil Nadu and a field event was organized as a demo for local stakeholders and local partners. The event was joined by the project consortium.

Aflatoxin control in Pakistan

Location: Pakistan

Dates: 06/01/2019 – 30/09/2021

CABI Project Manager: Dr Sabyan Faris Honey

CABI Project Team: Dr Babar E Bajwa, Dr Hamzah Shahbaz

Donors: United States Department of Agriculture (USDA)

Partners: Rafhan Maize Products Co. Ltd (Non-financial partner); Crop Diseases Research Institute; National Agricultural Research Centre (Collaborator)

Aflatoxins are a group of toxins produced by certain fungi – *Aspergillus flavus* – found in crops such as maize and groundnuts. These aflatoxins are toxic and can cause serious health problems for humans and livestock but can also cause problems within the food chain because they contaminate crops, cause food safety, nutrition and security issues and consequently affect a country's ability to trade.

Biological control is one way of sustainably handling aflatoxins in crops. In this project, CABI is working with USDA to test and register a native biocontrol product, locally termed as AflaPak™, for Pakistan. The product is applied to maize during the flowering stage and before the toxic fungus strains can grow and colonize the crop. The programme increased Pakistan's leadership in regional and global efforts to apply biological control technologies to grow safer crops.

www.cabi.org/aflatoxin-control

Africa soil health

Location: Ethiopia, Ghana, Nigeria, Tanzania, Uganda

Dates: 01/07/2015 – 31/12/2019

CABI Project Manager: James Watiti

Donors: Bill and Melinda Gates Foundation (BMGF)

Partners: 30 Partners: FRI; AFAP; The International Institute of Tropical Agriculture (IITA); N2A; Africa 2000 Network, Uganda (A2N-Uganda); Kenya Agricultural & Livestock Research Organization (KARLO); SELIAN-Tanzania; CRS; Ministry of Agriculture, Kenya; Ministry of Agriculture, Tanzania; Ministry of Agriculture, Uganda; National Agricultural Research Organization (NARO); Ministry of Agriculture, Ghana; UDS-Ghana; Ministry of Agriculture, Nigeria; Agricultural Seed Agency (ASA); ISL, Nigeria; Countrywise, Ghana; Access Agriculture; IPNI; IFDC; EIAR, Ethiopia; Well-Told Story; Beula Seed; Esoko; EAGC; and more

Poor soil fertility is a key constraint to improving farm productivity and farmer livelihoods in sub-Saharan Africa. Integrated Soil Fertility Management (ISFM) is recognised as an effective solution to poor crop yields. However, lack of access to information means that smallholder farmers do not adopt better techniques. To combat this, we worked with partners to add value to communication campaigns that were designed to facilitate adoption and capture learning.

With partners, over 400 different extension support materials, now published on the Africa Soil Health Consortium website (https://africasoilhealth.cabi.org), were developed, together with eight youth-targeted campaigns in four target countries using radio, print and SMS. Over one million farmers have been reached and at least 220,000 farmers have applied at least one improved technology in their fields. Papers and manuscripts, three have been published, on the lessons learnt from campaign implementation have also been produced.

www.cabi.org/africa-soil-health

African Crop Epidemiology System (ACES)

Location: Ethiopia, Kenya

Dates: 19/11/2019 – 31/12/2021

CABI Project Manager: Florence Chege

CABI Project Team: Dannie Romney, Negussie Efa, Sol Danielson, Martin Parr, Ruthie Musker, Mike Rose, Julien Godwin

Donors: Bill & Melinda Gates Foundation (BMGF); Foreign, Commonwealth & Development Office (FCDO)

Partners: Scriptoria; The International Maize and Wheat Improvement Center (CIMMYT); University of Cambridge

The increasing frequency and severity of pest outbreaks (insects, pathogens and weeds) cause huge crop losses in Sub Saharan Africa. Reducing losses requires robust plant protection measures by farmers. Pest-mediated crop losses exceed 50% in both West and East Africa, but losses in northwest Europe stand at only approximately 18%. The development and implementation of an efficient, resilient and integrated plant protection system, guided by surveillance and forecasting, will help provide a timely and effective response while narrowing the yield gap.

The project explored tools, technologies and partnerships needed to implement an early warning plant health system in East Africa and gathered evidence to show feasible modelling and data approaches. The findings proposed a five-year road map for consideration by governments, donors and the private sector. A landscape analysis report was also written documenting the current situation. The project also explored existing systems for desert locust management in Eastern Africa and proposed how these could improve responses to invasion in future.

www.cabi.org/aces

AIRCA Secretariat

Location: Global

Dates: 01/09/2020 – Ongoing

CABI Project Manager: Peace Tusasirwe

CABI Project Team: David Onyango

Donors: AIRCA Members

Partners: Crops for the Future (CFF), UK; International Center for Biosaline Agriculture (ICBA), United Arab Emirates; International Center for Integrated Mountain Development (ICIMOD), Nepal; International Center for Insect Physiology and Ecology (icipe), Kenya; International Fertilizer Development Center (IFDC), USA; and World Vegetable Center (WorldVeg), Taiwan

The Association of International Research and Development Centers for Agriculture (AIRCA) is an international, non-profit alliance of seven leading international research institutions focused on increasing food and nutritional security by supporting smallholder agriculture and rural enterprises within healthy, sustainable and climate-smart landscapes. AIRCA members are committed to combining their experience of successful approaches, opportunities and challenges in moving farmers beyond subsistence and their communities from poverty to prosperity. All AIRCA members have a proven track record of research, development, working closely with farmers, extension systems, national research institutes and the private sector across a wide range of crops and ecosystems.

In September 2020, CABI took over hosting of the AIRCA Secretariat and also provides and coordinates administrative and communication support.

Ambrosia biocontrol

Location: Switzerland, Europe

Dates: 01/01/2016 – 31/12/2019

CABI Project Manager: Urs Schaffner

CABI Project Team: Benno Augustinus

Donors: Swiss Secretariat for Education, Research and Innovation

Partners: University of Fribourg and several partners from the former COST Action 'SMARTER'

Ambrosia artemisiifolia, has become a major invasive alien species in Europe.

In 2013, the leaf beetle, *Ophraella communa*, a specialist herbivore of *A. artemissifolia* used as a biological control agent against *A. artemissifolia* in China, was detected in Switzerland and Italy. A taskforce was launched to develop and conduct data collections to quantify the spread of *Ophraella* and its potential impacts on ragweed pollen and seed production, on a reduction in health costs, and on the likelihood of non-target effects by *Ophraella* on native European or cultivated plant species.

Research, by CABI, on the above led to a paper in Nature Communications on the economic benefits of biological control of *A. artemisiifolia* in Europe.

The spread of *O. communa* in Europe now offers opportunities to test the projected effects of *O. communa* on reducing common ragweed pollen and health costs, a topic of the research component proposed to Horizon 2020.

An introduction to using CABI Platforms and Tools

Location: Chile

Dates: 01/07/2021 – 20/12/2021

CABI Project Manager: Yelitza Colmenarez

CABI Project Team: Marc Kenis, Yelitza Colmenarez, Claudio Plaza

Donors: CABI Development Fund (CDF)

Partners: Ministry of Agriculture, Chile

The project helped to improve the use of CABI tools in Chile including the Crop Protection Compendium, Invasive Species Compendium, Horizon Scanning Tool, Pest Risk Analysis Tool and the BioProtection Portal as part of the Member Benefits package. It aimed to established better communication with the Agricultural Research Institute and Servicio Agrícola y Ganadero, key institutions within the Ministry of Agriculture, as part of the membership responsibility transfer, and set up joint activities. In addition, it reinforced collaboration with the specialists of the Ministry of Agriculture as a whole, and identified joint areas of interest with the aim of developing new project proposals.

www.cabi.org/products-and-services

An old problem revisited: biological control of toadflaxes

Location: Canada, USA

Dates: 01/01/1987 – Ongoing

CABI Project Manager: Hariet Hinz

CABI Project Team: Ivo Toševski

Donors: Agriculture and Agri-Food Canada (AAFC); British Columbia Ministry of Forests, Lands and Natural Resource Operations, Canada; Montana Noxious Weed Trust Fund through Montana State University, USA; South Dakota Department of Agriculture; United States Department of Agriculture (USDA), USDA – Animal and Plant Health Inspection Service (APHIS); USDA-APHIS – Center for Plant Health Science and Technology (CPHST); US Forest Service through Montana State University; Wyoming Biological Control Steering Committee, USA

Partners: Dr Roberto Caldara, Milan, Italy; Dr Brent Emerson, Island Ecology and Evolution Research Group, Spain; IPNA-CSIC, La Laguna, Spain; Dr Rosemarie De Clerck-Floate, Agriculture and Agri-Food (AAFC), Canada; Dr Sharlene Sing, US Forest Service; Rocky Mountain Research Station, USA

Native to Europe, toadflaxes were introduced to the USA and Canada over 100 years ago as ornamental plants. They are now declared noxious in eight US states. CABI is part of an effort to identify natural enemies that can be introduced as biological control agents to reduce the vigour, density and spread of this invasive plant.

Following research, a shoot-galling weevil, *Rhinusa pilosa*, which specializes on yellow toadflax was released in Canada in 2014 and in the USA in 2019. Testing with its sister species, *R. rara*, on Dalmatian toadflax has been completed and data sent to our North American counterparts, while safety testing on *M.heydeni* for yellow toadflax and the hybrid continues. Rearing colonies of all five agents are maintained at CABI and shipments of selected species to North America are made for rearing in quarantine and subsequent field releases. Work on rearing continues for both agents.

www.cabi.org/toadflaxes

Analysis of fruit and vegetable value chains in Myanmar

Location: Myanmar

Dates: 10/06/2020 – 30/10/2021

CABI Project Manager: Sivapragasam Annamalai

Donors: Asian Development Bank (ADB)

Partners: Participatory Knowledge Management Department of Planning

As part of the Asian Development Bank's initiative on Agricultural Value Chain Development in Selected Asian Countries, this project aims to analyse the value chains of three main fruits and vegetables to determine the main constraints faced by the farmers. Upon identifying the gaps within the system (farm to market), the project will propose intervention approaches which lead to a new stakeholder's network and a holistic, and sustainable, mechanism. Improved value chains will reduce the post-harvest losses, while increasing profit and income to create new employment along the value chains.

The project conducted a thorough analysis of the value chains of three main fruits and vegetables selected at the Inception Workshop. The analysis will assess post-harvest losses occurring in different segments of the value chains; profitability (of farmers) in production of fruits and vegetables; the role of middlemen and its impact on price and supply; and availability and quality of market infrastructure including cold storage facilities, transportation, and packaging.

Assessing a biocontrol agent for *Jatropha gossypiifolia*

Location: Australia, Trinidad and Tobago, UK

Dates: 01/07/2008 – Ongoing

CABI Project Manager: Marion Seier

CABI Project Team: Kate Pollard, Nikolai Thom, Naitram (Bob) Ramnanan

Donors: Department of Agriculture and Fisheries (DAF)

Jatropha gossypiifolia (bellyache bush) is a major invasive plant in northern Australia. Previous biocontrol efforts have focused on insects but the Australian Government is now also keen to explore fungal pathogens. As experts, CABI is carrying out safety and efficacy experiments with the rust pathogen, *Phakopsora jatrophicola*, using a strain originating from Trinidad. Results will help the Australian authorities decide whether this rust is suitable for biocontrol of *J. gossypiifolia* in Australia.

Tests show that the rust fungus, *P. jatrophicola*, is specific and experimental research indicates that the rust could be autoecious, i.e. it can complete its life cycle on just *J. gossypiifolia*.

A release application for the rust will be prepared together with Australian counterparts at DAF which will detail all research undertaken with the agent. This document will inform a decision by the Australian quarantine authorities as to whether the pathogen is suitable as a biocontrol agent and whether to grant permission for its import and release.

www.cabi.org/jatropha

Assessing the challenges faced by the freshwater fish value chain in Ghana

Location: Ghana

Dates: 01/01/2021 – 31/12/2021

CABI Project Manager: Hettie Arwoh Boafo

CABI Project Team: Birgitta Oppong-Mensah, Jayne Crozier

Donors: The Science and Technology Facilities Council (STFC)

Partners: Birkbeck – University of London

The scoping project assessed the challenges faced by actors in the freshwater fish value chain in Ghana. The information gathered fed into the development of a project to tackle some of these challenges. In response to loss of income and inability to access nutritious fish products, due to COVID-19 lockdowns and disruptions to the aquaculture supply chain, this project aimed to resolve the integration and communication challenges facing the supply and demand sides by means of an innovative digital solution.

The follow-up project will create a novel digital platform. This will link fish farmers to customers directly, enabling them to market their fish products transparently. This digital platform will ensure that fish farmers can readily access the wider market hosted digitally and are able to sell in a safe environment.

Image © Gina Gleeson

Assessment of data across ACIAR research portfolio

Location: Australia

Dates: 01/12/2021 – 30/06/2022

CABI Project Manager: Martin Parr

Donors: Australian Centre for International Agricultural Research (ACIAR)

CABI is leading an assessment of data management and FAIR (Findable, Accessible, Interoperable and Reusable) data principles in research conducted by the Australian Centre for International Agricultural Research (ACIAR), with a view to assessing the barriers to data utility in the Centre's investment portfolio.

The six-month project will see CABI engaging with ACIAR Research Programme Managers to better understand and document data management, and sharing challenges across a range of geographical areas and domains where it operates, with the additional aim of improving its grant-making processes. The work will help ACIAR conduct case studies for improved data utility in countries where this is likely to have the greatest impact across the agency's portfolio – specifically in Indo-Pacific, Southern Asia and Eastern Sub-Saharan Africa regions.

Bahamas phytosanitary consultancy

Location: Bahamas

Dates: 15/03/2021 – 30/09/2021

CABI Project Manager: Yelitza Colmenarez

CABI Project Team: Yelitza Colmenarez, Eduardo Hidalgo, Natalia Corniani

Donors: Bahamas Government

Partners: The Bahamas Agricultural Health and Food Safety Authority (BAHFSA)

The Bahamas Agricultural Health and Food Safety Authority is seeking to improve its ability to carry out its mandate of ensuring that plant health remains uncompromised. There is renewed interest in developing agriculture and therefore a need to fast track the timeline for developing functioning sanitary and phytosanitary infrastructure.

The purpose of this consultancy is to assist and advise the Director of Plant Protection in improving official phytosanitary controls, thereby ensuring plant health and plant protection in the Bahamas. This involves upgrading official phytosanitary control procedures in line with the requirements established by International Plant Protection Convention standards. CABI has provided a toxicological classification of the pesticides commercialized in the islands, highlighting the highly hazardous pesticides, and has reviewed the bill to establish the parameters for registering chemical and biological pesticides.

Biocontrol of fall armyworm in Colombia

Location: Colombia

Dates: 01/01/2019 – 30/09/2019

CABI Project Manager: Yelitza Colmenarez

Donors: CABI Development Fund (CDF)

Partners: University of Nueva Granada; Ministry of Agriculture

The fall armyworm, *Spodoptera frugiperda*, has a wide geographical distribution across South America and in Colombia, it is a secondary pest of other crops, including sorghum, rice and sugar cane.

Its wide geographical distribution and the large number of alternative hosts make the damage caused by this insect one of the most important, economically. The pest can cause losses of more than 34% in corn, and, in Colombia, as high as 60%. In Colombia, basic information about natural enemies controlling the pest is still limited. So far, several parasitoids have been reported and the verification of *S. frugiperda* has been conducted with the help of taxonomists from Colombia and other countries in the Americas.

Biocontrol of papaya mealybug in East Africa

Location: Kenya, South Sudan, Uganda

Dates: 01/06/2022 – 30/06/2025

CABI Project Manager: Ivan Rwomushana

CABI Project Team: Monica Kansiime, Mary Bundi, Bethel Terefe, Idah Mugambi, Fernadis Makale, Selpha Miller

Donors: Darwin Initiative

Partners: The National Museums of Kenya (NMK); Kenya Plant Health Inspectorate Service (KEPHIS); Kenya Agriculture and Livestock Research Organization (KALRO); National Agricultural Research Organization (NARO); University of Juba

Papaya mealybug (PMB) invaded Kenya, South Sudan and Uganda between 2016 and 2020, causing 57% yield and £2,224/ha household economic losses annually.

The project aims to introduce *Acerophagus papayae* for the sustainable management of PMB in Kenya, South Sudan and Uganda, helping to enhance food security and protect biodiversity while serving as a scalable model for other affected countries in East Africa.

Launched in July 2022, the project's implementation phase will see native insect biodiversity in papaya production areas in East Africa documented, suitability and potential release areas for establishment of *A. papayae* established and field releases of *A. papayae* undertaken. Extension workers and community facilitators will be trained on mass rearing of *A. papayae* and farmer managed natural enemy field reservoirs set up in fields. The socio-economic impact will also be documented and the distribution and abundance of native insect species in papaya agro-ecologies mapped.

Biocontrol training in India for Better Cotton Initiative

Location: India

Dates: 01/04/2022 – 31/12/2022

CABI Project Manager: Malvika Chaudhary

Donors: Better Cotton Initiative (BCI)

CABI's experience in biocontrol research, development and extension has led to the development of a training course to improve advisory services' knowledge and awareness about these measures. Building on this, batches of Better Cotton Initiative field staff will be trained on various components of biocontrol, their mode of action and categories according to these and their occurrence in nature. The trainees will also be given field exposure to increase their understanding on the natural enemies.

CABI South Asia has been working with the Better Cotton Initiative to share its knowledge of biological control and the sustainable management of cotton pests and diseases. Under Phase 1, trainings have been conducted in Hyderabad, Ahmedabad and Nagpur.

Biological control against the invasive Comstock mealybug in Swiss orchards

Location: Switzerland

Dates: 01/04/2020 – 31/03/2023

CABI Project Manager: Lukas Seehausen

Donors: Federal Office for Agriculture (FOAG), Switzerland

Partners: Local fruit producers; Office of the Canton Valais; Andermatt Biocontrol; Agroscope

A new concerning invasive pest to Switzerland's orchard industry is the Comstock mealybug, *Pseudococcus comstocki*. Originating from Asia, the Comstock mealybug was first detected in 2016 in fruit crops of the Swiss canton of Valais. Following its detection, the mealybug has caused significant local economic damage to apricot, pear and apple production, especially during 2018 and 2019. This project aims to develop a sustainable and environmentally friendly, biological control method for the Comstock mealybug.

In 2020, one silver fly and three Asian parasitoids were found attacking the mealybugs in the Swiss orchards.

One parasitic wasp, *Acerophagus malinus*, has been identified as a suitable biological control agent and mass rearing in the quarantine laboratory of CABI in Switzerland has started. In July 2021, the first augmentative releases of the parasitoid took place to assess its suitability in the fight against the Comstock mealybug.

www.cabi.org/comstock-mealybug

Biological control for American beech trees

Location: Canada

Dates: 2018 – 2019

CABI Project Manager: Marc Kenis

Donors: Canadian Forest Service

The parasitoid complex of the beech leaf mining weevil, *Orchestes fagi*, a European species invasive in Canada and pest of American beech, was studied in Western Europe to assess the potential for biological control.

Surveys focused on larval/pupal parasitoids attacking *O. fagi* and included collections of potential alternate hosts. Surveys showed the beetle is attacked by a parasitoid complex of generalist parasitoids of leafminers and parasitoids.

Two parasitoids, *Triaspis pallipes* and *Trichomalus inscitus*, were considered promising because of a narrow host range, possibly restricted to *Orchestes* spp. with potential to reach high rates of parasitism. However, both needed an alternate host to complete their cycle. In 2019, egg and adult parasitism were investigated. An unidentified mymarid parasitoid, found attacking eggs, and a braconid parasitoid was reared from adult beetles and found to not need an alternate host to complete its cycle. Further studies to investigate it as biological control agent are needed.

Image: beech weevil (*Orchestes fagi*) © Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org

Biological control for the Emerald Ash Borer in Switzerland and Europe

Location: Switzerland

Dates: 01/07/2021 – 30/06/2024

CABI Project Manager: Lukas Seehausen

CABI Project Team: Marc Kenis, Saidou Nacambo

Donors: Swiss Federal Office for the Environment (FOEN)

Partners: Swiss Federal Institute for Forest Snow and Landscape Research (WSL)

In Switzerland, the European ash is the second most important deciduous tree species in terms of the number of stems but the Emerald Ash borer (EAB) is threatening the trees.

Three EAB parasitoids from China and one from Russia have been tested and released in North America. Initial results show positive effects on ash populations. Another parasitoid, the Western *Palaearctic Spathius polonicus*, also found in Switzerland, found on EAB in Russia, showed high parasitism rates in the field, making it another promising candidate.

The aim of this project is to test the suitability of native parasitoids of related beetle species, compared to Asian parasitoids as biological control agents against EAB in Switzerland and Europe. Rearing techniques for native Agrilus species and their parasitoids will be established, Asian EAB parasitoids from the USA will be imported into a quarantine laboratory in Switzerland where the effectiveness of indigenous and Asian parasitoids in controlling EAB will be tested and specificity tests will be initiated.

Image: emerald ash borer (*Agrilus planipennis*) © David Cappaert, Bugwood.org

Biological control of apple clearwing moth in Canada

Location: Canada

Dates: 30/11/2019 – Ongoing

CABI Project Manager: Tim Haye

Donors: Agriculture and Agri-Food Canada

Partners: Agriculture and Agri-Food Canada

The European apple clearwing moth, *Synanthedon myopaeformis* (Lepidoptera: Sesiidae) was confirmed in Cawston, British Columbia, Canada, in 2005 on apple as the first record in North America.

It has since spread throughout the Similkameen valley, to different areas of the Okanagan valley, is present in Coastal British Columbia and in one orchard in Ontario. Surveys for parasitoids of larvae and pupae in Europe were started in 2020 and continued in 2021. To date, we found two larval and three pupal parasitoids. Overall, parasitism of larvae and pupae was 15% and 21%, respectively. Larval parasitism was mostly caused by the tachinid, *Leskia aurea*, which is known to parasitize many other Sessiidae.

Biological control of apple leaf-curling midge in Canada

Location: Canada

Dates: 01/01/2016 – Ongoing

CABI Project Manager: Tim Haye

Donors: Agriculture and Agri-Food Canada (AAFC)

Partners: Agriculture and Agri-Food Canada (AAFC)

Damage from the apple leaf-curling midge in eastern Canada was effectively reduced by introducing a European natural enemy, *Platygaster demades*, in the 1990s. The pest arrived in British Columbia, where releases of *P. demades* are being considered. However, the identity of *P. demades* needs confirming using molecular tools and its host range defined.

CABI has collected several thousand midge larvae in infested apple orchards in Switzerland, Germany, northern Italy, and Holland – plenty of parasitoids emerged, including *Platygaster demades*. The molecular analysis is in progress.

In 2021, we focused mainly on the collection of non-target species in Switzerland to further investigate the host specificity of *P. demades*. We collected larvae of *Dasineura tiliae*, *Dasineura rosae*, *Dasineura pyri*, *Dasineura acrophila*, *Dasieneura irregularis*, *Kiefferia pericarpiicola*, *Contarinia pyri*, and *Dasineura crataegi*. Since most species produce one brood per season, overwintering larvae are currently kept in overwintering and will be incubated next spring.

www.cabi.org/apple-leaf-curling-midge

Biological control of brown marmorated stink bug

Location: Canada, China, Switzerland, Italy, Georgia

Dates: 30/11/2019 – 01/03/2022

CABI Project Manager: Tim Haye

Donors: Agriculture and Agri-Food Canada (AAFC); European Commission, Ferrero

Partners: Agriculture and Agri-Food Canada (AAFC); Western University, Canada; University of Torino, Italy

The brown marmorated stink bug is an invasive of fruit and vegetable crops. Due to climate change, it has spread throughout Europe and could spread worldwide, feeding on over 300 different host plants. Coordinated action is needed to slow its spread and mitigate its impacts.

Classical biological control, using parasitic wasps from the pest's origin of Asia, discovered the samurai wasp, *Trissolcus japonicus*. Laboratory host range studies showed it is restricted to the Pentatomoidea (family of insects belonging to stink bugs), but capable of parasitizing the eggs of several pentatomids and a few species of scutellerids (family of true bugs) other than *H. halys*.

Before laboratory risk assessment studies for *T. japonicus* in Europe were completed, self-introduced populations were detected by CABI in southern Switzerland.

A native European egg parasitoid, *Anastatus bifasciatus*, was also investigated for inundative biological control. Releases took place in Switzerland and Italy but showed the parasitoid did not suppress the pest.

www.cabi.org/brown-marmorated-stink-bug

Biological control of diamondback moth in Canada

Location: Canada

Dates: 01/04/2014 – Ongoing

CABI Project Manager: Tim Haye

Donors: Agriculture and Agri-Food Canada (AAFC)

Partners: Agriculture and Agri-Food Canada (AAFC)

Diamondback moth (*Plutella xylostella*) can be a significant pest of canola in Western Canada. However, parasitism in Canada is generally low. Therefore, the introduction of more than one exotic parasitoid from Europe to increase suppression of populations is likely.

Life table studies found net reproductive rates to be <1 in seven out of eight life tables, suggesting that *P. xylostella* populations in Switzerland are mostly driven by immigration and recolonization. Pupal parasitism by *D. collaris* reached up to 30%. In Canadian regions where *P. xylostella* has increasing populations and low larval mortality, *D. collaris* may be a promising approach.

In 2021, investigations into pupal parasitism by *D. collaris* and its habitats were carried out. Parasitism in canola was 35% and 48%, whereas in forests it was 0% and 4%. Repeated in harvested canola fields, parasitism was 28% and 66%, but in forests, parasitism increased to 26% and 38%, suggesting that parasitoids are more likely to find hosts in bordering habitats after harvest.

www.cabi.org/diamondback-moth

Biological control of flowering rush

Location: Canada, USA

Dates: 01/01/2013 – Ongoing

CABI Project Manager: Patrick Hafliger

Donors: Montana Department of Natural Resources and Conservation through the University of Montana, USA; British Columbia Ministry of Forests, Lands and Natural Resource Operations, Canada; Washington State Department of Natural Resources, USA; Washington State Department of Agriculture, USA; Washington State Department of Ecology, USA; US Forest Service through the University of Montana; Montana Noxious Weed Trust Fund through the University of Montana, USA; US Army Corps of Engineers

Partners: USDA-ARS Sidney, Montana; University of Montana, Missoula, USA; Washington State University, USA

CABI is searching for natural enemies to reduce its vigour and spread of the popular aquatic ornamental plant, the flowering rush, in North America.

Three biological agents have been identified with the semi-aquatic weevil, *Bagous nodulosus*, being the most promising. A rearing colony has been established at CABI's centre in Switzerland and host-range testing confirmed the weevil's narrow host range and no-choice larval establishment tests were carried out in 2018 and single-choice tests in 2021. CABI is now contributing to a petition for the field release of *B. nodulosus*, planned to be submitted early 2022.

We have established a rearing colony of the agromyzid fly, *Phytoliriomyza ornata*, and started host-specificity tests. Results look promising but no development was found, so far.

The third agent is a white smut fungus, *Doassansia niesslii*, which can infect submerged plants of flowering rush. The methodology of storage and application is being studied at CABI's UK centre; host-specificity testing has started.

www.cabi.org/flowering-rush

Biological control of garlic mustard

Location: Canada, USA

Dates: 01/01/1998 – Ongoing

CABI Project Manager: Ghislaine Cortat

CABI Project Team: Hariet Hinz

Donors: Minnesota Environmental and Natural Resources Trust Fund, USA; Minnesota Department of Natural Resources, USA; United States Department of Defense, Strategic Environmental Research Development Program (SERDP); US Forest Service; United States Department of Agriculture, Animal and Plant Health Inspection Service – Center for Plant Health Science and Technology (USDA-APHIS-CPHST); Wisconsin Department of Natural Resources, USA

Partners: Agriculture and Agri-Food Canada (AAFC); Colorado State University, USA; Cornell University, USA; Michigan State University, USA; Minnesota Department of Natural Resources, USA; University of Minnesota, USA; United States Department of Agriculture – Agricultural Research Service (USDA-ARS)

Crushed garlic mustard leaves and seeds have been used as flavouring in cooking for centuries but garlic mustard is a brassica from Eurasia that has become invasive in many of its forests. With partners, CABI is exploring the use of specially selected and tested insects from the native range to safely control the plant's spread and impact in the introduced range.

Testing, in collaboration with the University of Minnesota, into the seed-feeding weevil, *C. constrictus*, is nearing completion and we hope to submit a petition for release in 2022.

A root-crown weevil, *C. scrobicollis*, has also been tested and is being considered for release in the US. In Canada, the release permit was granted in June 2018. Since 2018, several have been made in Ontario. Monitoring of the release sites is ongoing but establishment could not so far be confirmed. Weevils are currently being reared in Switzerland and the University of Toronto for further releases.

www.cabi.org/garlic-mustard

Biological control of hawkweeds

Location: Canada, USA

Dates: 01/01/2000 – Ongoing

CABI Project Manager: Ghislaine Cortat

Donors: Agriculture and Agri-Food Canada (AAFC); British Columbia Ministry of Forests, Lands and Natural Resource Operations, Canada; Montana Noxious Weed Trust Fund through Montana State University, USA; United States Department of Agriculture, Animal and Plant Health Inspection Service – Center for Plant Health Science and Technology (USDA-APHIS-CPHST)

Partners: Agriculture and Agri-Food Canada (AAFC); Institute of Botany, Academy of Sciences of the Czech Republic; Montana State University, USA; University of Idaho, USA; USDA-ARS Northern Plains Agricultural Research Laboratory, Montana

European hawkweeds are invasive in North American pastures where they escape mowing and even profit from mechanical disturbance. Chemical control with broad-spectrum herbicides is not selective and is relatively expensive, and hawkweeds may recolonise pastures from untreated areas.

Insects that feed on hawkweeds in Europe have been studied as potential biological control agents for North America since 2000. The first agent, a gall wasp, *Aulacidea subterminalis*, was released in 2011 in Canada and the USA, followed by a root-feeding hoverfly, *C. urbana*, in 2017. Establishment has not been confirmed and due to COVID restrictions, shipments of *C. urbana* to Canada were put on hold. A shipment to the USA in 2021 was also postponed. We are also investigating another gall wasp, *Aulacidea pilosellae*, with host range tests continuing.

www.cabi.org/hawkweeds

Biological control of Himalayan balsam

Location: UK, India, Pakistan

Dates: 2006 – Ongoing

CABI Project Manager: Sonal Varia, Kate Pollard

CABI Project Team: Sonal Varia, Kate Pollard, Sarah Thomas, Suzy Wood, Anita Kopera, Marion Seier

Donors: Department for Environment, Food and Rural Affairs (Defra), Welsh government, UK water authorities, local action groups, local governments in the UK, BC Canada, BC Ministry of Forests and Range, Natural Environment Research Council (NERC), Scottish government, Environment Agency; Network Rail

Partners: National Bureau of Plant Genetic Resources (ICAR) India, University of Kashmir, Srinagar, India, University of Punjab, Pakistan, Plant Protection Institute, Centre for Agricultural Research, Hungarian Academy of Sciences, Royal Holloway University

Himalayan balsam has rapidly become one of the UK's most invasive weed species. This project involved identifying an insect or plant pathogen for UK release that exclusively attacked the weed. After assessment at CABI's UK quarantine facility, a rust fungus was approved by the UK and the EU Commission for release.

In 2015–2018, the fungus was released at 36 sites in England and Wales. However, field infection was lower than anticipated at a number of sites, partly the result of unfavourable environmental conditions and partly genetic resistance. A strain from Pakistan was tested and infected a different cohort of Himalayan balsam populations, but the presence of genotypes in the UK not susceptible to either strain requires additional ones to be identified. The aim is now to collect new strains to test against unsusceptible populations, while also continuing to release and establish the rust at susceptible sites.

www.cabi.org/himalayan-balsam

Biological control of lesser calamint

Location: New Zealand

Dates: 01/07/2018 – 29/02/2020

CABI Project Manager: Sonja Stutz

Donors: Manaaki Whenua – Landcare Research, New Zealand; Waikato Regional Council, New Zealand; Horizon's Regional Council (Manawatu-Wanganui region), New Zealand; Hawke's Bay Regional Council, New Zealand; Ministry for Primary Industries, New Zealand; Hawke's Bay Lesser Calamint Control Group, New Zealand

Partners: Biotechnology and Biological Control Agency (BBCA)

Lesser calamint is an aromatic perennial herb introduced to New Zealand from Europe. Currently present on the North Island, lesser calamint is affecting desirable pasture species and having negative economic impacts. CABI investigated natural enemies from lesser calamint's area of origin in Europe that could be introduced in New Zealand as biological control agents.

In 2018 and 2019, field surveys in six European countries were conducted. Plants were checked for exo- and endophagous herbivores, and fungal pathogens. Leaf samples were also collected for molecular analyses.

During surveys, a total of 32 insect species were found, one mite and one fungal pathogen on lesser calamint. Five of these species, the leaf beetle *Chrysolina suffriani*, the nepticulid moth *Trifurcula saturejae*, the cecidomyiid gall midge *Asphondylia nepetae*, the eriophyid mite *Anthocoptes* sp. and the rust *Puccinia menthae*, may have potential as biological control agents for lesser calamint in New Zealand.

www.cabi.org/lesser-calamint

Biological control of navua sedge

Location: Australia

Dates: 01/07/2019 – 30/06/2023

CABI Project Manager: Daisuke Kurose

CABI Project Team: Marion Seier

Donors: Department of Agriculture, Fisheries and Forestry (DAFF), Australia

Navua sedge (*Cyperus aromaticus* (Ridl.) Mattf. & Kük.), native to equatorial Africa, is an extremely aggressive perennial sedge impacting the Australian beef and dairy industries in Queensland's wet tropics; it is currently also spreading to southern Queensland. Current management options, based on mechanical and chemical methods, are expensive and offer only short-term control. Biological management would represent the best and most cost-effective long-term option for navua sedge in Australia.

Field surveys conducted in equatorial Africa identified a new smut fungus (*Cintractia kyllingae*) that attacks seeds in flower heads of the sedge. The aim of this project is to assess the potential of the smut fungus, *Cintractia* sp. nov., as a biological control agent. Teliospores and sporidia of Nigerian and Tanzanian smut strains have been shown to be effective against Australian navua sedge plants, with inoculation studies demonstrating that younger flower heads of navua sedge plants are more susceptible to the pathogen.

Image: navua sedge (Cyperus aromaticus) © Jim Space, Pacific Island Ecosystems at Risk (PIER), Bugwood.org

Biological control of Old Man's Beard

Location: UK, New Zealand

Dates: 01/01/2021 – 31/12/2022

CABI Project Manager: Sarah Thomas

CABI Project Team: Marion Seier, Norbert Maczey

Donors: Manaaki Whenua-Landcare Research

Clematis vitalba is a fast-growing vine that produces vast quantities of seeds and grows intensely as thickets over trees, shrubs and other vegetation, and is very difficult to control. Due to its rapid growth rate and ability to form large clumps, the plant can quickly outcompete native biodiversity which is why *Clematis vitalba* is classed as one of New Zealand's most invasive alien plants. Current control methods include mechanical removal and herbicides. In this project, CABI is investigating a potential biological control option of fungi from its native range to help control the weed.

A number of surveys have been carried out in the UK and Germany in 2021 and several fungal species were identified, including *Longididymella vitalbae*. Surveys will continue in 2022, possibly in France, Portugal and Spain where the climate is comparable to New Zealand. The most appropriate fungi will be selected and tested before further host range specificity testing is conducted.

Image: ©Josef Laimer/via Flickr - CC BY 2.0

Biological Control of *Opuntia Engelmannii* in Laikipia

Location: Kenya

Dates: 01/01/2017 – 01/12/2021

CABI Project Manager: Arne Witt

CABI Project Team: Winnie Nunda, Fernadis Makale

Donors: Oryx Ltd

Partners: Kenya Plant Health Inspectorate Service (KEPHIS); National Environment Management Authority (NEMA)

Physical and chemical control of invasive cactus species is costly and largely ineffective. Biological control offers the most cost-effective and sustainable solution to cactus invasions. To that end, CABI initiated a biocontrol programme against *Opuntia engelmannii* in Kenya using the natural enemy *Dactylopius opuntiae*. The objectives were to source several biotypes of a cochineal species (*Dactylopius* sp.) in Texas, USA; identify the most effective biotype; confirm host specificity; apply for permission to rear and release in Kenya; and mass rear, release and monitor establishment in Laikipia, Kenya.

Six *Dactylopius opuntiae* biotypes have been collected on various lineages of *O. engelmannii* in Texas, USA. CABI determined efficacy at the University of the Witwatersrand in South Africa, identified the most suitable biotype and reconfirmed host specificity. An application for importation and release has been submitted to the regulatory authorities in Kenya.

Biological control of oxeye daisy

Location: Australia, Canada, USA

Dates: 01/01/2008 – Ongoing

CABI Project Manager: Sonja Stutz

Donors: New South Wales Environmental Trust; Montana Noxious Weed Trust Fund through Montana State University, USA; Peace Region Forage Seed Association through the Alberta Invasive Species Council, Canada; Ministry of Forests, Lands, Natural Resource Operations and Rural Development, British Columbia, Canada

Partners: McClay Ecoscience, Alberta, Canada; New South Wales Department of Primary Industries, Australia; Agriculture and Agri-Food Canada (AAFC), Lethbridge Research and Development Centre

Oxeye daisy is an invasive weed in North America and Australia, while Shasta daisy remains a garden favourite. CABI is investigating whether specialist natural enemies could be introduced as biological control agents. In North America, any introduced agent must only damage oxeye daisy.

Many insects have not been specific enough but a root-mining tortricid moth, *D. aeratana*, proved to be very promising. In 2021, in collaboration with our partners in Canada and the US, we applied for permission to introduce it to North America. An application for release will also be prepared for Australia with our Australian collaborators.

Tests with a root-galling tephritid fly, *O. nebulosa*, were positive so work will continue. Tests with the weevil, *C. trisulcatus*, proved that it was not specific enough for North America but could be in Australia. Work on the shoot-mining torticid moth, *Dichrorampha consorana*, has since stopped due to limited funding and the ability to focus on other agents.

www.cabi.org/oxeye-daisy

Biological control of parrot's feather in North America

Location: Canada, USA

Dates: 2020 – Ongoing

CABI Project Manager: Philip Weyl

Donors: British Columbia Ministry of Forests, Lands, Natural Resource Operations, and Rural Development; Washington State Department of Ecology; Washington State Department of Agriculture

Partners: Agriculture and Agri-Food Canada

Parrot feather, *Myriophyllum aquaticum*, was first recorded in Canada in 1980 in British Columbia and has since been recorded in the Lower Mainland and in the USA. Parrot feather forms dense impenetrable mats which affect stream flow and result in reduced native species richness, water quality and habitat quality for fish and wildlife, and impacts human activities.

In 2020, CABI and partners initiated a project to evaluate the potential for biological control of parrot feather in British Columbia, specifically the Lower Mainland.

Two potential biological control agents, a leaf-feeding flea beetle (*Lysathia* sp.), and a stem-mining weevil (*Listronotus marginicollis*), native to Argentina, have been developed as agents for South Africa and Lysathia sp. released. Both agents are considered host specific and impactful in a South African context, although further research into both aspects in a Canadian context is required before releases are considered.

Based on this feasibility study, CABI proposed a three-year plan. The US is being added to the project in 2022.

Image: parrotfeather (Myriophyllum aquaticum) © Graves Lovell, Alabama Department of Conservation and Natural Resources, Bugwood.org

www.cabi.org/parrot-feather

Biological control of perennial pepperweed in the United States

Location: USA

Dates: 01/01/2004 – Ongoing

CABI Project Manager: Sonja Stutz

Donors: Bureau of Land Management (BLM), Idaho; USDA-APHIS-CPHST

Partners: Biotechnology and Biological Control Agency (BBCA), Rome, Italy; University of Idaho

Perennial pepperweed was accidentally introduced into North America with crop seed and is now an invasive due to the absence of natural enemies. CABI is seeking to identify biological control agents to help control the weed.

During testing, *M. lepidifolii* and *Ph. reitteri* proved insufficiently specific. *Melanobaris* sp. and *C. marginellus* were tested in more natural situations and reduced the number of non-target species attacked. Work with the *Melanobaris* species was suspended.

For *C. marginellus*, larvae developed to adults in about a third of test plants in laboratory tests. In outdoor experiments in Russia, the weevils were given a choice of test species attacked in laboratory tests plus perennial pepperweed - nearly a quarter of test species were attacked. At least one of these species was still attacked when growing at some distance from perennial pepperweed, and could act as an alternative host for *C. marginellus*. In 2021, work with this weevil will take place under quarantine conditions at CABI.

www.cabi.org/pepperweed

Biological control of strawberry blossom weevil in Canada

Location: Canada

Dates: 01/03/2021 – Ongoing

CABI Project Manager: Tim Haye

Donors: Agriculture and Agri-Food Canada

Partners: Agriculture and Agri-Food Canada

The Eurasian strawberry blossom weevil, *Anthonomus rubi* (Herbst) (Coleoptera: *Curculionidae*) was first detected in North America in Abbotsford, British Columbia.

It is recorded as a pest, damaging flowering buds of *Fragaria* spp. (strawberry), *Rubus* spp. (raspberry, blackberry, Himalayan blackberry, salmonberry, thimbleberry), and *Rosa* spp. (rose, wild rose).

Surveys of *A. rubi*, conducted in 2020, found the weevil to be well-established in cultivated and wild hosts throughout the Greater Vancouver area and Fraser Valley, British Columbia. Little is known about the identity, biology, or biological control impact of natural enemies attacking *A. rubi* in Eurasia or its newly invaded range of North America. Since *A. rubi* is widespread throughout Europe, during the 2021 field season, surveys were conducted in Switzerland and Northern Germany. 15,000 buds from various host plants were collected. From these samples 659 weevils and 323 parasitoids were reared. Surveys in Europe will continue in 2022.

Image: strawberry blossum weevil (Anthonomus rubi) © Mariusz Sobieski, Bugwood.org

Biological control of the Spotted wing Drosophila – *Drosophila suzukii*

Location: China, Switzerland

Dates: 01/06/2016 – 31/05/2022

CABI Project Manager: Marc Kenis, Lukas Seehausen

Donors: EU FP7 programme; Federal Office for the Environment (FOEN), Switzerland; Loterie Romande, Switzerland; Federal Office for Agriculture (FOAG), Switzerland

Partners: Agroscope, Switzerland; INRA, France; Yunnan Agricultural University, China; Canton of Ticino, Switzerland

Since 2008, the Asian spotted wing Drosophila (*Drosophila suzukii*) has invaded several continents, becoming a serious pest of various fruit crops. CABI is developing a classical biological control programme to identify a natural enemy that will not affect local biodiversity.

Surveys in Asia and research showed a figitid wasp in the genus *Ganaspis* as a potential agent and later confirmed that the parasitoid G1 *Ganaspis cf. brasiliensis* is safe and effective.

Host and habitat specificity of the parasitoid was tested against target and non-target species in fresh and decaying fruit, respectively. The parasitism of *D. suzukii* larvae feeding on fresh fruit averaged 13% and only 0.03% of parasitism of *D. melanogaster* on decaying fruit, confirming that G1 *Ganaspis cf. brasiliensis* is highly specific.

Experiments on the phenology and synchronization of the parasitoid with its target host and on the survival and overwintering are still in progress.

www.cabi.org/drosophila

Biological control of tree of heaven

Location: USA, Canada

Dates: 2020 – Ongoing

CABI Project Manager: Sonja Stutz

CABI Project Team: Philip Weyl, Hariet L. Hinz

Donors: British Columbia, Ministry of Forests, Lands, Natural Resource Operations and Rural Development

Partners: Biotechnology and Biological Control Agency (BBCA); University of Belgrade; Agriculture and Agri-Food Canada, Summerland Research and Development Centre; United States Department of Agriculture (USDA), Agricultural Research Service (ARS), European Biological Control Laboratory (USDAARS-EBCL), France

Tree of heaven (Toh), *Ailanthus altissima*, native to north-east and central China and Taiwan is an invasive and a regulated species in Canada. Control is difficult but biological control offers a sustainable option in the invaded range, including Canada.

A new potential biological control agent, the eriophyid mite (*Aculus mosoniensis*), was first recorded in Italy on Toh during 2016, then in several European countries in 2018. During 2019, first observations on its biology and open-field host-specificity tests were carried out by BBCA, Rome, Italy.

In 2020, this work continued but it was impacted by COVID-19. An open-field test was set-up during late July in Italy, from which we were able to inoculate five test plant species, plus the control. The results confirmed the narrow host range of the mite.

A test plant list, focusing on species of particular importance to Canada (but comprehensive for the potential distribution of Toh in North America) is being developed.

www.cabi.org/tree-of-heaven

BioProtection Portal

Location: Global. **Member Countries**: Australia, Bangladesh, Canada, Chile, Colombia, Gambia, Ghana, India, Kenya, Sri Lanka, Uganda, UK, USA

Dates: Ongoing

CABI Project Manager: Emma Jenner

CABI Project Team: Steve Edgington, Chrissy Sihdu

Donors: Swiss Agency for Development and Cooperation SDC; Foreign, Commonwealth & Development Office (FCDO); African Development Bank; Ministry of Foreign Affairs of the Netherlands; European Union

Partners: Nespresso; Applied Insect Science (APIS); Rainforest Alliance; Mondelez International; BioProtection Global; Biological Agri Solutions Association of India (BASAI); International Organisation for Biological Control (IOBC): International Biocontrol Manufacturers Association (IBMA); Bioagri Input Producers Association (bipa); Pesticides Manufacturers & Formulators Association of India (PMFAI); Koppert; Syngenta; E-nema; Oro Agri; IdaiNature; Biobest; Applied Bio-nomics; Terralink; BioNativa; Anatis Bioprotection; Crop Defenders; Biocare; Andermatt; Provivi

The CABI BioProtection Portal is a free, web-based tool that enables users to discover information about registered biocontrol and biopesticide products around the world. Available online, with an offline version coming soon, the CABI BioProtection Portal helps growers and agricultural advisors to identify, source and correctly apply biocontrol and biopesticide products against problematic pests in their crops. The portal can be accessed on multiple devices, thereby putting this valuable information at the fingertips of anyone who needs it. Currently available in 32 countries, with the USA being next to launch, further countries will be selected in collaboration with partners.

www.bioprotectionportal.com

Biosecurity manual for the Papua New Guinea coconut industry

Location: Papua New Guinea

Dates: 01/01/2021 – 30/04/2021

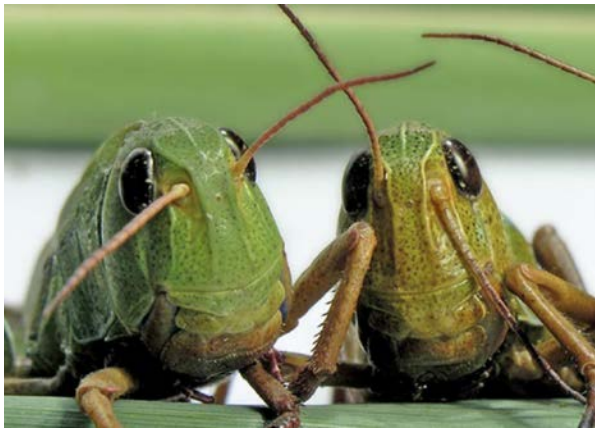
CABI Project Manager: Arnaud Costa

Donors: Kokonas Indastri Koperesen (KIK)

CABI in partnership with Kokonas Indastri Koporesen, drafted the first Biosecurity Plan (BP) in 2020 for the coconut industry in Papua New Guinea (PNG) with the main objective to secure and protect the future of the coconut industry against exotic pests and to maintain a sustainable level of productivity to meet the goals of the Coconut Industry Strategic Plan 2016-2025.

The "Biosecurity manual for the PNG Coconut Industry" is intended to give an overview of key features of the BP-PNG, highlighting the Pest Risk Analysis and summarizing future threats that could affect the PNG Coconut Industry. The manual includes examples of a contingency plan and mitigation measures, and intends to guide the reader through the BP. It also includes 20 factsheets of key pests and diseases that are identified as moderate and high-risk threats.

BioSpace: Using space-enabled remote sensing for long term sustainable growth of biopesticide use



Location: China

Dates: 13/02/2020 – 31/03/2022

CABI Project Manager: Elizabeth Finch

CABI Project Team: Belinda Luke

Donors: Newton Fund Science Technologies Facilities Council (STFC)

Partners: Assimila

Pests and diseases cause significant crop losses around the world. In China and Laos, locusts affect over two million hectares of agricultural land. Recently, the fall armyworm has become prevalent in China and Southeast Asia, and is already impacting maize in Laos. Due to a lack of detailed information on where the risks to crops are greatest and the use by farmers of ineffective control measures, managing pest damage can be difficult.

The project uses Earth observation and meteorological data to provide information to farmers and agricultural authorities to help them manage pest risk more sustainably. A two-day workshop on the BioSuccess app was held with over 35 employees of China's National Agriculture Technology Extension Service Centre and extension officers in Laos. Two sets of fieldwork in Hainan were carried out to validate the model for the oriental migratory locust.

www.cabi.org/biospace

BioSuccess: An app to help users to control insects with biopesticides

Location: UK, China

Dates: 01/03/2020 – 01/02/2021

CABI Project Manager: Belinda Luke

CABI Project Team: Hongmei Li, Steve Edgington, Emma Jenner

Donors: European Centre for Medium-Range Weather Forecasts (ECMWF); Copernicus Climate Change Service (C3S)

Partners: Assimila

BioSuccess is a decision support app designed to facilitate the efficient and effective application of microbial biopesticides for pest and disease control.

The app is designed to respond to the challenges faced by the suppliers and users of biopesticides. These include strategic questions identifying when and where the use of a biopesticide is likely to be effective, minimizing the amount of input required and reducing the reliance on the use of chemical pesticides; and also whether the application of a biopesticide will be effective in killing a sufficient proportion of a pest population within a given timeframe.

A demo app has been set up and feedback from various commercial and non-commercial institutes is being collected. The information gathered will help inform the decision on whether to commercialize this product.

Boosting early warning and response capacity in FAO sub-region for Eastern Africa

Location: Burundi, Ethiopia, Eritrea, Kenya, Rwanda, Somalia, South Sudan, Uganda

Dates: 16/11/2021 – 31/10/2022

CABI Project Manager: Lorna Migiro

CABI Project Team: Washington Otieno, Daniel Karanja, Rahab Njunge, Fredrick Mbugua

Donors: Food and Agriculture Organization of the United Nations, Subregional Office for Eastern Africa (FAOSFE)

Partners: Kenya Plant Health Inspectorate Service (KEPHIS)

The Eastern Africa sub-region has been ravaged in the past ten years by exotic plant pests that have cost communities billions in lost revenue and livelihoods.

Emergence of new pests and re-emergence of some recently introduced pests that have become endemic is a recurrent problem in Sub-Sahara Africa, causing significant crop damage and affecting food and nutrition security of millions.

As a follow-on project to 'working to intensify pest control in East Africa', this project will support FAOSFE member states to reach a conclusion on approaches to dealing with early warning and response to priority pests. The dialogue will capture perspectives of extension, research, public and private sector organizations – all vital actors in pest surveillance, detection and management – as a first step in developing a proposition, then escalated to policymakers, donors and development cooperation agencies.

Boosting vegetable production with promising technologies

Location: Malaysia

Dates: 09/07/2019 – 11/07/2019

CABI Project Manager: Sathis Sri Thanarajoo

Partners: Malaysia Agricultural Research and Development Institute (MARDI); Vegetable Science International Network (VEGINET)

The advancements in vegetable production technologies play an important role towards sustaining and securing our vegetable sources. Adopting the theme 'Advancing Vegetable Technology for Higher Productivity and Better Human Health', CABI co-organized the Southeast Asia Vegetable Symposium 2019 (SEAVEG 2019) to highlight new promising technologies and approaches to produce high quality vegetables. These included advanced vegetable technologies such as sensor devices, machinery, precision agriculture and smart farming that are currently being adopted to enhance vegetable production.

Building the policy ecosystem for organic production in Balochistan, Pakistan

Location: Pakistan

Dates: 02/08/2021 – 31/07/2024

CABI Project Manager: Habat Ullah Asad

Donors: Laudes Foundation

Partners: Ministry of National Food Security & Research (MNFSR); Directorate General Agriculture Extension, Balochistan; Pakistan Agricultural Research Council (PARC); Agriculture Policy Institute, Islamabad (API); Directorate General Agriculture Research, Balochistan; Nuclear Institute for Agriculture and Biology (NIAB); National Institute for Biotechnology and Genetic Engineering (NIBGE); Central Cotton Research Institute (CCRI), Multan; Lead farmers and farmer organizations

Sectoral approaches to land management (increasing production, for instance) are no longer viable to meet global challenges such as poverty alleviation, biodiversity conservation and food production due to mounting pressures from population increases and climate change. Organic production, however, is a more profitable, sustainable and environmentally-friendly approach to agriculture that alleviates problems.

This project focuses on integrated landscape approaches and will use CABI's strong in-country partnerships to integrate agricultural policy change, strengthen market linkages and ultimately enable business model change for organic produce production in the Balochistan province of Pakistan.

www.cabi.org/policy-ecosystem-pakistan

CAB Abstracts and Global Health for Member Countries

Location: Global

Dates: Ongoing

CABI Project Manager: Rene Schoelzel

Member Countries have free or discounted access to CABI's flagship knowledge products including the world-renowned CAB Abstracts and Global Health databases. The most comprehensive bibliographic database of its kind, CAB Abstracts helps governments and institutions around the world access up-to-date academic and technical knowledge and innovative, cutting-edge research to enable better evidence-based decision and policy making by providing over 10 million bibliographic records, full-text articles, news items and reports across the applied life sciences in one convenient platform. With over four million records in public health, Global Health helps thousands of professionals in government institutions around the world access a wealth of knowledge in public health, helping them to understand the current situation and make critical decisions – an essential tool in a world facing the COVID-19 pandemic.

As part of CABI Member Country benefits, every Member Country, with contributions at bands 1-4, is eligible for one free access; Member Countries at bands 5-10 can nominate one mutually agreed institution in one of their priority developing countries for free access. To date, 25 Member Countries are benefiting from this free access.

www.cabi.org/products-and-services

CABI Agriculture and Bioscience Journal

Location: Global

Dates: Ongoing

CABI Project Manager: Rene Schoelzel

Partners: BioMed Central (BMC)

CABI Agriculture and Bioscience (or CABI A&B) is an open access journal which publishes high quality, rigorously peer-reviewed interdisciplinary research focused on global agriculture, food security, forestry, environmental and social sciences.

CABI A&B encourages inter- and cross-disciplinary research that addresses the core focus areas, such as genomics; big data; climate change; evidence-based agriculture; technology; sustainability, restoration and conservation; agro-ecology; food security and nutrition; and modelling.

This journal is managed by BioMed Central (BMC) in collaboration with CABI.

www.cabi.org/journal

CABI Author services

Location: Global. **Member Countries**: Ethiopia, Uganda, Vietnam

Dates: Ongoing

CABI Project Manager: Philippa Benson

CABI Project Team: David Hemming

CABI has launched CABI Author Services, a new author education and editorial services programme created to build capacity for researchers in agriculture and bioscience worldwide.

Author Services is aimed at supporting non-English speaking or non-English as their first language. It offers support for editorial and translations to improve the written English of a manuscript prior to submitting for review.

These services include English editing, translation, research promotion, and a range of educational resources available through CABI's Author Services portal and from the preprint server agriRxiv.

As part of this programme, CABI has offered our Member Countries a limited number of vouchers to support the cost of researchers having their manuscripts fully and professionally edited. A number of Member Countries have taken, or are going to take, advantage of this offer.

www.cabi.org/author_services

CABI Compendia for Member Countries

Location: Global

Dates: Ongoing

CABI Project Manager: Rene Schoelzel and Gareth Richards

Comprehensive, encyclopedic resources across animal health and production, aquaculture, crop protection, forestry and horticulture. CABI Compendia are encyclopedic, mixed-media tools created in partnership with key organizations in each field, expertly produced, and packed with scientific information, images, maps and diagnostic and decision support tools.

Member Countries in bands 1-4 can nominate one mutually agreed institution or government agency for free access; Member Countries in bands 5-10 can nominate one mutually agreed institution in one of their priority developing countries for free access.

www.cabi.org/products-and-services

CABI compliance with the Nagoya Protocol on Access and Benefit Sharing (ABS)

Location: Global

Dates: 01//01/2015 – Ongoing

CABI Project Manager: David Smith

CABI Project Team: Advised by CABI Centre ABS Champions: Joseph Mulema (Kenya), Victor Clottey (Ghana), Noah Phiri (Zambia), Yelitza Colmenarez (Brazil), Feng Zhang (China), Gopi Ramasamy (India), Sivapragasam (Malaysia), Babar Bajwa (Pakistan),Hariet Heinz (Switzerland), Phil Weyl (Switzerland), Naitram Ramnanan (Trinidad & Tobago), Richard Shaw (UK); and Matthew Ryan (UK)

Donors: CABI Development Fund (CDF)

Partners: On behalf of Member Countries

In October 2014, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits arising from their utilisation came into force. Each signatory country is implementing its own controls to comply with the requirements. CABI is required to align its practices in the use and conservation of genetic resources to ensure that it follows the Protocol both locally and globally.

To facilitate this, the project developed policy and best practices to ensure that all organisms sourced comply with the Protocol and that all planned projects adhere to provider country requirements for access and benefit sharing. A prime objective was to raise staff awareness and help them in the process of securing the permissions needed. Actions included putting in place project mechanisms to assess compliance, and developing strong working relationships with national authorities, particularly in the UK.

CABI delivers postgraduate training courses

Location: Global

Dates: Ongoing

CABI Project Manager: Dirk Babendreier, Stefan Toepfer

Donors: Graduate School of Chinese Academy of Agricultural Sciences (CAAS); Ministry of Agriculture and Rural Affairs, China; CABI Development Fund

Partners: The Institute Plant Protection (IPP) – Chinese Academy of Agricultural Sciences (CAAS); Graduate School of CAAS

The Institute of Plant Protection at the Chinese Academy of Agricultural Sciences (IPP-CAAS) and the Graduate School of CAAS brought CABI on-board to provide courses on experimental design and statistics, and Integrated Pest Management (IPM). The 3-day course introduces postgraduate students and junior scientists to the basics in statistical data analysis to improve their capacity to design their own research. The 5-day course in IPM updates knowledge and skills to keep harmful vertebrates, invertebrates, diseases and weeds below economic damage levels.

Up to 2019, six courses were held (three on experimental design and statistics and three on IPM) that trained nearly 200 postgraduate students and young researchers. Due to the pandemic, face-to-face courses were put on hold, however, it is hoped they may move online.

CABI Development Fund

Location: Global

Dates: Ongoing

CABI Project Manager: Ulrich Kuhlmann

Donors: Australia Centre for International Agricultural Research (ACIAR); Ministry of Agriculture and Rural Affairs, China (MARA); Directorate-General for International Cooperation (DGIS); Foreign, Commonwealth & Development Office (FCDO)

To achieve CABI's objectives and contribute to our goals, the CABI Development Fund (CDF) funds support our research, development projects and interactions which respond directly our Member Countries' needs. We work closely with the CABI Liaison Officers in each Member Country to set mutual priorities for action, including CDF-funded work (eg in response to unforeseen pest problems).

The CDF is treated as a single entity supported by contributing donor organizations. The projects selected for CDF support must contribute both to pursuing CABI's mission and to the goals of the fund's supporters. In many cases, CDF resources co-finance larger projects, helping to achieve more than through CDF alone. In 2020, CDF funding focused on CABI's major programmes, thematic objectives, and collaboration with Member Countries and partner organizations, contributing to CABI's Medium Term Strategy. 2021 saw similar focuses and an increased allocation to support Member Country engagement and activities. In 2021, 18 activities with Member Countries were supported, ranging from global and regional workshops to national and local projects.

CABI Digital Library

Location: Global

Dates: Ongoing

CABI Project Manager: Lieke Boerefijn-van Schaaijk

CABI Project Team: A team of over 70 helped to develop and launch the platform

CABI Digital Library, launched July 2022, is an exciting new platform which offers students, researchers and practitioners a single place of knowledge and science discovery to support study, research and practice.

Currently, researchers are able to access journals, CABI books, case study databases, search and preprint repositories and distribution maps.

Coming soon: CABI databases including CAB Abstracts and Global Health, Knowledge and data tools such as CABI Compendium and Plantwise Knowledge Bank and Collections.

As CABI content migrates to the platform, some exciting new products will be added along the way such as One Health Knowledge Bank and CABI Compendium.

CABI Digital Library will see continuous enhancements to support research, making it the key platform for unified discoverability.

www.cabidigitallibrary.org

CABI Microbial Identification Service for CABI Member Countries (B1-4)

Location: Global. **Member Countries benefited**: Bahamas, Bangladesh, Barbados, Botswana, Brunei Darussalam, Burundi, Chile, China, Colombia, Cote d'Ivoire, Gambia, Ghana, Grenada, Guyana, India, Jamaica, Kenya, Malawi, Malaysia, Mauritius, Montserrat, Myanmar, The Netherlands, Nigeria, Pakistan, Papua New Guinea, Philippines, Rwanda, South Africa, Sri Lanka, Tanzania, Trinidad and Tobago, Uganda, UK, Vietnam, Zambia, Zimbabwe

Dates: Ongoing

CABI Project Manager: Mike Reeve, Alan Buddie, Thelma Caine

Donors: CABI

CABI's in-house expertise includes various full microbial investigations, identification, detection and testing services for all types of fungal and bacterial contamination problems that might be causing disease to agricultural crops. These services are supported by CABI's collection of over 30,000 living strains from 142 countries, one of the world's largest genetic resource collections.

Since 2009, CABI has offered its Member Countries (in bands 1 to 4) a (sample-limited) free microbial identification service and 20% discount of an additional 20 samples, which provides specifically for identification of bacteria and fungi of agricultural/horticultural importance or origin relating to food security or plant health, including quarantine organisms. Member Countries in bands 5-10 are offered the service at a 20% discount.

In general, CABI Bioscience carries out, in the region of, 60 Member Country identifications per year, though we would like to encourage increased uptake of this service in the future.

www.cabi.org/membership

CABI One Health

Location: Global

Dates: 2022 – Ongoing

CABI Project Manager: Andy Robinson

CABI is pleased to launch a new collection of One Health resources, edited by Jakob Zinsstag and Lisa Crump, from the Swiss Tropical and Public Health Institute, Switzerland. Stressing the relationship between humans, animals, plants, ecosystems and their shared environment in a transdisciplinary way, they will support research and its practical application in this important area. The resources will comprise research articles, cases, chapters and more, promoting the sharing of practical experiences, and providing support for education and training.

CABI One Health is a transdisciplinary open access journal focusing on the interconnections between humans, animals, plants, ecosystems, and their shared environment.

One Health Cases is a growing collection of online educational case studies providing real-life examples of One Health in action, designed for students, teachers and practitioners.

One Health Knowledge Bank contains journal articles, cases, book chapters, curated species datasheets, and an extensive collection of hard-to-find grey literature in a single searchable database.

www.cabi.org/ohresources

CABI Online Resources for Member Countries

Location: Global

Dates: Ongoing

CABI Project Manager: Rene Schoelzel

CABI's online bibliographic databases contain over 13.8 million bibliographic records, full-text articles, news items and reports across the applied life sciences.

In addition to CABI's world-renowned CABI Abstracts and Global Health, the online catalogue includes AgBioTechNet, Animal Science, Environmental Impact, Forest Science, Horticultural Science, Leisure Tourism, Nutrition and Food Science and VetMed Resource. Each providing complete online, up-to-date reference material for researchers, professionals and practitioners.

Member Countries in bands 1-4 can nominate one mutually agreed institution or government agency for free access; Member Countries in bands 5-10 can nominate one mutually agreed institution in one of their priority developing countries for free access.

www.cabi.org/products-and-services

CABI open access products

Location: Global

Dates: Ongoing

CABI Project Manager: Rene Schoelzel

Our CABI Open Access programme makes key tools and research freely available in order to contribute to our mission of solving problems in agriculture and the environment.

CABI believes that a crucial way to solve problems in agriculture and the environment is by creating, managing, curating and disseminating information. Through our experience in scientific research, publishing, knowledge management and communications, we put know-how into the hands of the people who need it most.

CABI Open Access products include: Invasive Species Compendium, Open access books, agriRxiv, searchRxiv, CABI Agriculture and Bioscience Journal, Fall Armyworm Collaboration Portal, Plantwise Knowledge Bank, BioProtection Portal and the Horizon Scanning Tool.

CABI Member Countries have access to each of these.

www.cabi.org/open-access

CABI programmes showcased at International Conference on Plant Protection in Horticulture

Location: India

Dates: 01/08/2019

CABI Project Manager: Malvika Chaudhary

Partners: International Conference on Plant Protection in Horticulture (ICPPH)

Two CABI-run programmes, Plantwise and Action on Invasives, showcased their expertise in plant protection and improving rural livelihoods to a global audience of agriculture experts and scientists at the International Conference on Plant Protection in Horticulture held at ICAR-Indian Institute of Horticultural Research, Bengaluru.

Speakers included Dr Claire Beverley, who delivered a speech outlining CABI's broad range of work, and Dr Malvika Chaudhary, Regional Coordinator for Plantwise Asia, who presented on Plantwise in Asia. Dr Manju Thakur, Plantwise Knowledge Bank Coordinator for South Asia, then shared with delegates CABI's knowledge tools – Horizon Scanning Tool and Pest Risk Analysis (PRA) Tool.

Building capacity in Asia is a key part of the work CABI delivers through these two programmes, and having the opportunity to engage at events such as this offers a valuable insight into their work.

CABI shares expertise on how to tackle citrus greening disease in the Caribbean

Location: Anguilla, Bahamas, Barbados, British Virgin Islands, Grenada, Guyana, Jamaica, Trinidad and Tobago

Dates: 01/01/2020 – 31/12/2020

CABI Project Manager: Yelitza Colmenarez, Naitram (Bob) Ramnanan

Donors: CABI Development Fund (CDF)

Citrus plays a significant role in the Brazilian economy, accounting for over 200,000 jobs and is the seventh most important farm produce to be exported. However, once a tree bearing fruit is infected by citrus greening disease, the whole tree declines, resulting in death.

CABI scientists from Brazil, Costa Rica and Trinidad have teamed up with experts from Fundecitrus and the University of São Paulo-Luiz de Queiroz College of Agriculture (ESALQ) to share their expertise on the debilitating citrus greening disease which threatens the success of citrus production – including oranges, grapefruit, lemons and limes – in the Caribbean.

Dr Yelitza Colmenarez and Naitram Ramnanan took part in a series of webinars aimed at strengthening the capacity for the region to manage the citrus greening disease which is caused by a bacterium vectored by the citrus psyllid.

CABI shares expertise on strengthening and diversifying food systems at all-Africa vegetable summit

Location: Global

Dates: February 2021

CABI Project Manager: Daniel Karanja

CABI Project Team: Morris Akiri, Monica Kansiime

Donors: US Agency for International Development (USAID)

Scientists from CABI's Africa Centre, with expertise in strengthening and diversifying food systems, shared their knowledge and research at the Power on Your Plate: All-Africa Summit on Diversifying Food Systems with African Traditional Vegetables to Increase Health, Nutrition and Wealth.

Across six sessions, 75 scientific presentations addressed issues related to diversity, breeding and seed systems, value chains and scaling, agronomy and production systems, food environments, nutrition and health, and other uses of valuable crops beyond food. As part of this, Dr Kansiime updated the summit on the positive impacts of the Good Seed Initiative – a CABI project implemented in Tanzania and Uganda. Dr Akiri took part in a high-level panel, Advancing the Continental Agenda on Traditional African Vegetables, with senior government officials, business partners from the public and private sectors, bankers, and leaders of non-governmental organizations.

CABI works with AIRCA to support UN Food Systems Summit

Location: Global

Dates: 2020 – Ongoing

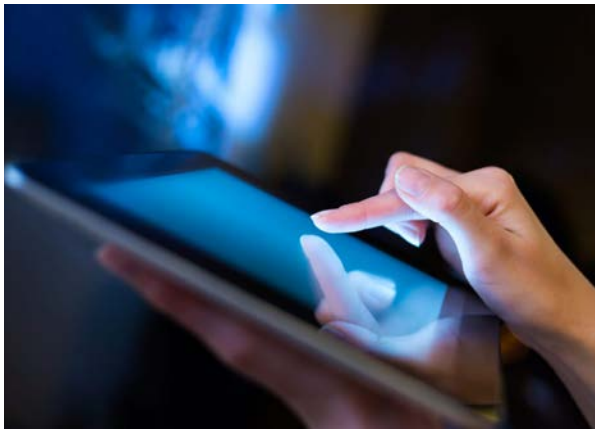
Partners: Association of International Research and Development Centers for Agriculture (AIRCA)

CABI is a member of the Association of International Research and Development Centers for Agriculture (AIRCA), an international alliance focused on increasing food security by supporting smallholder agriculture within healthy, sustainable, climate-smart landscapes.

In December 2020, AIRCA agreed to contribute position papers to the United Nations Food Systems Summit, which was held in September 2021 as part of the Decade of Action to achieve the Sustainable Development Goals by 2030. Each of the Goals relies to some extent on healthier, more sustainable and more equitable food systems.

Association staff and partners prepared four papers (for example, on the use of external nutrients in building soil health and raising productivity); these have since been published online. AIRCA colleagues also actively participated in the working groups for the Summit's five Action Tracks.

CABI's eBook programme for Member Countries



Location: Global

Dates: Ongoing

CABI Project Manager: Rene Schoelzel

CABI's eBook programme, offering over 900 titles, covers agriculture, international development, animal and veterinary sciences, environmental sciences, plant sciences, horticulture, forestry, human health and nutrition, leisure and tourism.

Member Countries in bands 1-4 can nominate one mutually agreed institution or government agency for free access; Member Countries in bands 5-10 can nominate one mutually agreed institution in one of their priority developing countries for free access.

www.cabi.org/ebooks

Capacity building of small-scale potato growers in Punjab, Pakistan

Location: Pakistan, The Netherlands

Dates: 01/01/2021 – 31/05/2023

CABI Project Manager: Umair Safdar

Donors: Netherlands Enterprise Agency (RVO)

Partners: Agriculture Extension Department, Punjab; University of Agriculture Faisalabad; Pakistan Agriculture and Research Council; Wageningen University & Research

Potato is an important crop in Pakistan for both consumers and producers. It has potential to increase yields by using good potato cultivation practices, but a lack of knowledge concerning these is inhibiting many smallholder farmers in their effort to raise productivity. Furthermore, unsuitable management of threats, such as pests and diseases, increases losses. CABI aims to mitigate challenges faced in the smallholder potato sector by building the capacity of small-scale growers, women in particular, in good agricultural practices, including the sustainable and safe use of pesticides.

www.cabi.org/potato-pakistan

Characterizing fall armyworm populations in Malaysia and Australia

Location: Australia, Malaysia

Dates: 31/05/2020 – Ongoing

CABI Project Manager: Muhammad Faheem

Donors: Commonwealth Scientific and Industrial Research Organisation (CSIRO)

Partners: Malaysia Agricultural Research and Development Institute (MARDI)

Fall armyworm (FAW) has been detected across southeast Asia, but in January 2020, individual specimens were recorded in the Torres Strait islands of Saibai and Erub, followed by detection on mainland Australia. FAW populations can develop resistance to commonly used insecticides and in the Americas, resistance to both conventional insecticides have been reported. For the Australian cotton and corn industry, the unknown resistance status of FAW represents a significant threat to current Integrated Pest Management practices and the sustainability of the transgene technology.

The objective of this project is to characterize the populations of FAW in crop production systems of South-East Asia and Northern Australia as the first step towards developing long-term management options. There is a focus on two key areas. Firstly, understanding which FAW management options that are currently being used successfully in other parts of the world may apply to South-East Asia farming systems. Secondly, characterizing the FAW populations in different regions of Australia and South-East Asia.

Classical biological control of Japanese Beetle

Location: Switzerland, Canada

Dates: 01/06/2021 – 31/04/2025

CABI Project Manager: Lukas Seehausen

Donors: Swiss Federal Office for Agriculture (FOAG)

Partners: Dipartimento delle finanze e dell'economia, Servizio fitosanitario cantonale, Sezione; University of Montréal, Canada

The Japanese beetle, *Popillia japonica*, native to East Asia, was accidentally introduced into Switzerland (Ticino) in 2017. Classical biological control could provide an area wide, long-term solution, preventing crop losses and reducing insecticide use. The most promising agent is the tachinid fly *Istocheta aldrichi*, native to Japan.

The project will assess the potential of *I. aldrichi* as a classical biological control agent, focusing on its host specificity and the climatic suitability of Switzerland for establishment. The potential presence of native parasitoids of *P. japonica* will be also studied.

Fly puparia will be imported from Canada to establish laboratory rearing in CABI's quarantine facility. Adults of non-target species will be collected in Ticino for exposure to females of *I. aldrichi* in no-choice tests to determine potential host range. Pheromone traps will assess the phenology of *P. japonica*. The phenology of the fly and beetle will also be monitored in Canada.

Image: Japanese beetle (Popillia japonica) © Jerry A. Payne, USDA Agricultural Research Service, Bugwood.org

Collating and publishing data on 14 of the worst plant pathogens in the world

Location: USA

Dates: 01/09/2021 – 31/08/2022

CABI Project Manager: Gareth Richards

CABI Project Team: Lesley Mcgillivray, Alice Campain, Sarah Reed

Donors: United States Department of Agriculture – Animal and Plant Health Inspection Service (USDA-APHIS)

Partners: United States Department of Agriculture – Agricultural Research Service (USDA-ARS)

The aim of the project is to collate and make available knowledge on species of invasive plant pathogens of the highest priority to the USA (as identified by the Federal Interagency Committee for Terrestrial Animal and Plant Pathogens).

The project activity involves commissioning and editing datasheets, and then managing their peer review and publication, on 14 plant pathogens from a list of 35 species that are a threat to US agriculture. This work follows on from previous projects. The work on the first two groups of plant pathogens was completed in 2020.

Collating and publishing data on 30 of the worst insect plant pests in the world

Location: USA

Dates: 01/09/2021 – 31/08/2022

CABI Project Manager: Gareth Richards

CABI Project Team: Lesley Mcgillivray, Alice Campain, Sarah Reed

Donors: United States Department of Agriculture – Animal and Plant Health Inspection Service (USDA-APHIS)

Partners: United States Department of Agriculture – Agricultural Research Service (USDA-ARS)

The aim of the project is to collate and make available knowledge of species of invasive insect plant pests of the highest priority to the USA (as identified by the Plant Pathogens Subcommittee of the Federal Interagency Committee for Terrestrial Animal and Plant Pathogens).

The project activity involves commissioning and editing datasheets, and then managing their peer review and publication, on 30 insect plant pests from a list of 165 species that are a threat to US agriculture. This list incorporates invasive insect species: (i) recommended by the Subcommittee members; (ii) found in the 2020 US Geological Survey database of US invasive species by region; and (iii) in the Animal and Plant Health Inspection Service 2021 priority list of invasive species. This work follows on from previous projects. The work on the first two groups of plant pathogens was completed in 2020.

Collecting and editing data on Caribbean invasive plants

Location: Caribbean

Dates: 01/01/2014 – Ongoing

CABI Project Manager: Gareth Richards

CABI Project Team: Anna Page, Alice Campain, Uma Sabapathy Allen, Sarah Reed, Lesley Mcgillivray

Donors: United States Department of Agriculture – Animal and Plant Health Inspection Service (USDA-APHIS)

Partners: Smithsonian Institution; Effective Environmental Restoration Inc., Puerto Rico; Julissa Rojas Sandoval (consultant, Costa Rica)

The Caribbean islands are a biodiversity hotspot, with over 650 critically endangered or endangered species. Collating and disseminating knowledge of them is necessary to stop them being a driving force of species extinction and to avoid other serious socio-economic impacts. Building on the seminal work Catalogue of Seed Plants of the West Indies and analysis of over 14,300 georeferenced accessions in the Smithsonian's herbarium, data is being collected on over 700 invasive plant species, prioritized from 1,879 plants identified as non-native to the region.

Expert authors compile datasheets on each species, and these are peer reviewed and published in the open access Invasive Species Compendium. Over 600 datasheets have been written and peer reviewed so far, and the majority published. Particular focus is being given to risk assessment, the management of pathways, public awareness, policy development, identification, detection and options for control.

Commercial Agriculture for Smallholders and Agribusiness (CASA)

Location: Global focus on Africa and South Asia: Malawi, Nepal, Uganda

Dates: 09/03/2019 – 08/03/2024

CABI Project Manager: Alvaro Valverde (CABI)

CABI Project Team: Alvaro Valverde, Mat Hague, Duncan Sones, Alice Chapple, Toby Penrhys-Evans, Jonathan Casey, William Holland

Donors: Foreign, Commonwealth and Development Office (FCDO)

Partners: NIRAS; Swisscontact; Technoserve

CASA is a FCDO-funded programme that makes the commercial and development case for driving global investment in climate-resilient agri-food systems and increased smallholder incomes.

The programme tackles the information and evidence gaps holding back investment. CASA has produced over 30 reports and produced summaries and links to over 300 other pieces of research that can support investment decisions. The CASA Agricultural Investment Database (AID) is being developed as a comprehensive free database of agricultural investments worldwide. CASA's innovative communication products are supporting agricultural investors response to the climate emergency including the CASA 4x4 series.

The CASA Technical Assistance Facility helps investors achieve increased returns on investment in climate smart agriculture. CASA Nepal and CASA Malawi are working to build evidence of how to help investors to increase the impact of their investments and empower producers,

CASA's work is made possible through partnerships and collaborations with investors, innovators, policymakers and others.

www.cabi.org/casa-programme

Conservation and sustainable utilization of the underutilized taro

Location: Fiji, Indonesia, Malaysia, Phillippines

Dates: 01/03/2020 – 31/10/2022

CABI Project Manager: Muhammad Faheem

CABI Project Team: Chan Fook Wing

Donors: Malaysia Agriculture Research and Development Institute (MARDI); International Treaty on Plant Genetic Resources for Food and Agriculture; Food and Agriculture Organization (FAO)

Partners: University of the Philippines Los Banos; Bogor Agricultural University, Indonesia; Ministry of Primary Industries, Fiji

This project will focus on strengthening and sustaining on-farm and community level conservation, utilization and management of taro genetic resources across Southeast Asia and South Pacific regions. Marginalized communities will be targeted, as well as woman for on-farm activities.

The CABI team will collect reports and valuable information in workshops and trainings during the project implementation phase, including scientific manuscripts and publication papers from research works. They will then analyse consumer acceptance and develop market linkages of taro products which will be shared amongst the stakeholders to strengthen the taro industry.

Strategy guidelines will be developed to harmonize the collaboration within the project country's members, leading to co-funding and Treaty implementation at national and international level.

At the end of the project phase, a strong network and collaboration within the project country's members will be established, and expand to create a consortium of taro stakeholders in South East Asia and the Pacific.

Consultancy on behalf of Member Countries

Location: Global

Dates: 2020 – Ongoing

CABI Project Manager: Qiaoqiao Zhang

Donors: CABI Development Fund (CDF)

CABI Member Countries enjoy a number of privileges, benefits and services relating to our scientific expertise, products and resources. Among membership benefits is CABI's offer of free consultancy days for policy and programme support. The original offer of up to three consultancy days has now been increased to up to five days in the revised benefits package launched on 4th March 2021. In response to the requests for CABI's consultancies, financial incentives are required for business units to fulfil such obligations and objectives. In 2020, the CABI Development Fund enabled CABI to respond to requests from several Member Countries and regions for advice, technical backstopping, project development and capacity building. In 2021, such consultancy services are being offered to three Member Countries in response to their requests.

www.cabi.org/membership

Control of fall armyworm in Eastern Africa

Location: Burundi, Ethiopia, Kenya, Rwanda, Tanzania, Uganda

Dates: 07/02/2018 – 30/06/2019

CABI Project Manager: Daniel Karanja

Donors: United States Agency for International Development (USAID)

Partners: National level, Ministries of Agriculture of implementing countries of Burundi, Ethiopia, Kenya, Rwanda, Tanzania and Uganda; Desert Locust Control Organization for Eastern Africa (DLCO-EA); International Centre of Insect Physiology and Ecology (ICIPE; FAO Sub-regional Office for Eastern Africa (FAOSFE); Food and Agriculture Organization of the United Nations (FAO) in Rome

In Africa, the fall armyworm is estimated to cause 8–20 million tonnes of maize losses each year. Due to poor knowledge of the pest, the impacts can be catastrophic. CABI developed an emergency response strategy that empowered the local communities of six target countries to manage outbreaks, helping to prevent further spread.

The project enhanced fall armyworm early warning system capacities across the communities. These were empowered to monitor infestation levels, and take effective action to minimize crop losses. A training manual was published and an additional set of fall armyworm communication materials were developed for capacity building.

Farmer networks were strengthened with field days and community meetings, reaching over 10,000 farmers. Over 600 community focal persons and 2,000 farmers were trained using the manual and communication materials. Over 2,640 pheromone traps, 15,840 lures and 9,000 kill strips have boosted community-based fall armyworm monitoring and reporting.

www.cabi.org/fall-armyworm-east-africa

Controlling floating pennywort in a safe and sustainable way

Location: UK

Dates: 01/04/2011 – 31/12/2022

CABI Project Manager: Djami Djeddour

CABI Project Team: Corin Pratt, Suzy Wood, Anita Kopera, Anna Tilling, Tasmin Alexander

Donors: Department for Environment, Food and Rural Affairs (DEFRA); Affinity Water; Colne Valley Fisheries Consultative; Environment Agency; Natural England

Partners: Fundación para el Estudio de Especies Invasivas (FuEDEI)

Floating pennywort (*Hydrocotyle ranunculoides*) has spread rapidly across the UK and Europe. Its adverse effects are severe: it overruns waterbodies, alters the availability of oxygen in the water, threatens fish and invertebrates, chokes drainage systems and crowds out native water plants. Mechanical and manual removal is expensive and often ineffective. The project aims to identify the safest and most effective biocontrol agent, collaborating with Argentinian and Brazilian institutes to survey potential insects and pathogens in the weed's native range in South America.

A damaging weevil, *Listronotus elongatus*, was prioritized for study. Having obtained authorization to export it to the UK, CABI conducted specificity testing against a selected list of non-target species. A Pest Risk Assessment of the weevil was submitted to the UK and approved for release into the environment in 2022 following a coordinated release strategy.

www.cabi.org/floating-pennywort

Controlling hoary cress in the North America

Location: Canada, USA

Dates: 01/01/2001 – Ongoing

CABI Project Manager: Philip Weyl

CABI Project Team: Hariet Hinz

Donors: Wyoming Biological Control Steering Committee, USA; Montana Noxious Weed Trust Fund through Montana State University, USA; South Dakota Department of Agriculture, USA; United States Department of the Interior Bureau of Land Management (USDI BLM), USA; British Columbia Ministry of Forests, Lands and Natural Resource Operations, Canada

Partners: University of Idaho, USA; USDA-ARS Northern Plains Agricultural Research Laboratory, Montana; USDA-ARS European Biological Control Laboratory, Montpellier, France; Biotechnology and Biological Control Agency (BBCA), Rome, Italy; Institute of Biological Research, Iasi, Romania; Zoological Institute, Russian Academy of Sciences, St Petersburg, Russia

Whitetops, or hoary cresses, arrived in North America as contaminants of seed from Eurasia. They are now aggressive invaders of crops, rangeland and riverbanks. CABI is looking into biological control prospects of these invasive plants.

Two weevils are the focus. Based on test results, a petition for field release of the gall-forming weevil, *Ceutorhynchus cardariae*, was submitted in January 2020. While the weevil was not recommended for release, additional information to clarify and expand existing data and arguments will be provided.

The seed feeder, *C. turbatus*, is the most specific agent. Under no-choice conditions, larvae only developed on a single native North American species, *Lepidium huberi*, and two other European non-target species (*L. campestre* and *L. appelianum*). *L. draba* remains the preferred host with no recorded non-target attack in multiple-choice tests. While established whitetops reproduce vegetatively, long-distance plant dispersal relies on seeds, which could be reduced by this weevil.

www.cabi.org/hoary-cress

Controlling noxious Russian knapweed in North America

Location: Canada, USA

Dates: 01/01/1999 – Ongoing

CABI Project Manager: Philip Weyl

Donors: Montana Weed Trust Fund through Montana State University, USA; United States Department of Agriculture, Animal and Plant Health Inspection Service – Center for Plant Health Science and Technology (USDA-APHIS-CPHST); Wyoming Biological Control Steering Committee, USA

Partners: Biotechnology Biocontrol Control Agency, Italy; Ferdowsi University of Mashhad, Iran; University of Belgrade, Serbia

Russian knapweed is one of several invasive plants of rangelands that arrived in North America in the 19th century from Asia. Biological control is often a good approach for these plants, but a nematode species introduced in the 1970s proved ineffective against Russian knapweed. CABI is researching new biological control agents for introduction.

Two biological control agents have been approved for release in the USA and Canada: the gall wasp, *Aulacidea acroptilonica*, and the gall midge, *Jaapiella ivannikovi*. Both species have successfully established, and a distribution programme covering eight US states has been initiated.

Field surveys in Kazakhstan proved successful and a potential new agent has been located, a small leaf mining weevil, *Pseudorchestes sericeus*. The combined effect of larval mining and adult feeding can have a significant effect on plant productivity and we have noted plant mortality with high densities of the weevil. Host-range testing has been successful and we conclude that this has excellent potential to be a successful biological control agent.

www.cabi.org/russian-knapweed

Controlling swallow-worts the sustainable way

Location: Canada, USA

Dates: 01/01/2006 – Ongoing

CABI Project Manager: Ghislaine Cortat

CABI Project Team: Hariet Hinz

Donors: Agriculture and Agri-Food Canada (AAFC); United States Department of Agriculture, Agricultural Research Service (USDA-ARS), USA

Partners: The University of Rhode Island, USA; United States Department of Agriculture, Agricultural Research Service (USDA-ARS), USA; European Biological Control Laboratory (EBCL), France; University of Toronto, Canada; Michigan State University, USA; Colorado State University, USA

Swallow-worts (*Vincetoxicum nigrum* and *V. rossicum*) are Eurasian plants that have become invasive in North America. This project's goal is to identify specific natural enemies that can be introduced to North America as biological control agents.

Two leaf-feeding moths, *H. opulenta* and *A. asclepiadis*, were tested on over 80 plant species. *H.opulenta*'s narrow host range was confirmed and released in eastern Canada in 2017 and in eastern USA in 2017 – monitoring is ongoing.

Further work on other three potential biocontrols (*Chrysochus (Eumolpus) asclepiadeus*, *Euphranta connexa* and, *Chrysolina aurichalcea asclepiadis*) has taken place. *Euphranta connexa* is only found on *V. hirundinaria* (white swallow-wort) in Europe. However, *V. nigrum* and *V. rossicum* proved to be suitable hosts in our tests. Of the 20 non-target species tested, four received eggs under no-choice conditions. Work with *E. connexa* faces challenges so, in view of limited funding, work will concentrate on *C. asclepiadeus*.

www.cabi.org/swallow-worts

Controlling the brown marmorated stink bug in China

Location: China, New Zealand

Dates: 01/01/2018 – 31/12/2020

CABI Project Manager: Jinping Zhang

CABI Project Team: Feng Zhang, Qianqian Mi

Donors: Zespri, New Zealand

Partners: Plant and Food Research, New Zealand

The brown marmorated stink bug (BMSB) is a polyphagous pest causing a serious damage to kiwifruits in Shaanxi, China. Chemical control has been the most widely used method to control BMSBs but causes adverse effects to the agro-environment.

Pheromone-based traps have been used during the crop growing season, but BMSB adults resist the pheromones during overwintering migration. The purpose of this study is to develop a physical trap to catch BMSB during the time when adults migrate to their overwintering sites.

So far, the results of two field trials have shown that wooden overwintering traps with lure attract more BMSBs than insecticidal light traps and wooden traps without lure. The direction of the traps around the building also affected the numbers trapped. Further field research is still required to test the efficiency of tailor-made BMSB traps.

Controlling wild ginger

Location: India, New Zealand, UK, USA

Dates: 01/07/2017 – 31/12/2023

CABI Project Manager: Djami Djeddour

CABI Project Team: Corin Pratt, Suzy Wood, Anita Kopera, Norbert Maczey, Sangay Bhutia

Donors: Landcare Research; United States Department of Agriculture, Forest Service (USDA-FS); The Hawaii Department of Land and Natural Resources

Partners: Indian Council of Agricultural Research (ICAR/NBAIR); Department of Forest, Environment and Wildlife Management (DFEWM); Sikkim Government; Sikkim University

Plants from the *Hedychium genus* (ginger lilies) are widely cultivated as ornamentals, but a few threaten delicate ecosystems in Hawaii, New Zealand, the Macaronesian Archipelago, Brazil, Australia and La Réunion. The project is researching natural ways to manage these plants. This involves returning to their original home range in the north-eastern Himalayan foothills to find specific, damaging insects and/or pathogens which may prove suitable for release in the invaded areas.

Host range testing in the UK and field testing in India have concentrated on the highly specific *Merochlorops* fly complex and *Metaprodioctes* species of weevil, with a view to submitting an application to the New Zealand Environmental Protection Authority when sufficient evidence on their specificity has been gathered. The fly and weevil will also be characterized via taxonomic and molecular studies; joint publications are also intended to form an important part of the application process.

www.cabi.org/wild-ginger

Coordinated Research Infrastructures Building Enduring Life-science Services

Location: UK

Dates: 01/09/2015 – 31/08/2019

CABI Project Manager: David Smith

Donors: European Commission

Partners: 37 individual partner institutions from 13 ESFRI Biological and Medical Sciences Research Infrastructures (BMS RI)

Coordinated Research Infrastructures Building Enduring Life-science Services (CORBEL) is an initiative of 13 new biological and medical research infrastructure projects across Europe. It has established a new model for biological and medical research in Europe, one which harmonizes user access to technologies, unifies data management, creates common ethical and legal services, and offers joint innovation support. CORBEL will boost the efficiency, productivity and impact of European biomedical research, transforming life-science disciplines.

Among other projects, the model has enabled Parma University to identify toxin-antitoxin systems in wild isolates of *Lactobacillus* strains and subsequently characterize the system's mode of action; transnational access study visits have allowed European scientists to explore new technologies; sea urchin ontology has been developed with the European Marine Biological Resource Centre, to be used in a new Echinoderm database; and a report on a common access framework concept has been completed.

Image: Sea Urchin, New Zealand © Shane Glynn

Coordinative surveillance and early warning for sustainable management of transboundary plant pests in Asia

Location: India, Pakistan

Dates: 05/01/2021 – 31/12/2021

CABI Project Manager: Malvika Chaudhary

CABI Project Team: Manju Thakur

Donors: Food and Agriculture Organization of the United Nations (FAO)

The FAO has commissioned CABI to formulate a harmonized strategy for fighting the transboundary pests which pose a huge global threat – both in terms of biodiversity and agriculture, trade, tourism and development – including in India and Pakistan and other countries in South Asia.

Under the project, regional guidelines have been drafted to devise, validate and deploy ecologically based plant health solutions to tackle desert locusts and fall armyworm, which pose a severe risk to local, regional and national food security as well as the livelihoods of millions of smallholder farmers.

The project will also enable national authorities and stakeholders to reduce the impact of these two transboundary pests, and increase awareness of agroecological tools and techniques to manage them, and pursue ecological intensification of agriculture. A strategy document will also be developed, defining ways to advance interdisciplinary 'systems-level' research on transboundary pest mitigation.

COSMIC pest and disease

Location: China, UK

Dates: 01/03/2018 – 31/12/2019

CABI Project Manager: Steve Edgington

CABI Project Team: Belinda Luke

Donors: Newton Fund Science Technologies Facilities Council (STFC)

Partners: University of Lincoln; Centre of Ecology and Hydrology; Kings College London; University of Loughborough; National Bureau of Agricultural Insect Resources (NBAIR)-EMR, The Institute Plant Protection (IPP) – Chinese Academy of Agricultural Sciences (CAAS); The Institute of Remote Sensing and Digital Earth (RADI) Chinese Academy of Science (CAS)

Grasshoppers are a significant pest in Inner Mongolia and population levels are currently determined by digging up eggs. Yellow wheat rust is also a major problem. A team from CABI is therefore looking to improve detection rates and warning systems for both. For grasshoppers, the intention is to use soil moisture, unmanned-aircraft vehicle system equipment (drones) and image-processing technologies. The project also aims to determine the level of wheat rust inoculum in overwintering sites.

Laboratory work has determined that sand moisture has little effect on hatching rates, and fieldwork has found that high winds present challenges for the use of drones. The lowest these can fly without disturbing the grasshoppers is 2 metres; however, to detect the grasshoppers, the camera needs to be at least 1.5 metres away. Further work is being done to resolve this problem. Wheat rust modelling is progressing well.

Creating healthy data ecosystems

Location: India

Dates: 01/02/2020 – 01/03/2020

CABI Project Manager: Arun Jadhav

Donors: Bill & Melinda Gates Foundation (BMGF)

Partners: Open Data Institute (ODI); Cereal Systems Initiative for South Asia (CSISA)

CABI, with support from the Gates Foundation, aims to help increase food security in India and Ethiopia through better access to data on soil health, agronomy and fertilizers. Importantly, the data drawn upon for this project on agricultural development is based upon FAIR principles (Findable, Accessible, Interoperable and Reusable), and can be monitored to assess the success of newly created data management systems.

A two-day training workshop was conducted by CABI alongside the Open Data Institute (ODI) and Cereal Systems Initiative for South Asia (CSISA) on 'Creating healthy data ecosystems' in Patna, with the aim to support stakeholders in the convergence platform to have better access to data and build an open and trustworthy data ecosystem in their respective workplaces.

CTA legacy asset transfer

Location: Global: Africa, Caribbean, Pacific

Dates: 01/01/2021 – 31/12/2021

CABI Project Manager: Robert Taylor

CABI Project Team: Janice Osborn, Tim O'Brien, Julie Walker

Donors: Technical Centre for Agricultural and Rural Cooperation (CTA)

For over 35 years, the Technical Centre for Agricultural and Rural Cooperation (CTA) effectively demonstrated how agricultural innovation could be documented, shared and scaled up to achieve significant improvements in incomes, productivity and food security. With the end of the Cotonou Agreement between the European Union and the African, Caribbean and Pacific Group of States, the financial and legal framework that supported CTA expired (2020).

Although CTA as an institution has ceased to exist, a rich portfolio of valuable assets remains, including knowledge products, databases and extensive networks. These assets were transferred to CABI to be made available in perpetuity and can now be accessed through CABI's Global Agricultural Research Archive. The work of the project involved digitising and indexing CTA documents and was completed in December 2021.

Demonstrating biological approaches for the sustainable management of tomato leafminer in Kenya

Location: Kenya, The Netherlands

Dates: 01/09/2019 – 15/04/2021

CABI Project Manager: Ivan Rwomushana

Donors: The Netherlands Ministry of LNV

Partners: Koppert Biological Systems; County extension department of Nairobi and Kaijado; The Netherlands Ministry of LNV; Fresh Produce Exporters Association of Kenya; Latia Agribusiness Solutions

Since 2014, the tomato leafminer has become the most serious threat to sustainable tomato production in Kenya. Almost 98% of tomato crops suffer from this pest and only 27% of farmers successfully use pesticides as a control method. CABI collaborated with Koppert to demonstrate the benefits of integrated biological control to farmers.

The inception workshop emphasized the need to deliver the project in more areas. Farmers were identified to host the demonstrations, and two studies, baseline and endline, were conducted to determine the cost-benefit of biological approaches and traditional methods for control of the leafminer.

Through training sessions and field days, 1000 farmers and 250 extension workers were reached with information on the benefits of biological control technologies. Materials, including a training manual, photo guide and videos, have also been disseminated to stakeholders. Though the project could not demonstrate a change in farmers' practices, their knowledge of and willingness to use the biological solutions were assessed.

www.cabi.org/tomato-leafminer-project

Determining the needs for a sustainable black pepper supply chain in Vietnam

Location: Vietnam

Dates: 01/10/2018 – 31/03/2019

CABI Project Manager: Muhammad Faheem

CABI Project Team: Suzanne Neave

Donors: International Finance Corporation (IFC); World Bank

This project aimed to determine whether the sustainable black pepper supply chain development in Vietnam required any capacity building and advisory services. The study, which formed part of the project, included a combination of qualitative interviews and quantitative mini-surveys of at least 500 respondents in three provinces.

The study adopted a three-stage approach to reach an informed understanding of peppercorn supply chains in three provinces of Vietnam: value chain mapping, value chain research, and value chain analysis. The research findings were used to build a detailed view of the market and the inter-relationships between the parties; identify major constraints within the market system; identify opportunities to improve sustainability of the industry; and formulate an intervention matrix.

A SWOT analysis was used to determine the major constraints and opportunities for the different stakeholder groups, and this informed a set of recommendations to alleviate, or at least mitigate, the identified limitations. Improving and strengthening existing advisory services were also recommended.

Developing a biopesticide for cabbage stem flea beetle

Location: UK

Dates: 01/09/2020 – 28/02/2022

CABI Project Manager: Steve Edgington

CABI Project Team: Rhian Whelan

Donors: Technology Strategy Board; Innovate UK

Partners: CHAP; CABI, H&T Bioseed, Russell Bio Solutions

Cabbage stem flea beetle is a major pest of oilseed rape, the third-largest arable crop in the UK. The chemical toolbox is limited to managing the beetle in the field as the EU Commission has restricted the use of neonicotinoid insecticides. Furthermore, over-reliance on pyrethroid chemicals has led to the development of resistance in the beetle. There is, therefore, a need to look for alternative solutions to manage the pest.

The proposed project is a feasibility study to develop a fungal biopesticide for the control of cabbage stem flea beetle as an alternative to chemical pesticides. CABI is a partner in this project, working with H&T Bioseed and Russell Bio Solutions on the development, testing and scale-up of the fungus as a seed and foliar treatment, with the aim of bringing to market a bio-product to limit the damage done by the beetle.

Developing a management package for *Fusarium oxysporum*

Location: Colombia

Dates: 01/09/2021 – 30/10/2021

CABI Project Manager: Yelitza Colmenarez

CABI Project Team: Rob Reeder, Sarah Hilliar, Yelitza Colmenarez

Donors: CABI Development Fund (CDF)

Tropical race 4 (TR4) is the name given to the strain of the fungus *Fusarium oxysporum* f. sp. cubense (Foc) that causes *Fusarium* wilt (Panama disease) in Cavendish banana cultivars, which are commercialized globally. The disease is of great concern due to the high impact that it can have, as observed in affected areas in Colombia (Latin America provides around 70% of Cavendish banana production).

Like all other soil-dwelling Foc strains, TR4 cannot be controlled using fungicides or be eradicated from the soil with fumigants. The capacity of TR4 to survive decades in the soil, its lethal impact and its wide host range are among the main reasons it is considered the greatest threat to banana production worldwide. The project involved a desk study to gather information on TR4, developing a management package for it in Colombia and delivering a regional webinar.

Developing a regional proposal on fall armyworm sustainable management for China-FAO Trust Fund

Location: China, Myanmar, Kenya, Ghana

Dates: 01/03/2020 – 30/11/2020

CABI Project Manager: Feng Zhang

Donors: CABI Development Fund (CDF)

Partners: Institute of Plant Protection, Chinese Academy of Agricultural Sciences (IPPCAAS); PPD-MM

Fall armyworm can cause serious yield losses if not brought under natural biological control or well managed. Appropriate policies that promote sustainable pest management need to be designed and monitoring and early-warning mechanisms to be utilized.

CABI's team assisted the Chinese Academy of Agricultural Sciences (IPPCAAS) and other CABI Member Country partners to develop 'Strengthening inter-regional cooperation for sustainable management of fall armyworm through South-South Cooperation', funded by China-FAO South-South Cooperation Trust Fund.

The aim of this project is to sustainably manage fall armyworm in selected countries in Africa and thereby improve rural livelihoods. In addition, this project will create synergies between conventional monitoring systems and Fall Armyworm Monitoring and Early Warning System (FAMEWS). The local capacity of farmers, extension officers and researchers to control fall armyworm, sustainably, will also be strengthened. Moreover, knowledge of biological control agents will be transferred from China to target countries.

Developing an interactive web-based tool to aid in planning cocoa agroforestry systems in West Africa

Location: Cote d'Ivoire, Ghana

Dates: 01/10/2021 – 31/07/2021

CABI Project Manager: Jayne Crozier

CABI Project Team: Derek Tapp, Mike Frewin, Michelle Jones, Tabitha Jay

Donors: Mondelez International

Partners: University of Cordoba

The project aims to build on the outputs from the CocoaAgroForecast project to develop an interactive web-based tool to aid decision making in planning cocoa agroforestry systems in West Africa. The tool will be used to identify the best combination of functional tree species for shade, biomass production and climate suitability. It will be hosted on an online platform which will also provide information sheets on the various tree species, with links to other relevant resources.

Developing and implementing a SADC-wide invasive alien species management strategy

Location: Angola, Botswana, Lesotho, Malawi, Mauritius, Mozambique, Namibia, South Africa, Seychelles, Swaziland, Tanzania, Zambia, Zimbabwe

Dates: Ongoing

CABI Project Manager: Arne Witt

Donors: Targeting Global Environment Facility; Country Governments and others

Invasive Alien Species (IAS) cost the global economy US$1.4 trillion per annum, affecting a range of sectors, from biodiversity to human health. With increased travel and trade, more pests, including weeds, are likely to be introduced to Sub-Saharan Africa (SSA) and those present are likely to expand and establish more widely. Countries within the Southern African Development Community (SADC) region have recognized this threat.

Recognizing the various barriers to effective management of IAS, the SADC Secretariat has called for the development and implementation of a SADC-wide IAS strategy. CABI is working with SADC Member Countries to develop a proposal that focuses on prevention, early detection and rapid response, and the development and implementation of best management practices, especially IPM, for targeted pests.

Improved coordination between Member Countries and resource collaboration to manage shared problems is a key issue CABI intends to address with one of the main outcomes being the development and implementation of a regional biosecurity system.

Development of a regional fall armyworm biocontrol programme for ASEAN

Location: ASEAN Countries: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Vietnam, China

Dates: 01/04/2021 – 31/12/2021

CABI Project Manager: Feng Zhang

Donors: CABI Development Fund (CDF)

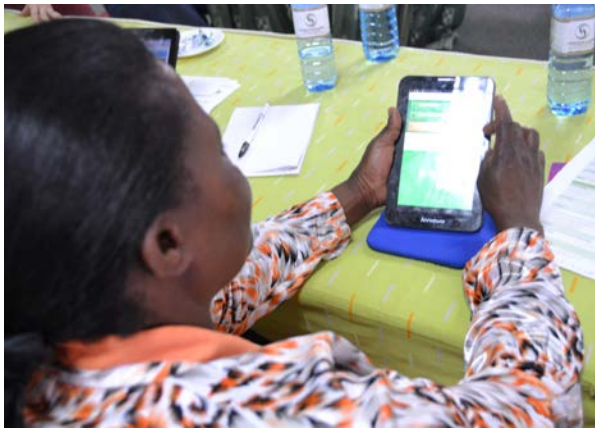
Partners: Grow Asia; Institute of Plant Protection, Chinese Academy of Agricultural Sciences (IPPCAAS)

Fall armyworm (FAW) was first reported in Southeast Asia in late 2018. It has since rapidly spread across the region in Southeast Asia with serious implication for food, feed, and income security of smallholder farmers in the region.

This has been exasperated by the severe impact of COVID-19 related implications on agricultural supply chains. Association of Southeast Asian Nations (ASEAN) farmers are in urgent need of effective, safe, locally viable and affordable FAW management solutions. The ASEAN Action Plan on FAW sets out a regionally agreed multi-stakeholder model for supporting Southeast Asian countries to monitor and manage the pest, based on integrated pest management (IPM) approaches. The Biocontrol Programme is a key component of that IPM approach to FAW management.

Working closely with Grow Asia and Institute of Plant Protection, Chinese Academy of Agricultural Sciences, CABI provides technical support for the development of a regional FAW biocontrol programme to underpin the ASEAN Action Plan in order to sustainably manage FAW in the region.

Development of farmer-friendly plant health digital content for smallholder farmers in Kenya



Location: Kenya

Dates: 01/04/2021 – 31/08/2021

CABI Project Manager: Henry Mibei

CABI Project Team: David Onyango

Donors: UK Government prosperity fund through the African Centre for Women, Information and Communications Technology (ACWICT)

Partners: Digital Green; DigiFarm; Kenya Agricultural Livestock and Research Organization (KALRO); Acre Africa

Digital technology has the potential to improve farmers' livelihoods through access to online content across the agricultural value chain. However, despite the rapid global growth of digital services, smallholder farmers face challenges in accessing the benefits of these services. Some of these challenges include a lack of knowledge, poor mobile internet connectivity, limited finances and skills gaps.

In this project, CABI developed farmer-friendly digital content on plant health for six main crops with the aim of improving access to digital resources, encouraging their use, and enabling sustainable agricultural production and food security. The excluded farmer communities in Kenya (Laikipia County) are now digitally included and able to use locally relevant, digital agricultural content for sustained community development. An agricultural resource centre has also been established in Laikipia County to provide information services to farmers within the community.

www.cabi.org/digital-plant-health

Development of tools to detect stink bugs in cargo

Location: Australia

Dates: 07/09/2020 – 20/04/2021

CABI Project Manager: Tim Haye

Donors: iugotec

The brown marmorated stink bug, *Halyomorpha halys*, has become widely established as an invasive species in many parts of the world. It is still absent from Australia but with the potential worldwide spread, the risk of unintentional introductions with freight is increasing.

This species forms large aggregations when entering a pause in development, and it is often these aggregations that are found by border officials conducting inspections of internationally shipped freight.

Identifying the presence of diapausing aggregations of *H. halys* using their emissions of volatile organic compounds may be a potential means for detecting and intercepting them during international freight inspections. Headspace samples were collected from aggregations of diapausing *H. halys* using quantitative chemical volatile traps. Conditions caused by shipment, such as temperature increases, have the potential to disrupt the bugs' diapausing state were simulated in the experiment. The analysis of the results is ongoing.

Distribution and effects of *Trissolcus japonicus*

Location: Switzerland

Dates: 01/01/2019 – 30/11/2021

CABI Project Manager: Tim Haye

Donors: Swiss Federal Office of Environment (FOEN)

Partners: University of Torino

The brown marmorated stink bug, *Halyomorpha halys*, is an Asian species invasive in Europe. It is a pest of economically important crops such as fruit trees, vegetables and leguminous crops. In 2017, CABI discovered its main natural enemy from Asia, *Trissocus japonicus*, was accidentally introduced to the Canton, Ticino. Within this project, CABI defined the distribution and spread of *T. japonicus* in Switzerland and investigated the impact of the wasp on *H. halys*.

Within three years, the Asian wasp had spread throughout Switzerland and is now present in the Cantons Bern, Basel, Zurich and Ticino. It is expected that its spread will continue throughout Europe in the coming years. The Asian wasp was also reared from native stink bug species, but in most cases parasitism was very low. The only species that may require further investigation is *Pentatoma rufipe*.

Drones for desert locust control in East Africa

Location: Kenya

Dates: 01/09/2020 – Ongoing

CABI Project Manager: Ivan Rwomushana

Donors: Foreign Commonwealth Development Office (FCDO) through the Frontier Technology Livestreaming

Partners: Astral-Aerial; County Governments in project areas; Ministry of Agriculture Livestock Fisheries and Cooperatives (MALFC)

The desert locust is arguably the most destructive agricultural pest worldwide. During 2019 and 2020, the changing weather created conditions favoured by the desert locust for rapid reproduction and migration, and led to the pest spreading through the Horn of Africa, East Africa, the Arabian Peninsula, South West Asia and West Africa. Over 25 million people in Ethiopia, Kenya, Somalia, South Sudan, Uganda and Tanzania will face acute food insecurity in 2020 as a result.

This initiative tested the use of drones to complement traditional desert locust management, including the development of procedures for the optimal use of the technology. The project was initially trialled in Kenya, with the potential for scaling to other African countries. The findings will be used to determine if drones can be used as a complementary tool to sustainably manage locusts. This will include Standard Operating Procedures and operating parameters to deploy more environmentally friendly biopesticides.

www.cabi.org/drones-desert-locust

Ecological intensification of smallholder farms in Kenya

Location: Kenya

Dates: 15/11/2018 – 15/11/2019

CABI Project Manager: Monica Kansiime

CABI Project Team: Joseph Mulema, George Oduor

Donors: Global Challenges Research Fund (GCRF)

Partners: University of Reading; National Museums of Kenya (NMK); Kenya Agricultural and Livestock Research Organization (KALRO)

Smallholder systems do not have a good understanding of the potential of biodiversity-based ecosystem service, such as natural pest control and pollination. There is a need to develop safe, sustainable and affordable methods to reduce pest burdens and increase yields.

The project carried out a study on the diversity of smallholder farming systems in two Kenyan counties. It was found that knowledge of pollination was moderate but that of natural pest control was low: 47% of farmers used chemicals in isolation, 41% used practices such as mechanical removal, planting resistant varieties and crop rotation, while only 6% used biological controls.

The farmers' lack of knowledge about pollinators and pests, and their increased use of chemicals are the main challenges faced when trying to manage pollinators and pests effectively. The opportunities identified will underpin future research, benefit farmer incomes and reduce health risks, contributing to sustainable agriculture.

www.cabi.org/ecological-intensification

Efficacy of Fipronil against rice insect pests and their natural enemies

Location: Malaysia

Dates: 01/10/2019 – 01/03/2020

CABI Project Manager: Muhammad Faheem

Donors: Bright Resource Technology (BRT) Sdn. Bhd

Partners: Malaysia Agricultural Research and Development Institute (MARDI)

Bright Resource Technology (BRT) Sdn. Bhd., a private company based in Malaysia, requested CABI's assistance to test the bio-efficacy of one of their insecticide Fipronil 0.3% GR *(Miflex 0.3), against three key insect pests of rice and their natural enemies in the field. The purpose of the bio-efficacy test was for the potential registration of this product with the Pesticide Board of Malaysia. The field trial was conducted in Sawah Sempadan, Sungai Besar, Selangor, Malaysia.

The final outcome was to provide a field trial report with bio-efficacy results of the product as per the registration requirement of the Malaysian Pesticide Board. The duration of the trial was 4-5 months. Fipronil granules application was a comparatively better insecticide to reduce the insect pests' populations, did not negatively impact population of the natural enemies to the pest, and produced significantly higher rice yield compared with the alternative control treatment.

Empowering smallholder farmers' access to digital agricultural extension and advisory services

Location: Kenya, Uganda

Dates: 30/04/2021

CABI Project Manager: Monica Kansiime

CABI Project Team: Dannie Romney, Harrison Rware, Abigael Mchana, Rahab Njunge

Donors: Food and Agriculture Organization of the United Nations (FAO)

Dr Monica Kansiime's research paper 'Challenges and capacity gaps in smallholder access to digital extension and advisory services in Kenya and Uganda,' highlighted that 78% of farmers accessed extension and advisory services mainly from radio while low digital literacy and high internet costs were central barriers.

During a webinar as a panel member, Dr Kansiime discussed the role of advisory systems and related policies in maximizing digital dividends, minimizing divides and helping farmers boost their yields in difficult times. The webinar drew upon the e-workshop's rich diversity of perspectives and the expertise of colleagues working with agricultural extension and advisory services in Europe and the Global South, to discuss policy recommendations for strengthening smallholder farmers' access to digital extension and advisory services and maximizing digital dividends.

As a follow-up, CABI has signed an LoA with the FAO to document Synthetic Studies on good practices for empowering smallholder farmers' access to digital agricultural extension and advisory service in Sub-Saharan Africa.

Enabling data access to support innovation in decision agriculture

Location: Ethiopia, India

Dates: 01/02/2019 – 31/01/2021

CABI Project Manager: Chipo Msengezi

CABI Project Team: Arun Jadhav, Akanksha Nagpal,

Donors: Bill & Melinda Gates Foundation (BMGF)

Partners: The Open Data Institute (ODI)

Healthy soil is critical to the growth of nutritious food and to farmers' livelihoods. However, declining soil health is causing poor productivity, leading to weak food security and low incomes. National systems can help farmers by sharing data and information on soil health, which can then be used to inform agricultural decisions.

The project aimed to facilitate data-driven decisions within the investments of the Bill & Melinda Gates Foundation and related national systems. Tools, guidelines and recommendations on how to manage soil and agronomy data, and data sharing best practice, have been developed for India and Ethiopia. For example, in India, the project supported the Cereal Systems Initiative for South Asia and developed data ecosystem maps. The project also launched the Data Sharing Toolkit, a set of capacity-building resources to increase access to agricultural data.

www.cabi.org/enabling-data-access

Enabling FAIR data sharing and responsible data use

Location: Global. **Member Countries**: Ethiopia, India

Dates: 01/09/2021 – 01/09/2024

CABI Project Manager: Chipo Msengezi

CABI Project Team: Martin Parr, Ruthie Musker, Ada Isaac, Henry Mibei, Tom Chaloner, Negussie Efa, Henry Mibei, Idah Mugambi, Arun Jadhav, Akanksha Nagpal

Donors: Bill & Melinda Gates Foundation (BMGF)

This initiative represents the third support phase for the Bill and Melinda Gates Foundation in improving the design of data and digital investments in agriculture. It addresses known constraints on data sharing, interoperability and data utility in Foundation investments by increasing the capacity to manage the change towards FAIR and responsible data use.

CABI is supporting the Foundation to shift from a largely technocentric investment approach to a more holistic one, and design grants and interventions that implement FAIR practices and responsible data use from the perspectives of people, processes and technology, rather than focusing on technology alone.

CABI aims to move towards a vision of success for the Foundation's data investments that focuses on local capacity building for long-term, sustainable data sharing. This includes ensuring that investments account for the enabling environments in which they are implemented, improving grant design to allow for an increased focus on people and processes, and developing ethical incentive systems.

Encouraging good agricultural and hygiene practices in peppercorn

Location: Vietnam, Laos, Cambodia

Dates: 01/10/2020 – 30/09/2023

CABI Project Manager: Muhammad Faheem

Donors: World Trade Organization (WTO); The Standards and Trade Development Facility (STDF)

Partners: Ministry of Agriculture, Forestry and Fisheries (Cambodia); General Directorate of Agriculture (Cambodia); Ministry of Agriculture and Forestry (Laos); Department of Agriculture (Vietnam); Western Highlands Agriculture and Forestry Science Institute (Vietnam)

Peppercorn is a key agricultural crop accounting for 20% of Vietnam's gross domestic product and is a rising industry in Laos and Cambodia. However, non-compliance with Sanitary and Phytosanitary Standards (SPS) at the smallholder farmer level is threatening exports to high-value international markets due to concerns over food safety.

CABI and its partners aim to tackle these SPS issues and improve the quality and traceability in the production, post-harvest, processing, and peppercorn trade by identifying, developing and disseminating good agricultural and hygiene practices that focus on peppercorn production in villages. By improving standards within these areas, the project will inevitably secure market access and enhance the peppercorn value chain.

www.cabi.org/peppercorn-south-east-asia

Endosulfan alternative technology development in China

Location: China

Dates: 01/01/2018 – 31/12/2019

CABI Project Manager: Rui Tang

CABI Project Team: Jinping Zhang, Feng Zhang

Donors: Global Environment Facility (GEF)

Partners: United Nations Development Programme (UNDP); Foreign Environmental Cooperation Center Ministry of Ecology and Environment (FECO-MEE); National Agriculture Technology Extension Service Center (NATESC); Xinjiang PPS

Endosulfan is a highly toxic, broad-spectrum pesticide which belong to Persistent Organic Pollutants (POPs). In accordance to the Stockholm Convention on POPs, which came into force in 2014, China was requested to stop the production and use of endosulfan by 2019.

To achieve this goal, the Global Environment Facility (GEF)-funded 'China Endosulfan Elimination Program' was launched in 2017. The project aims to screen and test alternative plant protection products/techniques to replace endosulfan and control cotton pests.

Results of field trials have shown that four alternatives, sex pheromone trapping, *chlorantraniliprole*, *H. armigera* NPV and *Bacillus thuringiensis* were superior to endosulfan.

Based on the field trial results and the local cotton planting situation in Xinjiang, an Integrated Pest Management strategy was developed and will be promoted at large-scale cotton production areas, thereby contributing to the overall phase-out of endosulfan in China.

Engaging with Asia and regional economic communities to promote an alignment of MRL standard setting bodies

Location: Pakistan, Philippines, Thailand, Vietnam

Dates: 01/08/2022 – 31/07/2024

CABI Project Manager: Sabyan Faris Honey

CABI Project Team: Babar E Bajwa, Chubashini Suntharalingam

Partners: US Department of Agriculture Foreign Agricultural Service (USDA FAS)

This project aims to help partner countries in Asia's regional economic communities, The Association of Southeast Asian Nations (ASEAN) and Asia-Pacific Economic Cooperation (APEC) to understand and adopt regulations that are consistent with international standard setting bodies while ensuring they are compliant with the APEC Maximum Residue Level (MRL) Guidelines.

The objectives are to encourage a science-based and trade facilitating policy reform in Asia based on international sanitary and phytosanitary standards and obligations; build a robust regulatory framework for biopesticide registration, both nationally and regionally; and leverage active work streams in MRLs to create a larger, well-coordinated pesticide MRL capacity-building programme in Asia. The project is currently in its inception phase.

Enhancing biosecurity and biological control capacity in the Falkland Islands and St Helena

Location: St Helena, Falkland Islands, UK

Dates: 01/04/2018 – 31/03/2020

CABI Project Manager: Norbert Maczey

CABI Project Team: Pablo Gonzalez Moreno, Suzy Wood, Kate Constantine

Donors: Darwin+ (via Department for Environment, Food & Rural Affairs (DEFRA))

Partners: Department of Agriculture of the Falkland Island Government; Environment and Natural Resources Directorate; (ENRD) of St Helena

St Helena and other UK Overseas Territories in the South Atlantic rank highly for their unique biodiversity. New pests here can be devastating, so the islands need to be protected from incursions. This two-year project developed Pest Risk Assessment procedures and the capacity to use them in the individual territories. St Helena and the Falklands provided case studies.

The improved procedures made use of a new horizon scanning and pathway analysis tool, developed at CABI. Initially, specific requirements for improved procedures were discussed at a regional workshop; the implementation was then tested during the second half of the project. The project ended with the successful development of Pest Risk Assessments for high-priority invasive species, leading to positive reviews from the Darwin Initiative and an additional DEFRA contract to expand the work to other UK Overseas Territories.

Enhancing biosecurity in the Caribbean UK overseas territories through Pest Risk Assessments

Location: Antigua, Cayman Islands, Montserrat, Turks & Caicos, Anguilla

Dates: 01/11/2019 – 31/03/2020

CABI Project Manager: Norbert Maczey

CABI Project Team: Pablo Gonzalez-Moreno, Suzy Wood, Kate Constantine, Djami Djeddour

Donors: Department for Environment, Food and Rural Affairs (DEFRA)

This project provided training to biosecurity officers from UK Overseas Territories to enable them to conduct Pest Risk Assessments independently. Templates developed as part of the project 'Enhancing biosecurity and biological capacity in the Falkland Islands and St Helena' were used to include additional Overseas Territories in the training provided in the first project. As a result of a one-week workshop, held on Antigua in January 2020, a number of Pest Risk Assessments were produced; these covered high-priority invasive species for each participating territory.

Enhancing Diversity to Overcome Resistance Evolution

Location: Brazil, UK

Dates: 01/05/2019 – 31/03/2022

CABI Project Manager: Steve Edgington

CABI Project Team: Belinda Luke, Yelitza Colmenarez, Steve Edington, Natalia Corniani

Donors: Biotechnology and Biological Sciences Research Council (BBSRC); Adiciona a FAPESP

Partners: Stirling University, São Paulo State University

Despite its place as a global leader in agriculture, each year the Brazilian agricultural economy loses approximately US$15 billion to pest outbreaks. Current agricultural practices in Brazil rely heavily on pesticides, which has led to pesticide resistance in several major insect pests. As a result, there is an urgent need for new technologies that minimize damage to the natural environment, while safeguarding the ability to protect crops. This has led to a growing interest in biopesticides.

The Enhancing Diversity to Overcome Resistance Evolution (ENDORSE) project proposes a revolutionary approach to pest management that will enhance the sustainability and resilience of crop production, making it possible to manage insect pests more predictably. The Brazil centre interviewed farmers in six Brazilian states to learn about their perception of bioproducts and the barriers they face to using these.

Enhancing technical capacity for monitoring and managing fall armyworm in Bangladesh

Location: Bangladesh

Dates: 01/11/2019 – 01/06/2020

CABI Project Manager: Malvika Chaudhary

CABI Project Team: Dr Manju Thakur, Mr Ganeshamoorthy Rajendran

Donors: Food and Agriculture Organization for the United Nations (FAO)

Partners: Department of Agricultural Extension (DAE), Bangladesh

The project aimed to contribute towards increased resilience of livelihoods to threats and crises due to the invasion of fall armyworm (FAW) in Bangladesh. CABI provided technical assistance by conducting survey, analysis and reporting on FAW infestation in Bangladesh.

Stakeholder consultations were then conducted to develop Training of Trainers (ToT) manuals for extension officers and farmers to address the pest in the country. CABI also conducted trainings to enhance the capacities of National focal extension officers for the FAW Monitoring and Early Warning System (FAMEWS) application and data collection on the FAMEWS global platform. In addition, the project also developed communication materials including pamphlets and posters to promote awareness among the communities more prone to FAW on effective management through continuous situation monitoring, data gathering and reporting.

www.cabi.org/fall-armyworm-bangladesh

Enhancing technology-based agriculture and marketing in rural Punjab

Location: Pakistan

Dates: 01/01/2020 – 31/10/2022

CABI Project Manager: Shakeel Ahmad

Donors: Asian Development Bank (ADB)

Partners: Euro Consults (Pvt) Ltd

Punjab's agriculture growth rate has declined over the last two decades because of various challenges. These include the inadequate availability of high-yielding cultivars and lack of diversification in cultivation, inefficient on-farm water management, poor infrastructure for value chain development, and weak research and extension services that are largely disconnected from market demands. There is, however, also the lack of advanced agriculture management reinforced by new technologies and innovations which can support sustainable agricultural growth in Punjab.

CABI facilitated the rapid adoption of advanced technologies to strengthen value chains and improve the productivity and profitability of agriculture in Punjab. CABI also enabled further development and adoption of advanced technologies to benefit the agriculture sector while contributing to higher farmer incomes and improved livelihoods in rural communities.

www.cabi.org/technology-based-agriculture

Enhancing the capacity of Uganda's fruit and vegetable sector to comply with phytosanitary requirements

Location: Uganda

Dates: 01/02/2019 – 31/07/2022

CABI Project Manager: Florence Chege

CABI Project Team: Mary Bundi, Christine Alokit, Caroline Aliamo, Stanley Kamau

Donors: Standards and Trade Development Facility (STDF); Royal Netherlands Embassy (RNE), Kampala; in-kind contribution by the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF); World Trade Organization (WTO)

Partners: Department of Crop Inspection and Certification; Ministry of Agriculture Animal Industry and Fisheries (MAAIF); Uganda Fruits and Vegetable Exporters and Producers Association (UFVEPA); Horticulture Exporters Association of Uganda (HORTEXA); Uganda Horticulture Exporters and Processors Association (UHEPA); Ministry of Trade Industry and Cooperatives (MTIC); Uganda Export Promotion Board (UEPB); National Agricultural Research Organization (NARO); Uganda Agribusiness Alliance (UAA)

The project aimed to improve Uganda's access to the EU and other high-end markets for fruit and vegetables. Its key purpose was to improve the country's compliance with international phytosanitary production and export standards which will lead to market growth, sustain producer incomes, increase economic development, reduce poverty and increase food security.

The project was launched in March 2019 with the creation of a multi-stakeholder forum to ensure smooth delivery. A multi-stakeholder workshop provided an opportunity to train participants on export requirements, including: pest control at the grower level; tracking and tracing; the functions of an export certification system; and phytosanitary import requirements for the EU and other markets. Participants also learned about the risk to Uganda of losing the EU market, and the benefits of working in partnership to improve the current fragmented value chain.

www.cabi.org/uganda-fruit-vegetables

Enhancing the Government of Rwanda's agricultural capacity

Location: Rwanda

Dates: 05/02/2019 – 31/01/2022

CABI Project Manager: Silvia Silvestri

CABI Project Team: Negussie Efa, Mary Bundi, Richard Musebe, Martin Kimani

Donors: EuropeAid

Partners: EGIS – Consortium lead

CABI is a member of the Consortium for Technical Assistance to Enhance the Government of Rwanda's Capacities in the Agriculture Sector for the Sustainable Use of Land and Water Resources, Value Creation and Nutrition Security, and was awarded two assignments within the framework of this project.

The first assignment consisted of the production of Customized Agricultural Extension Projects and a five-year action plan. The proposed plan was endorsed and upgraded to become the national extension strategy in Rwanda.

The second assignment consists of a pilot of one of the components developed as part of the first assignment. This covers a coordinated extension service, and improved monitoring, evaluation and reporting systems, and is being applied in the district of Rulindo.

Ensuring resilience of maize production and quality in a changing climate

Location: Democratic People's Republic of Korea

Dates: 01/04/2020 – 31/03/2024

CABI Project Manager: Keith Holmes

Donors: European Commission, Directorate-General for International Cooperation and Development

Partners: Academy of Agricultural Sciences, DPR Korea; Ministry of Agriculture, DPR Korea

Climate change is impacting the agricultural sector in DPR Korea (DPRK), with extreme weather events becoming more common. This has led to increased damage to the main staple crops, rice and maize. Maize is particularly vulnerable to damage in the field and subsequent colonization by toxin producing fungi which are an immediate and long-term hazard to health. CABI is working with the Ministry of Agriculture (MoA) in DPRK, and key local stakeholders, to increase the resilience of the maize value chain to the impacts of climate change, and in particular reduce contamination by these harmful fungal toxins.

The project aims to enhance awareness and institutional capacity in the maize production sector to detect, manage and mitigate climate change-related increases in aflatoxin contamination at pre and post-harvest stages and at multiple stakeholder levels (household, co-farm and county).

Due to COVID-19 and travel restrictions, this project is on hold.

www.cabi.org/maize-dprk

Environmental journalism handbook

Location: Global

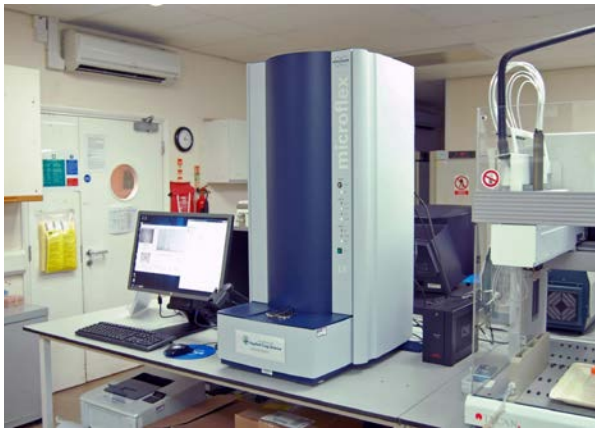
Dates: 01/09/2020 – 25/02/2021

CABI Project Manager: Paul Dawson

Donors: The United Nations Educational, Scientific and Cultural Organization (UNESCO)

The aim of this project is to produce a training handbook for journalists to report on environmental issues in Africa. We are currently awaiting feedback before proceeding.

Establishing a centre for crop health and protection in the UK



Location: Ghana, UK

Dates: 01/03/2016 – 01/02/2021

CABI Project Manager: Sophie Lane

CABI Project Team: Richard Shaw

Donors: CHAP Consortium

Breakthroughs in science and technology are helping overcome global food production challenges and changing the world's agriculture. A new Centre for Applied Crop Science is ensuring the UK has the necessary capital to deliver a cutting-edge platform to support agriculture in the country and beyond.

CABI is the lead partner in three main work strands: novel control discovery and implementation; the collection of biotic crop pests; and horizon scanning and international development. Actions taken include: the installation of a shaker, a small automated spore sprayer, an incubator and a microscope camera at CABI's site in Egham; the installation of a cryopreservation tank, mass spectrometer, Eppendorf pipettes, rotators and centrifuges; and the integration of 137 strains and associated data from CABI's Genetic Resource Collection into the centre's new resource – the National Reference Collection.

www.cabi.org/centre-crop-health

Establishing a national plant health data management system in Grenada

Location: Grenada

Dates: 01/01/2015 – 20/12/2020

CABI Project Manager: Yelitza Colmenarez

CABI Project Team: Eduardo Hidalgo, Yelitza Colmenarez,

Donors: Plantwise

Partners: Grenada's Ministry of Agriculture and Land

Grenada's Ministry of Agriculture and Land, in coordination with CABI, have implemented the Plantwise programme in the country, increasing the reach of farmers at the national level. The plant health management system was improved through the development of a national platform for data management; this includes all the Ministry of Agriculture forms and the Plantwise prescription form used to capture the information from farmers. It is expected that the new data management system will contribute to the gathering and use of agricultural data at the national level.

Establishing cocoa losses in West Africa due to pests and diseases

Location: Cote d'Ivoire, Ghana

Dates: 01/10/2019 – 30/04/2020

CABI Project Manager: Jayne Crozier

CABI Project Team: Julie Flood

Donors: Mondelez International

The aim of the project was to address the lack of accurate information on pests and diseases affecting cocoa production in Ghana and Côte d'Ivoire. The method involved a desk study to collect field loss data through (published and unpublished) data searches and key informant interviews with researchers. The findings confirmed that there are few current published studies available on the real losses. The study also highlighted that there is a reliance on chemical pesticides for the management of pests and diseases affecting cocoa, and that little is currently known about the effect of climate change on the distribution and severity of these.

Establishing cocoa-specialized plant clinics in Colombia

Location: Colombia

Dates: 10/12/2019 – 30/09/2021

CABI Project Manager: Jayne Crozier

CABI Project Team: Eduardo Hidalgo

Donors: Innovate UK (CABI sub-contracted through CATAPULT Satellite Applications)

Partners: CATAPULT Satellite Solutions; Manufacturing Technology Centre (MTC); Cervest; Grupo Nutresa (Compañía Nacional de Chocolates); Federacion Nacional de Cacaoteros (FEDECACAO); Compañia Colombiana Cacao (CCC)

The project brings together Colombian and UK partners to grow the local business ecosystem and positively impact the socio-economic situation in rural areas of Colombia by improving productivity, profitability and traceability along the cocoa supply chain.

CABI's role in the project is to improve the advice that technical staff give to farmers by using the same methodology employed in the Plantwise Programme to improve the diagnosis and management of pests and disease in cocoa and associated crops. For Phase 1 (May 2019), an initial Plantwise training workshop was carried out in Antioquia and Santander with 17 participants, and three pilot plant clinics were established. In 2020, two further sessions were planned for local trainers but COVID-19 delayed Phase 2 implementation and led to virtual workshops. As part of Phase 2, CABI and the project associates in Colombia carried out a study to help extension services identify and better understand some of the barriers faced by cocoa producers in the management of pests and diseases.

Establishing model farms in Pakistan

Location: Pakistan

Dates: 01/02/2018 – 30/06/2022

CABI Project Manager: Sabyan Honey

Donors: Department of Agriculture, Government of Punjab

Partners: Star Farms, Pakistan

The horticulture chain in Punjab, Pakistan is facing difficulties exporting to international markets because produce is not meeting quality and safety standards, and jeopardising the local government's goals to enhance its exports by 30%. To address this, this project will establish model farms and build the capacity of those in the value chain, whilst building important linkages with local and international markets.

To support the process towards international certifications, fifteen global Good Agricultural Practices certifications and eight ISO certifications have been gained, while 139 small grants have been given to project beneficiaries for farm machinery and equipment, helping to develop the supply chain infrastructure.

Market linkages have also been strengthened through domestic horticultural and agricultural exhibitions with international buyers, and a promotional campaign on Pakistani mango in Malaysia.

www.cabi.org/model-farms

Establishing technical links between the plant health management system of Chile's Agricultural Research Institute and the Plantwise Knowledge Bank

Location: Chile

Dates: 01/02/2020 – 20/12/2020

CABI Project Manager: Yelitza Colmenarez

CABI Project Team: Yelitza Colmenarez, Idah Mugambi, Eduardo Hidalgo

Donors: CABI Development Fund (CDF)

Partners: Ministry of Agriculture, Chile

The project focused on the establishment of technical links between MATEO, the plant health management system run by Chile's Agricultural Research Institute and the Plantwise Knowledge Bank. Once linkages were established, the technical material from the institute was included in the Plantwise portal.

www.cabi.org/plantwise

Establishing the psyllid: field studies for the biological control of Japanese knotweed

Location: Canada, Netherlands, UK, USA, Japan

Dates: 25/03/2008 – Ongoing

CABI Project Manager: Daisuke Kurose, Corin Pratt

Donors: Cornwall Council – previous sponsor; British Waterways (Canal & River Trust) – previous sponsor; Department for Environment, Food and Rural Affairs (Defra) – current sponsor; Environment Agency – previous sponsor; Network Rail – previous sponsor; South West Regional Development Agency (SWRDA) – previous sponsor; Welsh Assembly Government – current sponsor; British Columbia Ministry of Forests, Lands and Natural Resource Operations; The Netherlands Government; Bureau for Risk Assessment

Partners: Agriculture and AgriFood Canada (AAFC); Lethbridge Research Centre; University of Reading; University of Kyushu; Wageningen University

Japanese knotweed is highly damaging. Research has identified a tiny psyllid from Japan as a suitable, safe agent to control Japanese knotweed. The aim of this research is to achieve establishment and impact of the psyllid on Japanese knotweed in the UK, Canada, Netherlands and USA.

The psyllid, *Aphalara itadori* (a small sap-sucking insect), was approved for release in the UK in 2010 followed by mass releases during subsequent years. In Canada, the psyllid was released in 2014 and in the USA in 2021. The spread and impact will be closely monitored.

Due to challenges associated to over-wintering and long-term establishment of the psyllid, a survey was carried out in Japan to collect better climatically-matched psyllids. The Murakami psyllid was found and was released in 2020 in the Netherlands. The psyllid was also released in the UK and Canada in 2021 – its spread and impact are being closely monitored.

www.cabi.org/japanese-knotweed

EU and China join to increase development and adoption of integrated pest management tools

Location: China, Europe

Dates: 01/12/2022 – 30/11/2026

CABI Project Manager: Feng Zhang

CABI Project Team: Urs Schaffner, Bryony Taylor, Hongmei Li

Donors: EC DG RTD (via Horizon Europe)

Partners: The EU-China consortium composed of 32 partners and led by INRAE, France

The project aims to promote a global transition to sustainable food systems and to strengthen international cooperation between the EU and China on integrated pest management (IPM) in agriculture. Despite EU and Chinese policies prompting the use of IPM, widespread adoption by farmers is slowed by key barriers, notably because many readily-available non-chemical IPM tools lack reliability or effectiveness.

The project will exploit thorough knowledge, accumulated on pest management methods, to adapt and optimize IPM tools and practices on target crops such as tomato, leafy vegetables, wheat and maize. The project will also work furthering the development of high potential IPM tools and will design cost-effective environmentally-sound IPM packages for further dissemination at large-scale.

European Marine Biological Research Infrastructure Cluster

Location: UK, France

Dates: 01/04/2015 – 01/04/2019

CABI Project Manager: David Smith

Donors: European Commission; Research and Innovation Action (RIA)

Partners: The EMBRIC consortium comprises 29 partners of 4 different types (Academia, Research institutes, non-for-profit organizations and industry)

Marine organisms have typically been difficult to study, but this has improved thanks to the development of marine laboratories and related research infrastructure in Europe. The European Marine Biological Research Infrastructure Cluster focuses marine biotechnology on unlocking the potential of unique marine organisms as sustainable sources of biomolecules and food.

The Cluster has built service provision workflows for applied bioprospection and aquaculture-related research on marine resources, and developed a Memorandum of Understanding between complementary EU partners. A showcase pipeline has demonstrated how the aquaculture of finfish could be improved and developed. In March 2019, at a meeting in the European Parliament, MEPs and representatives from industry and academia heard about 250 rarely isolated bacteria, including two new species, from the Pacific Ocean, the 500 bioactive extracts derived from them, and marine microalgae that yielded interesting properties, including anti-cancer activity.

Evaluating the mycoherbicide potential of a leaf-spot pathogen against Japanese knotweed

Location: Canada, The Netherlands, UK, Japan

Dates: 01/04/2017 – 31/12/2020

CABI Project Manager: Marion Seier, Daisuke Kurose

Donors: CABI Development Fund; Department for Environment, Food and Rural Affairs (Defra); British Columbia Ministry of Forests, Lands and Natural Resource Operations (Canada); Dutch waterboards and other authorities (funding is administered through the Dutch foundation STOWA (Stichting Toegepast Onderzoek Waterbeheer); Koppert Biological Systems

Partners: Koppert Biological Systems; Agriculture and AgriFood Canada (AAFC); Lethbridge Research Centre; University of Reading

Japanese knotweed (*Fallopia japonica*) is a problematic invasive species in Europe and North America. The fungal pathogen *Mycosphaerella polygoni-cuspidati*, while not suitable as a classical biocontrol agent due to possible non-target impact, shows potential as a mycoherbicide. Patent applications have been filed to protect this idea. This project researches the potential mycoherbicide and seeks potential collaborations with private companies to develop a product.

The inoculation of Japanese knotweed with *mycelium* was tested under standardized greenhouse conditions. Permission from the UK authorities meant that the pathogen could be released from quarantine; experimental trials under field conditions started in August 2019, allowing *Mycosphaerella* leafspot to be assessed under more natural conditions. The susceptibility of knotweed species in Canada to the agent is also being tested. In collaboration with a commercial company, the leafspot pathogen is undergoing a parallel assessment in the Netherlands.

www.cabi.org/japanese-knotweed-mycoherbicide

Evaluation of fungal pathogens for biocontrol of cat's claw creeper

Location: Australia, UK

Dates: 31/05/2018 – 30/06/2021

CABI Project Manager: Kate Pollard

Donors: Seqwater; Department of Agriculture and Fisheries (DAF)

Partners: Universidade Federal de Viçosa

Cat's claw creeper is a vigorous vine native to tropical Central America and northern South America. Introduced into Australia for ornamental purposes, it escaped cultivation and is now regarded as a significant environmental weed. In 2001, the Australian Department of Agriculture and Fisheries began a biological control programme against it. To date, three insect agents have been released.

CABI scientists are now looking into the use of fungal pathogens as potential biological control agents to join the fight against this prolific invader. As a perennial vine with abundant subterranean tuber reserves, multiple agents, including fungal pathogens, which attack various parts of the plant, may be required if it is to be successfully controlled.

www.cabi.org/cats-claw-creeper

Expertise register for the ASEAN Regional Diagnostic Network

Location: Global

Dates: 01/02/2020 – 01/10/2020

CABI Project Manager: Chan Fook Wing

Donors: Association of Southeast Asian Nations Network on Taxonomy (ASEANET)

The project builds on previous efforts to develop an Expertise Register of taxonomic experts and institutions to support the ASEAN Regional Diagnostic Network (ARDN). The ARDN is a network of regional experts with the objectives of facilitating efficient and accurate pest diagnostics and coordinating the development of skills, systems and tools to provide regional diagnostic capacity. The Expertise Register contains details of experts, institutions, and information on skillsets, training and their expertise.

Exploring links between organisms and their microbiomes

Location: Global

Dates: January 2022 – December 2032

CABI Project Manager: Matthew Ryan

CABI Project Team: Marion Seier

Partners: Imperial College London; Wellcome Sanger Institute; EMBL's European Bioinformatics Institute (EMBL-EBI); Natural History Museum; Royal Botanic Gardens Kew; Rosalind Franklin Institute; Mary Lyon Centre; ZSL London Zoo; Tara Oceans Consortium

CABI will be contributing to the new Imperial College-led Leverhulme Research Centre of the Holobiont, a project that is exploring the links between host organisms and their microbiomes. A better understanding of the microbiome could help avert declines in biodiversity, mitigate the effects of climate change and improve crop yields. This is a ten-year project that will see a post-doctoral researcher and PhD students allocated to CABI, and will provide a springboard for new projects and solutions in this rapidly expanding research area.

Exploring management practices and socio-economic status of smallholder peppermint production systems

Location: India

Dates: 01/03/2022 – 31/05/2022

CABI Project Manager: Malvika Chaudhary

Donors: LUSH Cosmetics, UK

A baseline survey on the management practices influencing the health, environment, and socio-economic status of small growers in peppermint production systems. This short study had two objectives: to gather evidence to gain a deeper understanding of operations, stakeholders and existing knowledge on different management practices including Integrated Pest Management in the peppermint crop; and data analysis and knowledge creation using CABI knowledge products and other available resources.

The study covered 350 farmers (40% were registered growers). A total of six field visits were undertaken by CABI experts at the target locations. The study data was collected by the local enumerators covering 50% of the registered growers/farmers. The data collection process was monitored by CABI to ensure that the data was collected accordingly.

Fall armyworm in India

Location: India

Dates: Ongoing

CABI Project Manager: Malvika Chaudhary

Donors: Government of India; CABI Development Fund (CDF)

Partners: National Bureau of Agricultural Insect Resources

Fall armyworm (FAW) is a highly invasive pest with the potential to cause significant damage to crops worldwide. Spreading to India in 2018, it has now been identified across 20 states. In addition to maize, FAW attacks other important crops such as rice, sugarcane, beet, potato, cotton and grassland.

This project, funded by the Government of India and CABI's Development Fund, run jointly with the Indian Council of Agricultural Research's National Bureau of Agricultural Insect Resources, and includes both research and awareness raising on integrated pest management (IPM) technologies for fall armyworm. Molecular characterization of FAW from different parts of India has been undertaken. Surveys for native natural enemies found *Telenomus remus* and several species of *Trichogramma* attacking the eggs. In response, IPM trials are being conducted with a range of non-chemical methods.

FarmStack

Location: Ethiopia

Dates: 01/01/2021 – 30/04/2021

CABI Project Manager: Chipo Msengezi

CABI Project Team: Martin Parr

Donors: Digital Green Foundation

The Digital Agricultural Advisory System for Ethiopia aspires to enable system-level change by integrating the farmer-level data that the Ministry of Agriculture, regional Bureaus of Agriculture and other development actors, including Digital Green, have been collecting for decades. The integration of data and technology will be facilitated by FarmStack, a digital agricultural extension platform. This is intended to be designed using open data standards. However, given the diversity of data assets and value-chain actors envisioned, challenges to data exchange exist (for example, associated with farmer privacy).

From December 2020 to May 2021, CABI supported Digital Green in specific pilot cases around two value chains: dairy and wheat. The pilots provided an opportunity to address some of the data sharing challenges that FarmStack would face at scale and to tailor approaches aimed at minimizing friction and maximizing incentives in data exchange.

Feasibility study and consultation for Organic Cotton Accelerator

Location: Pakistan

Dates: 01/07/2021 – 31/12/2021

CABI Project Manager: Abdul Rehman

CABI Project Team: Babar Latif Baloch, Noor Nabi, Yasar Saleem, Shah Faisal

Donors: Organic Cotton Accelerator (OCA)

Partners: Ministry of National Food Security and Research; Pakistan Agriculture Research Council; Pakistan Cotton Standards Institute; Pakistan Central Cotton Committee; Agriculture Policy Institute; Provincial agriculture departments

Organic Cotton Accelerator (OCA), a global platform committed to bringing integrity, supply security and measurable social and environmental impact to organic cotton, would like to establish its presence and operations in Pakistan. On behalf of OCA, CABI is conducting a pre-entry market study and roll out plan for OCA in Pakistan.

The study includes a market study for readiness and availability of resources, designing an organic farm programme in Pakistan, and launching the OCA Organic Cotton Programme in Pakistan. Furthermore, the project plans to deliver an inventory of the major organic cotton initiatives, and an inventory of geographical, agricultural and legal aspects for the organic farming landscape. In addition, the identification and recommendation for plug and play mechanism of transformation from India to Pakistan will be looked into, as will development of an expansion plan for future intervention by OCA.

Feasibility study on cluster development based Agriculture Transformation Plan – Vision 2025

Location: Pakistan

Dates: 01/06/2018 – 31/12/2019

CABI Project Manager: Yasar Saleem Khan

Donors: Government of Pakistan, Planning Commission; Ministry of Planning, Development and Reform

The Government of Pakistan is keen to improve its competitiveness in agricultural commodities, and it's 'Vision 2025' aims to do just that. As part of the plan, the government wants to promote development by building collaboration among private firms, the government, academic and research institutions.

A team from CABI is helping them do this by carrying out a feasibility study regarding cluster formation on 33 different commodities, as well as undertaking a comprehensive literature review on the clusters. The team are also analysing existing and potential supply and demand, as well as for existing value chains. In addition, the team are also performing a Strength, Weakness, Opportunity, and Threat (SWOT) analysis of the clusters, and suggesting improved technologies, processes and products. The CABI team also aims to introduce international best practices, and will suggest a policy package to be implemented.

Fertilizer Optimization Tools

Location: Burkina Faso, Ethiopia, Ghana, Kenya, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Tanzania, Uganda, Zambia

Dates: 01/01/2017 – Ongoing

CABI Project Manager: Harrison Rware

CABI Project Team: Christine Alokit, Tim Beale

Donors: Alliance for a Green Revolution in Africa (AGRA); Biotechnology and Biological Sciences Research Council (BBSRC); Bill & Melinda Gates Foundation (BMGF)

Partners: Rothamsted Research; Centre of Ecology and Hydrology; Africa Soil Information Service (AfSIS); Quantitative Engineering Design (QED); World Agroforestry Centre (ICRAF)

The Fertilizer Optimization Tool (FOT), out-scaled to 13 countries, was developed as part of the Optimizing Fertilizer Recommendations in Africa (OFRA) project with the aim of increasing crop productivity, profitability, and food security in smallholder farming systems in Africa. Project communications were supported by the Africa Soil Health Consortium which continued to support OFRA outputs in Uganda including field testing, training of champion field testers and a manual to promote the use of the FOT. Field testing continues with the objective of building a strong case of FOT best methods and benefits at farmer level. Tested by the champions, the FOT is now a mobile app, includes three core components, and is part of the CABI digital tools chosen for the Plantwise Programme. Further development and finetuning of the tool were accomplished during 2021 and is now available in the Google play store. The team looks forward to field testing with users in 2022.

Fighting the desert locust through emergency communication campaigns

Location: Kenya

Dates: 01/07/2020 – 30/11/2020

CABI Project Manager: David Onyango

Donors: Mercy Corps AgriFin

Partners: Ministry of Agriculture, Ethiopia; Ishamba; Mediae; Pennsylvania State University Plant Village team; Agricultural Transformation Agency (ATA)

The desert locust remains a key threat to food security across Eastern Africa. As part of an emergency response to the risk posed by this pest, CABI and partners developed actionable, farmer-friendly desert locust content to support awareness raising, and monitoring and reporting efforts in Ethiopia and Kenya.

The project ran for four months and reached over five million farmers through a multi-media awareness campaign, using television, radio, WhatsApp messages, mobile SMS messages, mobile video messages and print materials.

A multi-channel approach offered a unique opportunity for effective communication with farmers and the general public, including coordination between the Ministries of Agriculture, in-country locust divisions and development partners. It is envisaged that the learning generated will provide a blueprint for future crises and catalyse the development of similar solutions by actors beyond the region.

www.cabi.org/desert-locust-comms

Fighting the yellow-legged Asian hornet in Switzerland

Location: Switzerland

Dates: 31/01/2017 – 31/12/2020

CABI Project Manager: Lukas Seehausen

Donors: Federal Office for the Environment (FOEN)

The yellow-legged Asian hornet, *Vespa velutina nigrithorax*, is a predator of honey bees and other insects, threatening honey production, pollination and biodiversity. This project aims to establish an early detection monitoring system, determine control strategies and use climate modelling to predict where in Switzerland the insect might settle.

To-date, CABI has established an information network among beekeepers which serves as a platform for the notification and identification of hornet observations in the Swiss Jura.

In September 2020, the first Asian hornets were observed attacking beehives in Geneva, Switzerland. CABI assisted using our scientific expertise to find these first two nests and then applied this experience in the canton of Jura to find the first nest in this canton using newly-developed radio-telemetry.

In 2021, a few nests have been reported from Geneva, and one individual has been reported from the Canton Jura.

Image: Asian hornet (Vespa velutina) © Allan Smith-Pardo, Invasive Hornets, USDA APHIS PPQ, Bugwood.org

Finding a biocontrol agent for *Crassula*

Location: Australia, UK

Dates: 2011 – Ongoing

CABI Project Manager: Sonal Varia

CABI Project Team: Corin Pratt, Suzy Wood

Donors: Department for Environment, Food and Rural Affairs (Defra); Natural England; the Ministry of Defence UK; UK water authorities

Partners: Australia Biological; University of Tasmania, Australia

Crassula helmsii, Australian swamp stonecrop, is an invasive aquatic weed that can dominate still and slow-moving waterbodies, smother native species and potentially deplete the water of oxygen. The UK Government commissioned CABI to investigate the potential of controlling it in a sustainable way.

Many of the pest's natural enemies, both fungal and insect species, that were identified during surveys in its native range, were rejected as potential control agents because they were able to attack closely related plants. However, further testing revealed the gall-forming eriophyid mite (*Aculus* sp.) to be a suitable agent.

CABI submitted a Pest Risk Analysis and approval was granted in 2018. The mite has been released at a small number of sites in England and Wales. Early results have shown that it can survive under UK conditions; the aim is now to ensure that it can establish robust and sustainable populations at the release sites.

www.cabi.org/crassula

Finding a biocontrol for Himalayan raspberry

Location: China, India, UK, USA

Dates: 2013 – Ongoing

CABI Project Manager: Marion Seier

CABI Project Team: Daisuke Kurose, Anita Kopera, Corin Pratt, Norbert Maczey

Donors: United States Department of Agriculture, Forest Service (USDA-FS); State of Hawaii; Department of Land and Natural Resources (Watershed Partnerships); Hawaian Invasive Species Council (HISC)

Partners: Indian Agricultural Research Institute (IARI); National Bureau of Agricultural Insect Resources (NBAIR), Indian Council of Agricultural Research (ICAR); Yunnan Academy of Forestry and Grassland (YAFG), Kunming, Yunnan

Himalayan raspberry is a major threat to native Hawaiian forests, and current control methods are labour intensive and costly. The aim of this project is to find biological control agents from the plant's native range, the Indian and Chinese regions of the Himalayas.

Seven insect species, a rust and a leafspot fungus were identified in India as potential biocontrol agents. In 2016, an export permit to the UK was granted for four of the insect species, but insect numbers were too low to establish cultures for further testing. The survey in China prioritized several insects, a rust and a leafspot pathogen. Of these, the *Pseudocercospora* leafspot underwent testing against key Hawaiian non-target species. However, it was found to infect a native species, *R. hawaiiensis*. Molecular work is underway to understand from where precisely in the native range the Himalayan raspberry was introduced to Hawaii.

www.cabi.org/himalayan-raspberry

Forecast scenarios for cocoa

Location: Cote d'Ivoire

Dates: 15/10/2019 – 30/06/2021

CABI Project Manager: Jayne Crozier

Donors: Mondelez International

Partners: University of Cordoba

The CocoaAgroForecast project used a modelling approach to forecast key parameters in the Mondelez cocoa agroforestry trial for the implementation of an adaptive local management strategy. These included carbon sequestration (allometric models and remote sensing), shade management and plant interactions.

Fostering agricultural revitalization in Myanmar

Location: Myanmar

Dates: 01/09/2018 – 01/09/2019

CABI Project Manager: Sivapragasam

Donors: International Fund for Agricultural Development (IFAD)

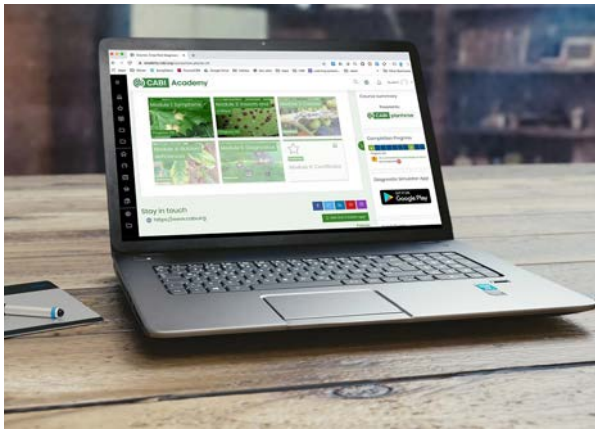
Partners: Plant Protection Division (PPD)

The project supports IFAD's Fostering Agricultural Revitalization in Myanmar (FARM) project by developing the effective provision of plant health services for market-driven smallholders, landless, ethnic minorities and other marginalized groups, thereby reducing losses due to pest and diseases in the area.

The introduction of ICT-supported advisory services and farmer outreach approaches, building on the experiences of the Plantwise programme, will support FARM in achieving its goal of assisting rural households in accessing services and technologies in and outside the knowledge centre catchment area, and improve their productive and economic activities.

To date, an inception workshop for managers and Knowledge Centre staff has been held to launch the project, identifying and selecting crops and problematic pests and diseases; and 60 Knowledge Centre Managers have been trained as plant doctors using Plantwise training modules on operating plant clinics, giving good plant health advice, and on the operation of e-plant clinics.

Free access to CABI Academy



Location: Global

Dates: Ongoing

CABI Project Manager: Rene Schoelzel

CABI Academy builds on CABI's scientific and publishing background, translating the latest innovations in crop and plant health research into programmes designed to help students and professionals focusing on crop pest diagnosis and management to solve problems in agriculture and the environment.

As part of the membership benefits package, Member Countries have free access (for up to five users) to the CABI Academy learning programmes and packages. Examples include: Crop Pest Diagnosis, Crop Pest Management and the Diagnostic Field Guide support document.

www.cabi.org/membership

Free access to CABI's flagship knowledge products for Member Countries in bands 1-4, and discounts for all Member Countries

Location: Global. **Member Countries benefited**: Australia, Bahamas, Barbados, Botswana, Canada, Brunei Darussalam, Burundi, Chile, China, Colombia, Cote d'Ivoire, Democratic People's Republic of Korea, Ethiopia, Ghana, India, Kenya, Mauritius, Montserrat, Myanmar, the Netherlands, Pakistan, Philippines, Rwanda, Sri Lanka, St Helena, Trinidad and Tobago, Uganda, UK, Vietnam

Dates: Ongoing

CABI Project Manager: Rene Schoelzel

Donors: CABI

CABI publishes world-renowned, high-quality scientific information resources. CAB Abstracts, containing over 10 million records on applied life sciences, is just one of them. As part of CABI's Member Country benefits, every Member Country, with contributions at bands 1-4, is eligible for one free access to a range of CABI publishing products including CAB Abstracts, Global Health, compendia (five in total), e-Books (over 900 titles) and online resources. This enhanced offer has been provided since March 2021, which is worth £40K per year. In addition, a discount of 50% (B1-4) and 20% (B5-10) on purchase of CABI books, compendia and databases is offered to all Member Countries.

To date, 28 Member Countries are benefiting from this free access while more than five Member Countries have taken the advantage of discounts of 20% (or more) on purchase of CABI books, compendia and databases.

Further information about these knowledge products is detailed in this dossier.

www.cabi.org/membership

Gender and legume alliance

Location: Ghana, Tanzania

Dates: 01/06/2016 – 31/12/2019

CABI Project Manager: Silvia Silvestri

CABI Project Team: Dannie Romney, Monica Kansiime, Rahab Njunge

Donors: Sustainable Agricultural Intensification Research and Learning in Africa (SAIRLA); Department for International Development (DFID)

Partners: Partners with a formal contract include: International Institute of Tropical Agriculture (IITA); iLogix; University for Development Studies (Ghana); Sokoine University (Tanzania). In addition, there are another 30 among delivery, knowledge, value-chain, communication and research partners.

Legume crops play a key role in household nutritional security and incomes, but production is in decline. To rectify this, the Legume Alliance tried to secure information about growing common beans to as many smallholder farming households in Ghana and Tanzania as possible. This work looked at information targeting different gender groups, allowing them to achieve sustainable intensification that would increase incomes and help attain nutritional security in the region.

As a result of the project, the public and private sectors and NGOs are able to engage with the evidence from differing communication channels. This can, in turn, help strengthen value chains and enable poor smallholders in Tanzania and Ghana, particularly women and youths, to profit from legume technologies that allow intensification without further land degradation.

www.cabi.org/gender-legume-alliance

Generating learning from how China built early warning systems for crop pests

Location: Global. China

Dates: 01/10/2020 – 01/12/2021

CABI Project Manager: Feng Zhang

Donors: Bill & Melinda Gates Foundation (BMGF)

Partners: Institute of Plant Protection, Chinese Academy of Agricultural Sciences (IPPCAAS)

With escalating global trade and climate change, transboundary crop pests have become one of the most serious challenges worldwide to crop production, livelihoods of smallholder farmers, and food security. Establishing stronger early warning systems for major crop pests have been identified as a key priority for African countries to improve their crop production and strengthen food security.

China has been recognized as one of the leading countries who can offer valuable advice to strengthen the monitoring and early warning systems for crop pests. Therefore, this project will investigate China's comprehensive, agile, and nation-wide monitoring and early warning system of crop pests with the aim to generate learning from China's experience.

The knowledge gained, which can be shared with less developed countries in need of assistance, especially in Sub-Saharan Africa, will lay a foundation for further technology transfer from China to these countries.

Giant Pine Scale in Australia

Location: Australia

Dates: 01/01/2020 – 31/12/2022

CABI Project Manager: Marc Kenis

Donors: Agriculture Victoria Research

Giant pine scale is an oligophagous, sap-sucking insect that attacks pines, firs and spruces. High populations of this insect can damage trees (sometimes tree death), and impact productivity and biodiversity.

In 2014, the scale insect was detected in South Australia and Victoria and in high densities have the potential to adversely impact pines in Australia.

This project builds on a feasibility study conducted by the Agriculture Victoria Research in 2018 which identified two chamaemyiid fly species as potential classical biological control agents, one of which, *Neoleucopis kartliana*, is being used in Italy successfully. However, the second *Neoleucopis* sp. should also be identified to compare the effectiveness of both predators.

The aims of this project are to:

- determine the suitability biological control agents *Neoleucopis* spp. for long-term sustainable management of giant pine scale in Australia
- apply for a release to introduce the most promising agent in Australia based on a favourable outcome of prey specificity studies

Image: Marchalina hellenica (Marchalina hellenica) © Andrea Battisti, Universita di Padova, Bugwood.org

Giving dyer's woad the blues

Location: USA

Dates: 01/01/2004 – ongoing

CABI Project Manager: Philip Weyl

Donors: United States Department of the Interior Bureau of Land Management (USDI BLM), Idaho; United States Department of Agriculture, Animal and Plant Health Inspection Service – Center for Plant Health Science and Technology (USDA-APHIS CPHST); Wyoming Biological Control Steering Committee, USA

Partners: Biotechnology and Biological Control Agency (BBCA), Rome, Italy; University of Idaho, USA

Dyer's woad is recognized as a serious weed in the western USA. CABI is searching for specialist natural enemies in Europe that could be introduced for its biological control.

Work has concentrated on two weevils: the seed feeder, *Ceutorhynchus peyerimhoffi*, and the root-crown miner, *C. rusticus*.

Host range testing with *C. peyerimhoffi* is ending and a petition for a field release to the USDA-APHIS (Animal and Plant Health Inspection Service) Technical Advisory Group (TAG) in 2021 is planned.

C. rusticus developed to adult on 174 native species but Dyer's woad was highly preferred for egg-laying in field tests.

In impact experiments, up to 97% of seeds were destroyed by *C. peyerimhoffi*, while *C. rusticus* reduced seed production by up to 72% and plant biomass by 46%. Therefore, a combination of both agents would be ideal to control dyer's woad in North America..

www.cabi.org/dyers-woad

Global action plan for agricultural diversification

Location: Global

Dates: Ongoing

CABI Project Manager: CABI Africa

Partners: Association of International Research and Development Centres for Agriculture (AIRCA) members; CABI; World Vegetable Centre (WorldVeg); International Centre for Biosaline Agriculture (ICBA); Crops for Future (CFF)

Agriculture has to produce more food to feed a growing population, more raw materials for energy and more feed for livestock while adapting to a hotter world. The Declaration on Agricultural Diversification therefore calls for a 'Global Action Plan for Agricultural Diversification (GAPAD)' to help address the UN's Sustainable Development Agenda (SDA2030). CABI is working with other AIRCA members to develop concept notes that could be developed into full proposals for suitable donors.

Close consultation between CABI, WorldVeg, ICBA and CFF led to the development of three concept notes on:

1. Enhancing food, nutrition and livelihood security of smallholder farmers in selected countries through agricultural diversification
2. Agricultural diversification and commercialisation to improve smallholder farmers' incomes and nutrition
3. Utilizing the genetic diversity of vegetables and other nutritious crops in breeding programmes to enhance resilience and nutrition

Global Burden of Crop Loss

Location: Global

Dates: 13/03/2019 – Ongoing

CABI Project Manager: Julien Godwin

CABI Project Team: Cambria Finegold, Tamsin Davies, Tom Chaloner, Roger Day, Anna Szyniszewska

Donors: Foreign, Commonwealth & Development Office (FCDO); Bill and Melinda Gates Foundation (2019-2020)

Partners: Luma Consulting; University of Exeter; University of York (2019-2020)

Efforts to reach Sustainable Development Goals in food security, nutrition and livelihoods are hindered by crop losses. Up to 40% of crops are lost to pests and disease, but available data is limited. The Global Burden of Crop Loss project will collect, analyse and disseminate data on the extent and causes of crop loss to enable the prioritization of plant health research, and improve the ability to predict the impact of pests in new areas.

Multisectoral stakeholder engagement confirmed the need for a data-driven system to produce economic metrics on the size of crop losses in individual locations. Preliminary investigations suggested that there was sufficient data to test the framework on a global scale, resulting in the decision to move forward to a 2021 pilot phase on wheat. The project aims to publish a first full round of Global Burden of Crop Loss estimates by 2026.

www.cabi.org/gbcl

GlobalScape

Location: Brazil, Egypt, Kenya

Dates: 01/03/2021 – 28/02/2023

CABI Project Manager: Luisa Massarani

Donors: European Commission

Partners: The University Of Dublin – Trinity College, Dublin; Qualia Analytics; ecsite; University of Leiden; Springer Nature; SciDev.Net

Science communication is a global field of research and practice central to the relationship between science and society. While recent large-scale studies of science communication have focused on European and Western contexts, the EU-funded GlobalSCAPE project aims to contribute to a more comprehensive picture of science communication by focusing on science communication professionals working in non-Western countries and in regions where science communication can be challenging or under-valued. The project is implementing a programme of electronically-facilitated diary studies to determine the challenges and opportunities faced by science communication professionals as they navigate a rapidly changing field.

The logo and website have been launched, as well as the system for setting up the diary study. The enrolment for the participants in the diary study is in process. More information can be found at https://global-scape.eu/

GODAN

Location: Global

Dates: 18/01/2015 – 31/01/2020

CABI Project Manager: Sam Compton

Donors: US Department of Agriculture (USDA)

Open data – data that is freely available and machine-readable for everyone to use – is a vital resource for improving global food security and human health. The Global Open Data for Agriculture and Nutrition (GODAN) programme was set up to take pioneering agriculture and nutrition research information and make it openly accessible – together with up-to date information on soils, weather, land ownership, market prices and similar – to the people who need it most.

The initiative focused on building high-level support among governments, policymakers, international organizations and business. It promoted collaboration to harness the growing volume of data generated by new technologies to solve long-standing problems and to benefit farmers and the health of consumers.

www.cabi.org/godan

Green control of brown marmorated stink bug

Location: China

Dates: 01/07/2012 – Ongoing

CABI Project Manager: Jinping Zhang

Donors: Ministry of Agriculture and Rural Affairs (MARA); CABI Development Fund (CDF)

Partners: Northwest Agriculture and Forestry University (NWAFU);Jilin Agricultural University; Yangtze University

The brown marmorated stink bug (BSMB), originally from East Asia, has become a harmful invasive pest of many fruit and vegetable crops in North America and Europe. Biological control using Asian or European natural enemies may be an environmentally friendly, cost-effective and sustainable way of managing the pest.

The Joint Lab team has developed environmentally-friendly control techniques (biological control, physical control and agricultural control methods) to reduce the BMSB field population on high value horticultural crops. Their natural enemies (ie egg parasitoid) was mass reared and released in a fruit tree orchard. In addition, a pheromone trap was successfully designed and tested for field trapping of BMSB adults and nymphs which also serves as a pest monitoring tool for applying other control methods.

Guiding Acid Soil Management Investments in Africa

Location: Ethiopia, Rwanda, Tanzania, Kenya

Dates: 01/01/2021 – 31/12/2021

CABI Project Manager: Chipo Msengezi

CABI Project Team: Martin Parr, Ruthie Musker, Henry Mibei, Tom Chaloner, Ada Isaac

Donors: The International Maize and Wheat Improvement Center (CIMMYT)

The goal of the Guiding Acid Soil Management Investments in Africa project is to devise interventions to rehabilitate acid soils at scale in East Africa. Data-driven recommendations seek to maximize returns on investment for farmers, the private sector and governments. While the analysis and outputs are targeted at the specific needs of partner counties (Ethiopia, Kenya, Tanzania and Rwanda), the approach is relevant for other countries in the region.

CABI's contribution to the project involves enhancing the use of data related to acid soil management. Work implemented, so far, includes an awareness creation workshop, data canvasing workshops, desktop research and interviews with key data stakeholders. The work supported by the project mainly focuses on Tanzania but also includes a component to consolidate policy and practice engagement in Ethiopia and Rwanda.

Helping to achieve sustainable agriculture in Myanmar

Location: Australia, Myanmar

Dates: 01/05/2019 – 30/09/2020

CABI Project Manager: Sivapragasam

Donors: Australian Centre for International Agricultural Research (ACIAR)

Partners: Department of Agriculture (DoA); Yezin Agricultural University (YAU); Department of Agricultural Research (DAR); Department of Agriculture, Department of Agricultural Research, Ministry of Agriculture, Livestock and Irrigation

The agriculture sector in Myanmar predominantly consists of rice. It is a key commodity for domestic food security as well as a generator for export income, and could even be a global rice supplier in the future. However, to accomplish this, the sector and its farmers must address challenges faced by crop losses. CABI is working with scientists in Myanmar to promote green agriculture practices.

This project conducted a survey on farmers' pest management practices, pest residues and health issues relating to pesticide use, focus group discussions drew insights understand farmers' beliefs, practices and decision-making related to pest management. In later surveys, pest incidence ranked as the highest constraint to farmers.

Toxicology training was also conducted to boost farmers' knowledge and that focused on the basics of insecticide resistance monitoring, principles of toxicological research, modes of action of insecticides, genetics of resistance development and general lab techniques.

www.cabi.org/sustainable-agriculture-myanmar

High-level discussion on food security amid the pandemic

Location: Global

Dates: 01/10/2021 – 25/11/2021

CABI Project Manager: Joel Adriano

Donors: CABI Development Fund (CDF)

Partners: CABI; SciDev.Net

Stakeholders working and interested in the field of agricultural science and international development were invited to a high-level discussion exploring how the COVID-19 pandemic has affected food security for millions of people around the world.

A panel of experts – including senior representatives from the African Union, China Agricultural University, Ministry of National Food Security and Research, Pakistan, Ministry of Agriculture and Livestock (MAL), Zambia, and CABI – met online to generate insights, opinions and lessons learned, focusing on how to sustain food security even amidst a global shock.

The webinar took place on Thursday 25 November 2021 – as part of CABI's mission to help countries, particularly CABI's Member Countries, to develop quick recovery plans from the pandemic and to ensure a better response to future events which may affect food security. Over 200 people attended.

Hope for biological control of houndstongue in the USA

Location: USA, Canada

Dates: 01/03/1998 – ongoing

CABI Project Manager: Hariet Hinz

Donors: South Dakota Department of Agriculture, USA; Wyoming Biological Control Steering Committee, USA; United States Department of Agriculture, Animal and Plant Health Inspection Service – Center for Plant Health Science and Technology (USDA-APHIS CPHST); United States Department of the Interior Bureau of Land Management (USDI BLM), Oregon

Partners: University of Idaho, USA; Agriculture and Agri-Food Canada (AAFC), Lethbridge

Houndstongue was accidently introduced to North America and has since invaded most Canadian provinces and adjacent US states. CABI is investigating specialized natural enemies that could be introduced as biological control agents.

Four species were discarded and efforts were focused on the seed-feeding weevil, *Mogulones borraginis*, as the most specific potential agent.

Due to the specificity and potential impact of *M. borraginis*, following protocols, the weevil was introduced in March 2020 in North America. A Biological Assessment by the USDA Animal and Plant Health Inspection Service and a federal document will now be prepared for consultations with the US Fish and Wildlife Service. Once these steps are passed, further consultations with Tribal Nations and US states will be required before an official permit is issued.

Rearing colonies of the weevil at CABI in Switzerland and in quarantine in the USA continues so we are ready to release once permission is given.

www.cabi.org/houndstongue

Identifying the origin of yellow floating heart, *Nymphoides peltata*

Location: USA

Dates: 01/02/2019 – 31/12/2021

CABI Project Manager: Sonja Stutz

Donors: US Army Corps of Engineers

Partners: US Army Corps of Engineers

Yellow floating heart, *Nymphoides peltata*, was introduced in North America as an ornamental plant. Since its introduction, it has steadily spread and been repeatedly introduced across the USA and parts of Canada.

In this project, CABI helped to clarify the origin of *N. peltata* in the USA while literature and field surveys were conducted to identify potential biological control agents.

Between 2019 and 2021, sites in Europe were surveyed for the plant. Dried leaf samples were sent to the USA for molecular characterisation.

In China, the weevil, *Bagous charbinensi*, may have potential as a biological control agent. In addition, two pathogenic fungi (*Septoria villarsiae* and *Uromyces nymphoidis*) were reported as specific on *N. peltata* in the European literature. While *S. villarsiae* is very common in Europe and was found on the majority of the sites that were surveyed, *U. nymphoides* could not be found, despite a targeted survey. *Septoria villarsiae* has recently been found in the USA, which should facilitate its use in controlling *N. peltata*.

www.cabi.org/yellow-floating-heart

Impact and management of the box tree moth

Location: Switzerland

Dates: 2013 – 2019

CABI Project Manager: Marc Kenis

CABI Project Team: Lukas Seehausen

Donors: Office de l'Environnement du Canton du Jura ; Food and Agriculture Organization (FAO); Federal Foreign Office Funds of the Federal Republic of Germany

The box tree moth, *Cydalima perspectalis*, is an Asian moth that is killing both ornamental and wild box trees in Switzerland and around Europe. Since 2013, CABI has followed the outbreaks of the moth in wild box stands in western Switzerland and assessed its environmental and social impact. We have also developed management plans for the Canton of Jura and biological control using natural enemies from Asia and assessed the regeneration capacity of defoliated box tree stands.

Studies showed that the moth has a devastating effect on box tree stands. Defoliated box populations do not easily regenerate and there is a high risk that all natural box tree stands in Switzerland, Europe and the Caucasus will disappear if no action is taken. Biological control, through the importation of natural enemies, is presently being studied and, presently, provides the only long-term solution to preserve this highly-valued plant.

Image: box tree moth (Cydalima perspectalis) © Ferenc Lakatos, University of Sopron, Bugwood.org

Implementing Integrated Weed Management in Europe

Location: Global

Dates: 01/06/2017 – 31/05/2022

CABI Project Manager: Urs Schaffner

CABI Project Team: Patrick Häfliger

Donors: European Commission, Horizon 2020

Partners: Consortium of 23 partners (institutes, universities, organizations, and private enterprises) from 9 countries

The Integrated Weed Management (IWM) project in Europe will demonstrate that adoption of IWM supports more sustainable cropping systems, both agronomically and environmentally, without jeopardising profitability or the steady supply of food, feed and biomaterials.

CABI will test and validate a novel approach to manage native weeds with biological control products based on native insects.

Behavioural bioassays revealed that two root-mining clearwing moths, candidate biocontrol agents for Rumex weeds, show cannibalistic behaviour, which may explain the low larval densities observed under field conditions. Unfavourable climate conditions may also contribute to low efficiency too. In south-eastern Europe, where the climate is warmer and less humid, one of these root-boring insects incurred high mortality of small and medium-sized Rumex plants. Further investigations are underway to assess the prospects of using these native root-boring insects for augmentative biological control of Rumex species in Europe, either alone or in combination with other management approaches.

www.cabi.org/weed-management-europe

Improvements to the Invasive Species Compendium Advanced Datasheet Search

Location: Global. USA

Dates: 01/09/2021 – 31/08/2022

CABI Project Manager: Gareth Richards

CABI Project Team: Lucinda Charles, Lesley Mcgillivray, Mike Frewin, Michelle Jones, Neil Docherty, Phil Barton, Hannah Fielder, and many others.

Donors: United States Department of Agriculture – Animal and Plant Health Inspection Service (USDA-APHIS)

Partners: United States Department of Agriculture – Agricultural Research Service (USDA-ARS)

The aim of the project is to mitigate the impacts of invasive species by providing data support to the investigations and decision making of members of the biosecurity community and invasion science researchers.

Leveraging on the extensive data collated within the Invasive Species Compendium, an Advanced Datasheet Search will be built to allow users to easily generate lists of species filtered by taxonomy, distribution, habitat, pathways of introduction, and risk and impact factors. Key activities will include: user testing and evaluation of the Advanced Datasheet Search (beta version); carrying out bug-fixing and itemizing design changes and improvements into a prioritized backlog; IT development, leading to full launch of the new feature, as indicated by user feedback and usage analytics following the launch of the beta version; and the full launch of the Advanced Datasheet Search.

www.cabi.org/isc

Improving banana agronomy practice for small scale farmers in East Africa

Location: Tanzania, Uganda

Dates: 01/07/2018 – 31/07/2020

CABI Project Manager: Christine Alokit

CABI Project Team: James Watiti, Abigael Mchana, Rahab Njunge

Donors: Bill and Melinda Gates Foundation (BMGF)

Partners: National Agriculture Research Association (NARO); The International Institute of Tropical Agriculture (IITA); Biodiversity International; Makerere University; Tanzania Agricultural Institute; Horticultural Research and Training Institute (HORTI), Tengeru and Maruku

Over 50 million people in East Africa depend on highland bananas for their food and/or income. Annually, production is worth $4.3 billion, However, pests and diseases, nutrient deficiencies and drought stress affect productivity. This project helped farmers bridge the yield gap by providing appropriate knowledge and skills in good management practices to help improve farmers' productivity in Tanzania and Uganda.

CABI, with support from the project and the Africa Soil Health Consortium, developed and scaled out pretested communication materials and campaigns in the two countries which included a story chart, calendar, posters, extension guides, pest management decision guides, a radio campaign and drama series which was shown at screenings in local communities in Uganda project sites. Hands-on training was also provided through farmer field days, lead farmers/agents and extension training. Results show that yields were increased by 64% – from 10mt/ha/year to 19mt/ha/year – worth an extra USD $8.15m a year. In total, 47,650 people were reached.

www.cabi.org/banana-agronomy

Improving knowledge on the benefits of cocoa agroforestry systems

Location: Cote d'Ivoire

Dates: 01/07/2021 – 31/12/2023

CABI Project Manager: Jayne Crozier

CABI Project Team: Joe Beeken

Donors: Mondelez International

Partners: University of Cordoba; Innovacion y Desarrollo Forestal (IDAF)

Mondelez International has installed a 12-hectare cocoa agroforestry trial in Cote d'Ivoire to expand the knowledge base on the economic, agronomic and environmental benefits of different cocoa agroforestry systems. The trial was installed in 2018 and compares three different planting schemes, with implementation and data collection by partner Barry Callebaut. CABI is responsible for data analysis and reporting.

Improving Pakistan's food value chains through certification and quality assurance

Location: Pakistan

Dates: 01/08/2019 – 30/06/2021

CABI Project Manager: Naeem Aslam

Donors: Government of Khyber Pakhtunkhwa, Pakistan

Partners: Agriculture Department, Government of Khyber Pakhtunkhwa, Pakistan

Despite sufficient availability of natural resources, in Khyber Pakhtunkwa, Pakistan, constraints are faced throughout the value chain, and means that growth opportunities provided by domestic and global agriculture markets cannot be capitalized on. The aim of this project is to create stronger food value chains in Pakistan through the introduction of certification facilities for quality assurance, improved market linkages and better use of the natural resources using more innovative, technology-based agriculture.

The inception and feasibility phases of this project are complete where work plans have been developed, value chains prioritised and interventions designed. CABI has proposed final sites and also potential commodities for implementation in the field. The implementation phase, which includes putting all activities into practice and developing complete packages, are now taking place.

www.cabi.org/certification-quality-assurance

Improving pest management in agroforestry on sloping land

Location: Democratic People's Republic of Korea

Dates: 01/07/2015 – 31/12/2020

CABI Project Manager: Manfred Grossrieder

Donors: Swiss Agency for Development and Cooperation (SDC)

Partners: Ministry of Land and Environment Protection

During the 1990s, people in the Democratic People's Republic of Korea (DPRK) deforested and cultivated slopes using unsuitable methods which caused land degradation, soil erosion and increased flood risks.

Agroforestry methods help to maintain sloping land and over 200 established Sloping Land User Groups (SLUGs) apply these methods. To mitigate associated environmental risks of sloping land, increase food security of SLUGs and progress slope stabilization, this project focused on improving existing management practices of SLUGs and county tree nurseries.

The production of a *Trichoderma* biopesticide against seedling diseases in nurseries progressed well and preparations for the insect killing Beauveria against white grubs, have been successful.

Effective and feasible sets of Integrated Pest Management practices were developed for white grub in nurseries and the Asian corn borer in SLUG food crops. The project was crucial in increasing capacity of partner organizations in sustainable pest control and technical skills for biopesticide production. Further activities for future cooperation have been proposed.

www.cabi.org/sloping-land

Improving soybean production in Kenya

Location: Kenya

Dates: 01/08/2020 – 31/03/2022

CABI Project Manager: Suzy Wood

Donors: Innovate UK

Partners: Agriculture and Climate Risk Enterprise Ltd (ACRE Africa); International Food Policy Research Institute (IFPRI)

In Kenya, soybean is a key crop in helping to improve livelihoods and nutrition. However, production only meets 10% of the market needs due to the effects of poor agricultural practices and pests and diseases. To address these issues, the project aimed to provide a frontier system that integrated Earth Observation technology, pest modelling and best-practice approaches in agricultural extension to increase soybean productivity and quality. The project aimed to reach 30,000 farmers, of which, women farmers were targeted.

Project activities included training up to 300 of ACRE Africa's VESPs (Village Extension Service Providers) on basic plant doctor processes, focussing on soybean pest management; extend and test a 'Picture-Based Insurance' tool to help accelerate uptake of pest insurance; validate pest models across rural and peri-urban locations; determine validity and value of models to inform insurance claims; determine value-add to insurers, examining the probability of longer-term B2B sustainability funding.

www.cabi.org/improving-soybean-production

Improving surveillance for Invasive Alien Species across the Caribbean

Location: Caribbean

Dates: 01/06/2021 – 31/12/2022

CABI Project Manager: Naitram (Bob) Ramnanan

CABI Project Team: Arne Witt

Donors: Global Environment Facility (GEF); US Department of Agriculture (USDA)

Partners: CABI; Caribbean Plant Health Directors' Forum

The Caribbean Biosecurity Interceptions System (CBIS) is an online cloud-based system that will record data on all items that pose a biosecurity risk. Interceptions by countries in the Caribbean will be recorded to allow collaboration among countries to determine common biosecurity threats. It seeks to provide accurate, timely reports to strengthen surveillance capabilities, and will be accessible only to registered users within a country. Each country controls who has access to their data via access codes, and what reports generated by the system are shared.

The CIBIS was launched at the 2021 Annual meeting of the Caribbean Plant Health Directors (CPHD) Forum. It was endorsed by the CPHD, and with funding from the USDA, a component on non-compliance will be added. The system will begin a phase implementation with the project countries as well Jamaica and the Cayman Island.

Increasing research and development through a joint laboratory in Malaysia

Location: Malaysia

Dates: 01/08/2019 – 22/11/2021

CABI Project Manager: Muhammad Faheem

Donors: Malaysia Agricultural Research and Development Institute (MARDI)

This project aimed to establish a joint laboratory between CABI and the Malaysian Agricultural Research and Development Institute (MARDI) to improve MARDI's facilities, following a Memorandum of Agreement that was signed between the two parties.

The three main functions of the laboratory are research and development, capacity-building and international collaboration, aiming to conduct project activities within three themes: biological-based pest management, invasive species and biopesticide product development.

The first project being implemented by this initiative will be to establish a *Trichogramma* mass-rearing facility to carry out research and development of *Trichogramma* species as a biological control agent for rice pest control in Malaysia.

Increasing safe and efficient trade of agriculture in East Africa

Location: Burundi, Kenya, Rwanda, Tanzania, Uganda

Dates: 10/02/2020 – 15/12/2021

CABI Project Manager: MaryLucy Oronje

CABI Project Team: MaryLucy Oronje, Daniel Karanja, Rahab Njunge

Donors: LandO'Lakes Venture 37, with funding from the United States Department of Agriculture (USDA); Foreign Agricultural Service (FAS)

Partners: KO Associates (Phase 1)

The East African Community (EAC) represents one of the fastest growing regional economic communities in the world. However, trade of agricultural products, from and within this region, has been hindered by factors including Sanitary and Phytosanitary (SPS) issues. The project assessed the SPS systems and frameworks, identified challenges and opportunities for further investments in five EAC countries: Burundi, Kenya, Rwanda, Tanzania and Uganda that will help improve trade, regional and international, and strengthen regional integration.

CABI provided the technical assessment. Due to COVID-19, desk reviews, supported with virtual approaches collected SPS information from the five target EAC countries. The results have been collated into consolidated reports that aim to inform investment opportunities for the five-year project.

In phase two, CABI was contracted to provide technical support geared towards increasing capacity for surveillance, notifications and emergency response in four EAC countries: Kenya, Uganda, Tanzania and Rwanda with a specific focus on enlisted quarantine pests posing emerging threats. Training workshops were help with public and private sector organizations and a technical guide on Asian greening disease was produced in line with a pest alert to Partner States. Following training, a Public Private Partnership framework and national plan were developed.

www.cabi.org/trade-east-africa

Increasing the capacity of extension workers through online learning of effective scientific communication

Location: Australia, Myanmar

Dates: 01/12/2020 – 01/10/2021

CABI Project Manager: Sivapragasam Annamalai

Donors: Australian Centre for International Agricultural Research (ACIAR)

Partners: SciDev.Net: Yezin Agricultural University

A new project, 'Increasing adoption of 'green' pest management technologies by farmers in Myanmar through effective science communication', was implemented with support from ACIAR's Launch Funding. It involved an online masterclass on effective scientific communication to raise awareness issues by piloting and customizing communication approaches for Myanmar stakeholders to help farmers make informed decisions, and increase the adoption rates of outputs from the Social Responsibility Assessment (SRA) project.

The three-day training focused on how can agricultural scientists can effectively turn research findings into messages that can help policymakers and the public make informed decisions. The training, 'Science Communication Skills for Green Pest Control Technologies', was delivered by SciDev.Net, with support from ACIAR, from 14 to 16 July 2021. It aimed to equip scientists with skills and confidence to reach farmers and policymakers with research evidence for adopting green pest management technologies.

Increasing the capacity of Olam's field teams on plant health management

Location: Vietnam

Dates: 01/12/2018 – 01/09/2019

CABI Project Manager: Dr Sivapragasm Anamalai

CABI Project Team: Muhammad Faheem

Donors: Plant Protection Research Institute (PPRI), Vietnam

The project first assessed the Olam black pepper plantation in Vietnam to identify any gaps in pest and disease management. After discussing the typical plantation problems faced in Olam, a three-day training course was developed to build on the capacity of the plantation's field agronomists and managers.

The training course for 14 participants covered the understanding of the pepper plant and its cultivation practices, and looked at integrated management practices for nutrition and irrigation, a diagnosis and how to manage common pests and diseases of the pepper plant. The course also advised on monitoring pests and diseases in the peppercorn field.

Five attendees from the course were selected for the role of Plant Doctor and completed a further two-day course to give them in-depth knowledge and expertise in detailed lab and field diagnosis of major pests and diseases, nursery management, field monitoring, Integrated Pest Disease Management and farm biosecurity.

Increasing trade for Kenya through SPS needs assessment

Location: Kenya

Dates: 01/09/2021 – 30/12/2021

CABI Project Manager: MaryLucy Oronje

CABI Project Team: Washington Otieno, Lorna Migiro, Daniel Karanja, Rahab Njunge

Donors: TradeMark East Africa

Partners: Kenya Plant Health Inspectorate Service (KEPHIS)

In Kenya, compliance with sanitary and phytosanitary (SPS) measures has opened up tremendous export opportunities for the country's producers and exporters at intra-regional and international levels of trade. However, there are often overlaps between the government agencies applying these measures. Harmonizing the approach is essential for the expansion of trade, and reducing or eliminating illegitimate SPS measures would remove barriers to the movement of food and agricultural products.

CABI was contracted to provide short-term technical assistance for a capacity needs assessment of SPS institutions in Kenya. This involved checking how SPS measures are applied, and what the strengths and gaps are in these measures. The findings are expected to inform investments to boost the application of these measures and enhance trade.

Information gathering for TradeMark East Africa Sanitary and Phytosanitary Measures Information Sharing Platform

Location: Burundi, Kenya, Rwanda, South Sudan, Tanzania, Uganda

Dates: 01/02/2022 – 31/08/2022

CABI Project Manager: MaryLucy Oronje

CABI Project Team: Washington Otieno, Lorna Migiro, Daniel Karanja

Donors: TradeMark East Africa (TMEA)

Partners: EAC Partner States

TradeMark East Africa (TMEA), through the Sanitary and Phytosanitary Measures (SPS) programme, is in the process of developing an East African Community (EAC) SPS Information Sharing Platform (EAC SPS ISP) with the aim of increasing the efficiency of accessing information by EAC Partner States.

CABI's work carried out in this project will contribute to the development of the EAC SPS ISP by consolidating information and documenting SPS measures in the region. The platform will serve as a database of selected commodity specific SPS measures for reference, helping to eliminate the current poor access to SPS information by stakeholders in agri-food trade.

The project identified regulations and laws for the selected commodities, identified risks and their respective SPS measures for selected commodity value chains and compiled lists of standards used by EAC Partner States for selected value chains. The plan will be to include this information into the EAC SPS ISP.

Information portal for major pests and diseases of coconut

Location: India, Indonesia, Malaysia, Philippines, Sri Lanka, Thailand, Vietnam, Timor Leste

Dates: 01/10/2021 – 01/10/2022

CABI Project Manager: Chan Fook Wing

Donors: International Coconut Community (ICC)

The project builds an online information portal for major pests and diseases of coconuts, aiming to support the under-served coconut industry to enable smallholders, and other potential commercial growers, to plant coconuts on a larger scale, while equipping them with the requisite information and knowledge, particularly on pests and diseases of coconut.

Integrated Pest Management and statistic training courses

Location: China

Dates: 2013 – Ongoing

CABI Project Manager: Feng Zhang

Partners: Chinese Academy of Agricultural Science (CAAS)

42 postgraduate students from the Graduate School of the Chinese Academy of Agricultural Sciences (GSCAAS) attended the fifth Agricultural Entomology-Integrated Pest Management course, and the sixth training course, on 18-22 March and 5-8 November 2019 in Beijing, China respectively.

CABI experts have provided the content for the English course for postgraduate students since 2013, which have been selected for routine English lectures for the postgraduate students at GSCAAS. At least 240 students attended the lectures.

Integrating advanced Earth Observation and environmental information for sustainable pest and disease management

Location: China

Dates: 01/05/2016 – 01/04/2019

CABI Project Manager: Belinda Luke

Donors: Newton Fund Science Technologies Facilities Council (STFC)

The forecasting and monitoring of insect pests and disease outbreaks is vital to protecting China's economically important agricultural sector. This project aimed to give rapid advice on the possible location and timing of locust and stripe rust outbreaks in China. Using data from satellites and other environmental sources, CABI and partners designed innovative data products and communication tools to help decision makers take informed action about pest control activities, helping to sustainably manage yellow rust in wheat and migratory locusts.

Results and outputs included the creation of reports, maps, a locust development model and a biopesticide efficiency model, and the training of 2,800 technical staff, extension officers and farmers on how to understand and use the reports. Publications included one book, 42 scientific papers, eight patents and five soft copyrights.

www.cabi.org/integrating-earth-observation

International consortium for plant protection under the 'Belt and Road' initiative

Location: Global

Dates: 01/03/2013 – Ongoing

CABI Project Manager: Feng Zhang

Donors: Ministry of Agriculture and Rural Affairs (MARA); CABI Development Fund (CDF)

Partners: Institute Plant Protection Chinese Academy of Agricultural Sciences (IPPCAAS); various Chinese, Asian, African, European and Pacific partners

China's 'Belt and Road' initiative was launched by the government in March 2015 to promote the connectivity and mutually beneficial cooperation between Asia, Europe and Africa. The aim is to improve innovation and productivity by strengthening scientific collaboration and exchange between agricultural and forestry technicians. Besides income, agricultural free trade will also stimulate agricultural development, sustainable agricultural development and food security.

Common threats, such as agricultural pests and their sustainable management, will be addressed, as will plant protection. Joint efforts will go into understanding the occurrence mechanisms, dispersal and outbreak of cross-regional pests, and through the initiative, there will be research and development of new technology on forecasting, monitoring and the control of pests.

The team will develop integrated pest management techniques across the value chain, and promote regional technology transfer of common plant protection products and techniques, adapted to local conditions.

Invasive plant pathogens threatening the USA

Location: USA

Dates: 01/09/2019 – 31/08/2020

CABI Project Manager: Gareth Richards

Donors: United States Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS)

Partners: Rosemarie Hammond, USDA-ARS NEA BARC Molecular Plant Pathology Laboratory, Beltsville, USA; Julius Fajardo, USDA Office of Pest Management Policy, Washington DC, USA; Federal Interagency Committee on Invasive Terrestrial Animals and Pathogens (ITAP) Subcommittee on Plant Pathogens; Hilda Diaz-Soltero, Caribbean Advisor to the APHIS Administrator

Invasive plant pathogens represent a threat to US agriculture, forestry and the environment. Accurate information on these pathogens is required to help prevent their introduction and spread. The Plant Pathogens Subcommittee of the US Federal Interagency Committee on Invasive Terrestrial Animals and Pathogens (ITAP) has identified the worst plant pathogen threats to the USA. CABI is commissioning the compilation of data on these plant pathogens to be published as full datasheets in the Invasive Species Compendium [www.cabi.org/isc] (an open access global resource currently containing over 10,000 datasheets).

In the first phase of the project, 17 new datasheets have been commissioned from experts and the editing, peer review and publication of these is underway. Datasheets are published once editing is complete. Further phases are planned to address even more plant pathogen threats that are of importance to the USA.

www.cabi.org/plant-pathogens-usa

Investigating technological risks in development and food security

Location: Kenya

Dates: 01/04/2020 – 31/03/2023

CABI Project Manager: Monica Kansiime

Donors: The British Academy

Partners: The University of Warwick; University of Nairobi

To maintain and improve food security, it is necessary to ensure that agricultural production is effective, efficient and sustainable. This project sought to investigate how technologies that have been introduced as solutions to food insecurity have in fact contributed to the creation of new technological risks, and how these technologies should be governed.

The CABI project team finalized the study design and tools. Data from 319 farm households were collected and interviews with 16 key informants held. A feedback meeting took place involving representation from government ministries, county governments, parastatals and non-governmental organizations. The issue of awareness of the key technologies investigated – genetically modified organisms and antibiotic use in livestock – was underscored, as was the need to enhance policy implementation, monitoring and surveillance to ensure that technology uptake presents no risks for food safety.

www.cabi.org/investigating-technological-risks

Joint crop and livestock services for smallholder farmers

Location: Uganda, Kenya

Dates: 01/01/2021 – 31/12/2024

CABI Project Manager: Christine Alokit

Donors: Biovision Foundation; WTS Welttierschutzstiftung

Partners: Ministry of Agriculture, Animal Industry and Fisheries (MAAIF); Makerere University; Selected District Local Governments; Self Help Africa

Crop and livestock health is crucial to agricultural productivity and farmer livelihoods. However, in low-income countries, smallholders often have insufficient support to deal with crop and animal problems since agricultural extension services are understaffed and underfunded.

CABI's work in plant clinics has revealed potential 'One Health' benefits to broadening their scope. This project developed integrated crop and livestock health advisory services, enabling smallholder farmers to address major health and production problems affecting crops, livestock and food safety.

Joint crop-livestock clinics are operational in six districts in Uganda. Over 1196 farmers were reached in 2021 in Uganda (43% females). The crops and plants taken to the clinics have included bananas, coffee, cocoa, tomatoes, cereals, and fruits and vegetables. So far, lessons learned from the joint clinics include increased awareness among staff and farmers of the interrelations between the health of plants, animals and the environment. The lessons have been shared with the Kenya team and the next project phase will include three counties in Kenya.

www.cabi.org/one-health-project

Maintaining Member Country microbial cultures at CABI's Genetic Resource Centre

Location: Global

Dates: 1910 – Ongoing

CABI Project Manager: Anthony Kermode

Donors: CABI

CABI manages a collection of around 30,000 living microbial strains, including the UK National Collection of Fungus Cultures. This includes over 6,000 species isolated from environmental and agricultural systems worldwide, making it one of the most significant in the world.

CABI's expertise in biological resources extends to the development of biological resource centres in regions and to assist Member Countries in maintaining their own biodiversity.

Since its founding in 1910, CABI has maintained approximately 15,000 microbial cultures from 44 of its Member Countries. These microbial resources form part of a wider, unique collection of microorganisms that underpins CABI's scientific activities, and serves as a tool to support research and development around the world.

www.cabi.org/membership

Malawi Digital Plant Health Service (MaDiPHS)

Location: Malawi

Dates: 01/06/2022 – 31/12/2027

CABI Project Manager: Henry Mibei

CABI Project Manager: Chipo Msengezi, Noah Phiri, David Onyango, Willis Ochillo, Susan Philcox, Marin Parr, Daniel Karanja

Donors: Norad

Partners: The Norwegian Institute of Bioeconomy Research (NIBIO); International Centre of Insect Physiology and Ecology (icipe); Penn State University (PSU); FAO Malawi (FAOMW); International Institute of Tropical Agriculture (IITA); Lilongwe University of Agriculture and Natural Resources (LUANAR); Met Norway; Viamo,; TLC Malawi; Malawi Ministry of Agriculture – Departments of Agricultural Extension Services (DAES), Agricultural Research Services (DARS) and Crop Development (DCD); Malawi Ministry of Natural Resources and Climate Change – Department of Climate Change and Meteorological Services (DCCMS)

Pests and diseases contribute to 40% of food losses. The extensive use of chemicals to control them has sparked a renewed interest in Integrated Pest Management (IPM).

Digital systems have been developed to identify, monitor, manage, control and predict outbreaks of a large number of pest and disease species. They can provide useful information to aid decision making and the timing of integrated pest management strategies.

The project's goal is to establish an agricultural plant health service at a national level in Malawi, based on the coordination of internationally developed digital systems. Six interlinked work packages will focus on communication and extension, data organization and management, implementing an integration platform, developing a national digital client and building new pest risk models.

The project is currently at an inception phase whereby a detailed work plan has been developed. Key inception phase activities include the mapping of key users of the MaDiPHS based on information needs, target crops and pests and diseases.

Managing the invasive threat to Europe's forests

Location: Europe

Dates: 01/10/2018 – 30/09/2022

CABI Project Manager: Lukas Seehausen

Donors: European Commission, Horizon 2020

Partners: Consortium of 23 partners (institutes, universities, organizations, and private for-profit entities) from 15 countries

Over the last few decades, European trees and forests have experienced dramatic losses caused by introduced non-native invasive pests and pathogens.

As part of HOMED (Holistic Management of Emerging Forest Pests and Diseases), CABI is leading a work package for the development of tools and best practices to carry out safe and efficient biological control operations, as well as developing an early warning system to protect European forests from possible pest and pathogen invasions.

A CABI-led study, funded by HOMED, revealed that the success of Classical Biological Control in Europe, North Africa and the Middle East is only rarely dependent on the released biological control agent, but on other factors, such as the target pest, its host plant, or the circumstances of the releases. The research was published in the journal NeoBiota.

www.cabi.org/homed

MARA-CABI – European Laboratory

Location: Countries involved or benefited: Switzerland, China, Nicaragua, Bolivia, Peru, Brazil

Dates: 01/07/2019 – Ongoing

CABI Project Manager: Hariet Hinz

CABI Project Team: Yelitza Colmenarez

Donors: Swiss Agency for Development and Cooperation (SDC); Chinese Ministry of Agriculture and Rural Affairs (MARA)

Partners: Institute of Plant Protection (IPP-CAAS)

The objective of the joint Chinese Ministry of Agriculture and Rural Affairs (MARA)-CABI European Laboratory in Switzerland is to support the existing lab in China and achieve a greater global reach. The overarching functions include collaborative research, scientific and technological exchange and training and cooperation with third-party partners.

The European lab opened in 2019 with two Chinese scientists working on biological control of the fall armyworm and the BioProtection Portal. In 2021, the 13th Steering Committee meeting reported 'outstanding progress' on all aspects of its work – ranging from governance, management, scientific exchanges and training, implementation of on-going collaborative projects and the development of new international projects to capacity building – during 2020 despite the challenges posed by the ongoing COVID-19 pandemic. At the 14th Steering Committee in 2022, continued progress was reported. The focus for 2022 will be collaborative research projects and further studies on the biological control of fall armyworm.

MARA-CABI Joint Lab impact study

Location: China

Dates: 01/04/2020 – 31/03/2021

CABI Project Manager: Min Wan

CABI Project Team: Julian Chen, Hongmei Li, Jinping Zhang, Bo Yuan, Qiaoqiao Zhang, Feng Zhang, Kongming Wu, Xueping Zhou, Ulrich Kuhlmann

Donors: CABI Development Fund (CDF)

Partners: Institute Plant Protection Chinese Academy of Agricultural Sciences (IPPCAAS)

The Chinese Ministry of Agriculture and Rural Affairs (MARA)-CABI Joint Laboratory for Bio-safety, located at Institute of Plant Protection of Chinese Academy of Agricultural Sciences (IPPCAAS) was launched in 2008 and since then has successfully led and/or implemented 32 international cooperation projects on research and technology transfer in the broad plant protection area.

In order to review stakeholders' needs and priorities on functions and key collaboration areas, an impact study was conducted, using qualitative approaches, to assess the output efficiency through an input-output analysis, and to evaluate social and ecological benefits of the Joint Lab. The study provides lessons and recommendations for further development which will be beneficial for similar collaborations between CABI and other Member Countries.

The successful and sustainable operation of the Joint Lab relies on financial investment from China and non-cash investment from both CABI and Chinese counterparts. The Joint Lab provides good value for money for both CABI and China, demonstrating a successful, win-win partnership.

Masters of Advanced Studies (MAS) in Integrated Crop Management (ICM) – face-to-face course

Location: Global. **Member Countries include**: Ethiopia, Ghana, India, Jamaica, Kenya, Malawi, Pakistan, Rwanda, Sierra Leone, Sri Lanka, Tanzania, Trinidad and Tobago, Uganda, Vietnam, Zambia

Dates: 01/01/2018 – 31/12/2020

CABI Project Manager: Manfred Grossrieder

Donors: Swiss Agency for Development and Cooperation (SDC)

Partners: The University of Neuchâtel

Food security, food safety and environmental sustainability are critical challenges for the growing population. It's time to engage with education as a pathway to new expertise, and new solutions.

The MAS in ICM course, held in Switzerland and designed for development professionals, aims to address these challenges. This interdisciplinary study programme provides knowledge on ICM as a sustainable agricultural production system that improves overall crop health and also addresses its wider implications, particularly the socio-economic and ecological aspects, which form the backdrop of this holistic agricultural production system. Topics include: soil management, seed selection, crop nutrition, cropping strategies, pest and landscape management, water management, statistics, national and regional agricultural policies, and rural economics.

Since its inception in 2015, the programme has trained 71 agricultural professionals from 22 countries including: Cambodia, Costa Rica, Ethiopia, Ghana, Honduras, India, Jamaica, Kenya, Malawi, Nepal, Pakistan, Rwanda, Sierra Leone, Sri Lanka, Tanzania, Trinidad and Tobago, Uganda, Vietnam, and Zambia.

In 2020, the 11 students who began the MAS ICM programme in 2020 had to transition from face-to-face teaching to online learning in their first month due to COVID-19.

Measuring the livelihood impacts of invasive alien species in East Africa

Location: Kenya, Tanzania, Uganda, Zambia

Dates: 01/01/2014 – 31/12/2020

CABI Project Manager: Arne Witt

Donors: CABI Development Fund (CDF)

Partners: Zambia Agriculture Research Institute; National Agricultural Research Organization (Uganda); The Nature Conservancy (Tanzania)

Much is known about the biodiversity impacts of introduced species in East and Southern Africa. However, very little is known about the livelihood impacts that such species have on poor rural communities that depend on goods and services provided by ecosystems, and the extent to which the erosion of these ecosystems impacts such communities.

The aim of this project was to determine the socio-economic impacts of selected invasive alien plants on poor rural communities, especially farmers, in East and Southern Africa. The results of these surveys informed relevant stakeholders on the wider, cross-cutting impacts of invasive alien plants, and will lead to significant changes in the support for projects mitigating their impacts. The final research paper was published in 2020.

www.cabi.org/invasives-east-africa

Mechanical removal of himalayan balsam

Location: Switzerland

Dates: 2016 – 2019

CABI Project Manager: Rene Eschen

Donors: Parc regional du Doubs

Himalayan balsam (*Impatiens glandulifera*) is a fast-growing, invasive alien, annual plant species that is suspected to negatively affect the native flora and fauna of Switzerland. The species is widespread and locally abundant in the Parc Regional du Doubs. To-date, the Parc has managed this species by manually removing it. This project tested the small-scale impact of two physical removal techniques (hand pulling and mowing) on Himalayan balsam and native flora and fauna.

After three years, no impact was found on Himalayan balsam, native flora and fauna. The results suggested the impact of the plant species on native flora and fauna is minimal which may be due to the late emergence of the plants during the year and the rapid decomposition of dead plants.

Medium-term gender implementation strategy

Location: Global

Dates: Ongoing

CABI Project Manager: Frances Williams

Donors: CABI Development Fund (CDF)

Gender should be incorporated into CABI's work from the outset of a project through inclusion in development, planning and implementation. This can be achieved by: carrying out gender analysis and developing action plans to ensure gendered implementation; incorporating a gendered technical approach; ensuring that gendered baselines are produced and that the project's workplan and budget allow for gendered activities; and undertaking research to identify barriers to entry, participation, competitiveness and knowledge uptake for women, youth and marginalized groups.

Work should also focus on the gendered measurement of outputs and outcomes, and on sharing the results and lessons learnt. Evidence of outcomes and impacts for women, young people and marginalized groups will be provided through gendered results measurement, analysis and reporting, based on gender analysis and gendered workplans. There will also be an emphasis on ensuring that gender is prominent in external communications and marketing.

Member Country support activities

Location: Global

Dates: 2020 – Ongoing

CABI Project Manager: Qiaoqiao Zhang

Donors: CABI Development Fund (CDF)

In 2020, CABI revised its Member Country Engagement Strategy, aiming to promote CABI's membership as a unique two-way strategic partnership for the benefit of all Member Countries, with CABI at the centre offering enhanced engagement, communication and business and capacity development. To achieve this goal, the following foci and measures were proposed: (a) actively addressing the needs and priorities of our Member Countries; (b) improving membership benefit packages and promoting their uptake and delivery; and (c) adopting a key account management approach. An allocation of CABI's CDF funding to this project has enabled CABI centres and business units to develop joint actions plans with Member Countries, help deliver revised membership benefits in a tailored approach, and conduct technical back-stopping, stakeholder analysis, capacity building, joint project development and fund-raising activities in our Member Countries. In 2021, more than 17 project and activities were supported by this programme. In 2022, 15 projects and activities are being funded.

www.cabi.org/membership

Microbiome-based strategies for sustainable intensification in Kenya

Location: Kenya

Dates: 01/12/2021 – 31/12/2022

CABI Project Manager: Joseph Mulema

CABI Project Team: Lucy Karanja

Donors: International Centre for Genetic Engineering and Biotechnology (ICGEB)

Partners: International Centre for Genetic Engineering and Biotechnology (ICGEB), Cape Town

Declining soil fertility and the increasing prevalence of soil-borne pests continue to affect smallholding productivity in sub-Saharan Africa, worsening the challenge of feeding a growing population. Harnessing beneficial microbes presents a promising strategy to optimize plant growth and agricultural sustainability. The proper management of soils is linked to good soil health: sustainable agricultural practices, such as crop rotation, the use of organic manure, crop diversification and reduced tillage, improve soil structure and promote microbial growth and survival.

The study aims to explore the diversity and abundance of soil microbial communities important to sorghum grown on smallholdings. Sorghum was selected because of its resistance to adverse climatic conditions. The study will clarify the functional significance of microbial species and the farming practices important for their abundance and diversity. The results from this work will be important for directing sustainable land use management policy.

Mitigating pesticide residues on red chillies in Pakistan

Location: Pakistan

Dates: 15/03/2021 - 30/09/2023

CABI Project Manager: Sabyan Honey

Donors: US Department of Agriculture (USDA) Foreign Agricultural Service (FAS); United States Agency for International Development (USAID)

Partners: Institute of Plant and Environmental Protection (IPEP) – NARC; Southernzone Agricultural Research Centre (SARC, Karachi); Pakistan Agricultural Research Council (PARC)

Pakistan faces challenges in conforming to international food standards and, in particular, pesticide maximum residue limits (MRLs). This is either because these MRLs are not established, or because the MRLs are too low for farmers to comply with. This then has a subsequent effect on Pakistan's ability to trade.

This project brings a new approach based on the strategic use of non-residue-producing biopesticides, following conventional pesticides. The approach aims to reduce residues at harvest and overcome trade barriers caused by MRL issues. CABI will work with partners and Pakistani farmers to increase their compliance with international standards, MRL regulations and enforcement.

A steering committee was convened for the MRL regulatory harmonization work in Pakistan, and CABI signed a cooperation agreement with PARC for planning and monitoring of the MRLs regulatory harmonization research work in Pakistan. A number of virtual capacity building sessions have also taken place and samples collected from chilli growing fields which are being inspected.

www.cabi.org/red-chillies-pakistan

Monitoring and evaluation for crop yield decision support data

Location: Ghana

Dates: 01/09/2020 – 31/03/2021

CABI Project Manager: Birgitta Oppong-Mensah

CABI Project Team: Mary Bundi, Frances Williams

Donors: UK Space Agency

Partners: Assimila Ltd; Farmerline; University College of London (UCL)

The project aimed to integrate crop growth models with quantitative biophysical vegetation parameters from earth observation data to derive farm-scale yield information without the need for extensive ground surveying. It sought to use vegetation parameters from earth observation data to calibrate crop growth models and derive reliable estimates of crop yield. The estimates of crop yield can be combined in different ways to fulfil user requirements for pre-harvest yield predictions and historical yield analysis.

CABI led the monitoring and evaluation work package for the discovery and planning phase of the project (a longer operational phase is yet to be funded), developed the monitoring and evaluation and gender plans, and sought the agreement of local field partners on the actions planned for the operational phase. The follow-up project will work on developing commercial tools of interest to industry.

Monitoring of ambrosia beetles in Swiss regions with drought-induced beech dieback

Location: Switzerland

Dates: 01/03/2020 – 31/12/2022

CABI Project Manager: Lukas Seehausen

CABI Project Team: Marc Kenis

Donors: Office de l'Environnement du Canton du Jura

Partners: Swiss Federal Institute for Forest Snow and Landscape Research (WSL)

The European beech is vulnerable to climatic changes. In Switzerland, beech is the most widespread species, reaching its maximum proportion in the east of the Jura.

Dead and stressed beech trees can attract wood boring beetles, causing further damage and significant tree mortality (evidenced in a Belgian study, 1998).

In 2020 CABI monitored beetle activity and attacks in beech forests in Jura. Three beech-dominated regions were selected. Pheromone traps captured >10,000 beetles of at least 10 different species during 2020 and 2021.

Results showed beetle abundance did not differ in stands of different decline classes; entry holes of beetles on trunks were also counted, showing that trees, without previous trunk damage, were not attacked. However, entry holes in heavily damaged trees increased significantly with the stands' damage class. Additional monitoring during 2022 will define the future role of wood boring insects after drought-induced beech dieback and provide information on forest dynamics in the context of climate change.

Monitoring, forecasting, prevention and control of fall armyworm in China

Location: China, Myanmar, Laos

Dates: 01/01/2019 – 31/12/2022

CABI Project Manager: Feng Zhang

Donors: China's donation to CABI Development Fund, Central Public-interest Scientific Institution Basal Research Fund

Partners: Institute Plant Protection Chinese Academy of Agricultural Sciences (IPPCAAS)

In early 2019, fall armyworm (FAW) invaded China and is becoming a major economic threat to maize production. As of 17 September 2020, 1.19 million hectares of maize across 27 provinces of China were affected by FAW. In response, China's government invested significant resources in FAW control across the country. The migration and biological nature of the pest means that FAW management in Southeast Asia is vital to controlling the pest in China and vice-versa.

Therefore, it is important to study and chart the migration pattern of FAW between China and Southeast Asian countries, providing useful information for pest monitoring and control sustainably. The MARA-CABI Joint Lab team have been working with partners in China, Myanmar and Laos to share the FAW occurrence data on maize and to investigate regional migration patterns of FAW for better prevention and control of this invasive insect pest in the Great Mekong Subregion.

Nature-based solutions for eco-friendly crop protection and One Health in the Asia-Pacific region

Location: India, Papua New Guinea, Vietnam

Dates: 20/06/2022 – 30/06/2023

CABI Project Manager: Hongmei Li

CABI Project Team: Urs Schaffner, Gopi Ramasamy, Malvika Chaudhary, Emma Jenner, Feng Zhang

Donors: Food and Agriculture Organization of the United Nations (FAO)

Partners: NPPOs in the target countries

Agricultural pest management is pivotal to ensuring food security. However, current crop protection schemes are overly reliant upon synthetic pesticides which inflict negative impacts on human health and the environment. This is particularly exacerbated in the Asia-Pacific region, with countries such as Cambodia, Vietnam and Laos reporting an increase in pesticide imports by up to 60%.

The key project objective is to support Member Countries in the region to unlock the potential of nature-based solutions (NBS) and integrated pest management (IPM) to address the problems posed by synthetic pesticides and other drivers of global change, including climate change.

The project will spotlight the myriad of green crop protection measures including biological control and its related agroecological practices to safeguard One Health and will culminate in the drafting of a comprehensive grant proposal to promote NBS and One Health in one country in the region.

One-health platform for climate-driven pests and diseases

Location: Ghana

Dates: 01/01/2021 – 12/01/2023

CABI Project Manager: Victor Clottey

CABI Project Team: Birgitta Oppong-Mensah, Solomon Agyeman Duah

Donors: World Bank through CGIAR Research Program on Climate Change, Agriculture, and Food Security (CCAFS); International Institute of Tropical Agriculture (IITA)

Partners: International Institute of Tropical Agriculture (IITA); International Water Management Institute (IWMI); Ghana Met; Esoko; Ministry of Food and Agriculture – The Plant Protection and Regulatory Services Directorate (MoFA-PPRSD); Council for Scientific and Industrial Research-Crops Research Institute (CSIR-CRI); UDS

The project will specifically launch a "One-health platform for climate-driven pests and diseases". It is an advanced climate-informed One-health innovation that builds on CGIAR's track record in this area, framing the nexus of crops, livestock, soil and water health, food safety and nutrition, and climate change as a complex public health issue.

Media and mass awareness campaigns will be launched, business models developed, and women- and youth-led enterprises championed. Pilot sites will be identified and training provided to farmers for successful implementation of One-health and climate-smart agriculture technologies.

Online Certificate of Advanced Studies (CAS) in Integrated Crop Management (ICM) and Diploma of Advanced Studies (DAS)

Location: Global

Dates: 2020 – Ongoing

CABI Project Manager: Manfred Grossrieder

CABI Project Team: Mark Berthelemy, Rachael Russel

Donors: Swiss Agency for Development and Cooperation (SDC)

Partners: The University of Neuchâtel

We aim to address today's critical agricultural and environmental challenges by creating unique online higher education programmes.

Working with the University of Neuchâtel, CABI will be delivering three Certificates of Advanced Studies (CAS) in Integrated Crop Management (ICM), which can be combined into a Diploma of Advanced Studies (DAS), via the e-learning CABI Academy platform.

These programmes will be available to students and practitioners around the world, offering the opportunity to learn about crop management principles and to explore solutions that can be incorporated into practice and policy in any country.

The first CAS in ICM (Sustainable Production Practices) started in January 2022 with 22 participants on the e-learning course.

www.cabi.org/academy

Opportunities and challenges in Sanitary and Phytosanitary measures to facilitate agricultural trade in Asia

Location: Bangladesh, Bhutan, Nepal, Pakistan, Vietnam, Laos, Kiribati, Solomon Islands

Dates: 01/12/2021 – 31/12/2022

CABI Project Manager: Vinod Pandit

CABI Project Team: Kritika Khanna, Shama Praveen, Hongmei Li, Habat Ullah Asad, Muzammil Farooq, Julie Flood, Jayne Crozier

Donors: Food and Agriculture Organization of the United Nations (FAO)

Most Asian countries are confronted with the need to strengthen Sanitary and Phytosanitary (SPS) systems. The proposed study focuses on analysing SPS-related barriers faced by the agricultural exports in Nepal, Bhutan, Bangladesh, Pakistan, Laos, Vietnam, Kiribati and the Solomon Islands. The project will document SPS issues, map the gaps in enforcement by trading partners and generate empirical evidence in a regional report and a position paper. The project will also advocate a fair and equitable multilateral trading system through virtual events aimed at raising awareness and promoting digital tools, contributing to enhanced regulatory cooperation in future phases.

Primary and secondary data has been collected in all eight counties via comprehensive desk reviews, focus group discussions and key informant interviews followed by a regional workshop. A two-day workshop was conducted to promote the Pest Risk Analysis Tool and Horizon Scanning Tool. Individual country reports and a regional report have also been finalised. A proposal is underway.

Optimizing biocontrol for brown marmorated stink bug in kiwifruit

Location: China, New Zealand

Dates: 01/06/2018 – 01/05/2023

CABI Project Manager: Jinping Zhang

CABI Project Team: Feng Zhang

Donors: Zespri; Kiwi Vine Health

Partners: Plant and Food Research, New Zealand; MARA-CABI Joint Laboratory for Bio-Safety; Kiwifruit Station; Northwest Agriculture and Forestry University (NWAFU)

The brown marmorated stink bug is native to East Asia and became an invasive pest in many northern, temperate regions of the world in the mid-1990s. It is now well-established in North America and Europe, and continues to invade new areas. It has a broad host range and is a major economic threat to New Zealand, where it could potentially jeopardize a multi-billion-dollar export market for fresh produce.

Biological control using Asian or European natural enemies may be an environmentally friendly, cost-effective and sustainable way of managing the pest. This project will be implemented in a kiwifruit orchard in north western China. Our research focuses on the stink bug's impacts and phenology on different management systems to understand its potential impacts in New Zealand as well as investigating the associated parasitoids.

Organization of virtual workshops and webinars

Location: Global

Dates: Ongoing

CABI Project Manager: Qiaoqiao Zhang

Donors: CABI Development Fund (CDF) and others

CABI regularly organizes virtual workshops and webinars that are led by teams of experts across our work areas and programmes including the Knowledge Business, International Development, Bioscience, Plantwise and Sci-dev.Net. The online events are designed to encourage discussion on topical subjects, provide learning outcomes and offer support.

Examples include a webinar series in collaboration with ASEAN on fall armyworm control, a high-level panel discussion, held specifically for Member Countries, on food security amid the COVID-19 pandemic and other future shocks, a series of events and workshops led by our publishing team, supporting research and scientists through their publication journey. The webinars and workshops are free and available to Member Countries.

Partnerships for improving fruit production in DPR Korea

Location: Democratic People's Republic of Korea

Dates: 01/10/2016 – 31/10/2020

CABI Project Manager: Keith Holmes

Donors: European Commission DG DEVCO -EuropeAid

Partners: Ministry of Agriculture, Democratic People's Republic of Korea

Fruit grown in DPRK is exposed to pests and diseases which reduces yield and quality. CABI created best practice guidelines for an Integrated Pest Management (IPM) programme and long-term solutions focusing on developing a *Trichogramma* biocontrol agent.

Project activities included training project partners on IPM best practices and techniques; a new building to house a *Trichogramma* Rearing Facility (TRF) and training of personnel on rearing. TRFs at plant protection stations were equipped and supplied with *Trichogramma* (*T.chilonis*). Study tours on field management best practice, pre and post-harvest handling and storage were carried out and guidelines implemented at four cooperative farms. Training of Trainers was successfully delivered.

Where IPM was implemented at farm level and control study plots with the *Trichogramma* biocontrol agent, most farms reported an increase in yield, some reported specific reduction in disease or pest incidence.

Course material for more than 40 hours was made available in 2019.

Due to COVID-19 and travel restrictions, this project is yet to complete its final activities.

www.cabi.org/improving-fruit-production-dprk

Phytosanitary Risk Management Programme in Pakistan

Location: Pakistan

Dates: 01/09/2014 – 30/09/2019

CABI Project Manager: Sabyan Honey

CABI Project Team: Babar E Bajwa, Riaz Mahmood, Muzammil Farooq, Fazlullah, Daud Hussain Anjum, Khalid Rasheed, Hamzah Bhatti, Saqib Ali, Ejaz Ahmed, Aqil Hussain

Donors: US Department of Agriculture (USDA) Foreign Agricultural Service (FAS); United States Agency for International Development (USAID)

Partners: Department of Agriculture, Balochistan; Department of Agriculture, Sindh; Department of Agriculture, Gilgit Baltistan; Pakistan Agricultural Research Council (PARC); Islamabad Southern Zone Agricultural Research Centre, Karachi; All Pakistan Fruit & Vegetable Exporters, Importers, and Merchants Association (PFVA); Rice Exporters Association of Pakistan (REAP)

Insect pests cause millions of dollars worth of crop losses throughout the world, and Pakistan is no exception. They can harm crops both before and after they are harvested in storage, and together, they are causing huge losses.

CABI implemented a pest management programme throughout Pakistan to strengthen its capacity to control major pre and post-harvest pests. The project aimed to mitigate pests' impact and improve the capacity of regulators to certify exports.

Biological control laboratories were established at six sites to mass rear natural enemies. Biocontrol agents for papaya mealybug, apple codling moth, spider mites and fruit flies were released, improving papaya production and led to an increase in the income of papaya farmers in Sindh. Trainings were conducted for farmers and technical experts on biological control and Sanitary and Phytosanitary System compliance as well as a variety of communication materials. The project plans to continue implementing biological control in these regions.

www.cabi.org/PRMP-Pakistan

Phytosanitary system development for the vegetable sector in Ghana

Location: Ghana, The Netherlands

Dates: 01/05/2015 – 31/07/2021

CABI Project Manager: Walter Hevi

Donors: Ministry of Foreign Affairs of the Netherlands

Partners: Quinn Organics; Ghana Association of Vegetable Exporters (GAVEX); Plant Protection and Regulatory Services Directorate (PPRSD) of the Ministry of Food and Agriculture, Ghana

Ghana's vegetable sector has the potential to create 20,000 skilled jobs and increase exports to the EU. But exports are hampered by quarantine pests. The project aimed to develop a new organic supply chain by establishing an effective phytosanitary system, facilitating strategic alliances between importers, producers and exporters, and investing in technical expertise.

The project improved compliance with production standards, implemented management systems, made available technical assistance for certification, built infrastructure for sorting, inspection, packing and storage, and developed effective business relations between exporters and farmers. Field trials for the management of pests were run at seven sites. The CABI team also assisted with an audit visit from the European Commission Directorate-General for Health and Food Safety, contributing to the lifting of the export ban on selected vegetables in January 2018, and a reduction in interceptions of harmful organisms in commodities exported to EU markets.

www.cabi.org/ghana-food-safety

Piloting biopesticide use to manage fall armyworm in South Sudan

Location: South Sudan

Dates: 14/02/2019 – 31/12/2019

CABI Project Manager: Ivan Rwomushana

Donors: International Maize and Wheat Improvement Center (CIMMYT); US Agency for International Development (USAID); Food and Agriculture Organization (FAO); AgBiTech

Partners: Star Trust Organization (STO); South Sudan Ministry of Agriculture and Food Security (MAFS)

Biopesticides are considered a good alternative to chemical pesticides in fall armyworm management – they are better targeted and a lower risk to health and the environment. However, available commercial biopesticides are not accessible in Africa.

CABI supported the pilot use of Fawligen, a baculovirus biopesticide, to manage fall armyworm on 500 smallholdings in South Sudan. Data collected at the end of the growing season from three of the four sites demonstrated that the application of Fawligen resulted in a 63% average yield gain, compared to untreated maize fields.

A survey carried out at the end of the pilot with farmers revealed that 63% felt the treatment had been very successful, and 95% were willing to pay for it if it was available, at a price comparable to a synthetic insecticide.

A Phase II pilot was planned to apply learning, expand reach and further refine an integrated package of technologies. Unfortunately, Phase II did not go ahead.

www.cabi.org/fall-armyworm-botswana

PLANTS database collaboration

Location: Global

Dates: 01/10/2022 – ongoing

CABI Project Manager: Gareth Richards

Donors: United States Department of Agriculture - Natural Resources Conservation Service (USDA-NRCS)

Partners: Gerry Moore, Leader, National Plant Data Team, USDA-NRCS,. Greensboro, NC. Chris Taliga, USDA-NRCS PLANTS Data Team Plant Ecologist

This project proposes the alignment of species names in the Invasive Species Compendium (ISC) with those in PLANTS database, and the creation of 46 new datasheets for the ISC. A collaboration between NRCS, CABI and EER through a cooperative agreement will allow NRCS to update PLANTS' outdated invasive/noxious status data, including the data on the Caribbean area which is the main entry for the species into the continental U.S.

Updating and expanding the invasive/noxious data for the Caribbean in PLANTS will also benefit the conservation efforts of EER and other Caribbean island countries and supports NRCS's commitment to provide technical assistance to underserved clients in Puerto Rico, the U.S. Virgin Islands and Caribbean countries. In doing so, this will greatly benefit conservation planners, landowners, farmers, and others in making informed management decisions to prevent the further spread of invasive species.

The millions of other users of PLANTS will also benefit by having access to updated invasive species data.

Plantwise in Africa

Location: Ethiopia, Ghana, Kenya, Malawi, Rwanda, Uganda, Zambia, Burundi

Dates: Ongoing

CABI Project Manager: Willis Ochilo

CABI Project Team: Birgitta Oppong-Mensah, Caroline Aliamo, Christine Alokit, David Onyango, Duncan Chacha, Efa Negussie, Florence Chege, Idah Mugambi, Linda Likoko, Noah Anthony Phiri, Peter Karanja

Donors: Foreign, Commonwealth and Development Office (FCDO), the Swiss Agency for Development and Cooperation (SDC); the Directorate-General for International Cooperation (DGIS), Netherlands; NUFFIC; the Netherlands Embassy in Bujumbura; International Fund Agricultural Development; the Australian Centre for International Agricultural Research (ACIAR); Koppert Foundation

Partners: Various ministries of agriculture, NGOs, extension services, private sectors, and research institutes

Plantwise is a global programme led by CABI, which helps farmers lose less of what they grow to plant health problems. Working closely with national agricultural advisory services, we have established a global plant clinic network, run by trained plant doctors, where farmers can find practical plant health advice.

Since its launch in 2011, the Plantwise programme has been introduced to 34 countries in Africa, Asia, and the Americas, positively impacting the lives of over 50 million smallholder farmers by contributing to improved plant health management, leading to increased yields and income. The programme has achieved this by strengthening the capacity of extension staff to deliver quality plant health advice through plant clinics and complementary extension approaches, and by strengthening the linkages between plant health system stakeholders, leading to better targeting and coordination of farmer support.

Individual country (2019-2022) progress is as follows:

Burundi: Implementation of the Plantwise programme is led by Institut des Sciences Agronomiques du Burundi (ISABU) with funding support from NUFFIC and the Netherlands Embassy in Bujumbura. Other partners involved include the Ministry of the Environment, Agriculture and Livestock, MoA, and Plant Protection Directorate (DPV). Since the launch of the programme in November 2020, 100 plant doctors and 16 plant clinics have been established.

Ethiopia: Implementation of the programme is led by the Ministry of Agriculture (MoA), Plant Health Regulatory General Directorate (Plant Protection Directorate) with support from the Regional Bureaus of Agriculture, EIAR, and the regional plant health clinics. Plant clinics are now included in the revised agriculture development policy, plant protection roadmap, and annual plans of the ministry and are therefore provided for in the Ministry's budget. In 2021, the Ministry allocated £5,000 GBP for Plantwise activities. To date, a total of 167 plant clinics have been established; 714 plant doctors trained; 73 pest management decision guides and 10 factsheets developed.

Ghana: Plant Protection and Regulatory Services Directorate of the Ministry of Food and Agriculture (PPRSD/MoFA) leads the implementation of the programme in the country. Unfortunately, there has been limited funding from PPRSD/MoFA and other partners resulting in a decline of Plantwise activities over the last two years. To date, there are 256 plant clinics (32 active), 612 trained plant doctors, 122 pest management decision guides, and 10 factsheets available for use in the country.

Kenya: Implementation is led by the Ministry of Agriculture and Irrigation. County governments, Kenya Agriculture and Livestock Research Organization (KALRO), Kenya Plant Health Inspectorate Service (KEPHIS), and NGOs such as Self Help Africa also provide funding and support implementation of the programme in Kenya. In 2021, partners contributed approximately £43,130 GBP to support Plantwise activities. There are 311 plant clinics, 731 trained plant doctors, 359 pest management decision guides and seven factsheets are available for reference.

Malawi: The Department of Agricultural Extension Services, Department of Crop Development, Department of Agricultural Research Services (DARS), and Dedza–United Purpose are involved in the implementation of Plantwise in the country. Plantwise is included in national strategies and budget. For instance, the government under the multi-donor trust fund project, ASWAP-SPII has set aside £210,988 GBP for Plantwise activities in 2022. There are 155 plant clinics (126 active), 583 trained plant doctors, 61 pest management decision guides, and seven factsheets for farmers for use by the country.

Rwanda: The Rwanda Agriculture and Animal Resources Development Board (RAB) and the Ministry of Local Government, through the districts' local governments, are the key partners involved in the coordination and implementation of the programme in the country. From 2020, sustenance of the programme has been through its linkage with groups set up by Twigire Muhinzi (the decentralized national extension system in Rwanda) and farmer cooperatives. Through this arrangement, plant clinics are conducted at farmer field schools (FFS) learning plots or on farmer promoters' demo plots. In addition, FFS facilitators and farmer promoters are involved in mobilizing farmers to attend market-based plant clinics. Through these arrangements, there are 42 of the 66 established plant clinics running, 404 plant doctors trained, 71 pest management decision guides and 48 factsheets.

Uganda: The Ministry of Agriculture, Animal Industries and Fisheries (MAAIF) has embraced the plant clinic approach as a model of providing advisory extension services to farmers. The Ministry and district local governments provide funding for Plantwise activities. Partners such as Makerere and Gulu universities have integrated Plantwise modules into their curriculum as a way of sustaining Plantwise training in the country. Others involved in the implementation of the programme include the Biovision Foundation and the IFAD Program for the Restoration of Livelihoods. A total of 287 plant clinics have been established (50 active); 987 plant doctors trained, 350 pest management decision guides and 71 factsheets developed by Plantwise trained local experts for reference.

Zambia: Implementation of the programme is led by the Ministry of Agriculture (MoA) and the Zambia Agriculture Research Institute. Others involved include the University of Zambia, the Natural Resources Development College, CropLife Zambia, and the Plant Quarantine and Phytosanitary Service, and Simalaha Conservancy. Since 2020, there has been a significant decline in the implementation of the programme activities due to limited funding from in-country partners. So far, a total of 174 plant clinics have been established (100 active), 442 plant doctors trained, 52 pest management decision guides and 51 factsheets for farmers developed for use by the country.

www.cabi.org/plantwise

Plantwise in the Americas and Caribbean

Location: Barbados, Bolivia, Brazil, Costa Rica, Grenada, Honduras, Jamaica, Nicaragua, Peru, Trinidad and Tobago

Dates: Ongoing

CABI Project Manager: Yelitza Colmenarez

CABI Project Team: Natália Corniani (M&E), Eduardo Hidalgo (Central America and the Caribbean), Luis Medina (CABI Associate – Central America) and Claudia Sainz (CABI Associate – South America)

Donors: Foreign, Commonwealth and Development Office (FCDO); the Swiss Agency for Development and Cooperation (SDC); the Directorate General for International Cooperation (DGIS), Netherlands; Australian Centre for International Agricultural Research (ACIAR); the International Fund for Agricultural Development (IFAD); Koppert Foundation

Partners: Various ministries of agriculture, NGOs, extension services, private sector entities and research institutes

Plantwise is a global programme led by CABI, which helps farmers lose less of what they grow to plant health problems. Working closely with national agricultural advisory services, we have established a global plant clinic network, run by trained plant doctors, where farmers can find practical plant health advice.

Since its launch in 2011, the Plantwise programme has been introduced to 34 countries in Africa, Asia, and the Americas, positively impacting the lives of over 50 million smallholder farmers by contributing to improved plant health management, leading to increased yields and income. The programme has achieved this by strengthening the capacity of extension staff to deliver quality plant health advice through plant clinics and complementary extension approaches, and by strengthening the linkages between plant health system stakeholders, leading to better targeting and coordination of farmer support.

Individual country (2019-2022) progress is as follows:

Barbados: Assisted by the Ministry of Agriculture, Food Fisheries and Water Resources, Plantwise has established 39 plant clinics, run by 21 trained plant doctors, in collaboration with three agro-input suppliers, a wholesale supplier and government institutions. In support, 14 pest management decision guides and 23 factsheets have been written.

Bolivia: Implemented in four departments through regional governments, Plantwise has established 100 plant clinics and 371 trained plant doctors. They have 138 factsheets and 29 pest management decision guides. Some former plant doctors from regional governments now provide clinic services as part of their private initiative.

Brazil: Partnering with EMBRAPA Mato Grosso, Plantwise has six plant clinics in Brazil, run by 39 trained plant doctors. Experts have written 17 factsheets and 10 pest management decision guides. The national forum is reviewing and planning activities. Plantwise has been able to establish a group of graduate students to follow up production of extension materials in Portuguese.

Colombia: CABI has been implementing Cocoa Value Chain plant clinics in collaboration with key public-private sector entities, as part of the Colombian Cocoa control and monitoring system (COLCO) project, which was funded by the Newton-Caldas Fund and Plantwise. The COLCO project was set up in early 2018 to increase the volume and quality of cacao produced in Colombia, by means of increased monitoring and traceability throughout the cacao value chain. Six pilot plant clinics have been implemented and 44 plant doctors trained.

Costa Rica: The programme is operating in four provinces through the Extension Service with technical backup from the Plant Health Department of the Ministry of Agriculture. Plantwise has established 27 plant clinics, run by 155 trained plant doctors that have developed five factsheets and 55 pest management decision guides for technical support.

Grenada: Operated by the Ministry of Agriculture, Forestry, Fisheries and the Environment, Plantwise has trained 27 plant doctors, in collaboration with the national team of trainers. Eleven plant clinics have been established and 24 factsheets and 18 pest management decision guides have been developed to support the clinics.

Honduras: Operating in 10 departments through the Plant Health Secretariat of the Ministry of Agriculture, NGOs and private sector, Plantwise runs 32 plant clinics. Approximately 106 plant doctors have been trained and are supported by 19 factsheets and 74 pest management decision guides. Plant health rallies have been helpful to deliver extension messages to indigenous farmers in Intibucá, leading to less reliance on toxic pesticides (class III and IV).

Jamaica: Operating in 14 parishes through the Rural Agricultural Development Authority and the Research and Development Division of the Ministry of Industry Commerce, Agriculture and Fisheries. There are 122 established plant clinics; all regions are now covered by 89 trained plant doctors.

Nicaragua: Plantwise has facilitated the establishment of 30 plant clinics, operated through farmer cooperatives, universities and NGOs in five departments. 175 plant doctors have been trained, 42 factsheets produced and 148 pest management decision guides created for technical support. Two universities have adopted the Plantwise training materials and have trained more than 400 agronomy students, reinforcing their diagnostics skills. The UCATSE University launched a Diploma Course for plant doctors with 17 participants in the first course.

Peru: Plantwise in Peru is the most developed programme. It has established 84 plant clinics with more than 370 plant doctors, supported by 84 factsheets and 34 pest management decision guides. The introduction of the e-plant clinic has helped to reduce the waiting time of when data becomes available from approximately 170 days to 21 days.

Trinidad and Tobago: Plantwise runs through the Ministry of Agriculture, Lands and Fisheries, through the Extension Training and Information Services Division (ETISD) and the National Agricultural Marketing and Development Corporation. Plantwise facilitated the establishment of 12 plant clinics with 153 trained plant doctors. Experts have written 36 factsheets and nine pest management decision guides to help provide technical support. ETISD has successfully adopted the scheme of virtual plant clinics reaching 109,690 views in 2021 only.

E-plant clinics: E-plant clinics have been introduced using government sponsored equipment to improve data collection in Jamaica, Honduras and Costa Rica. Data collection has improved the quality of the data.

www.cabi.org/plantwise

Plantwise in Asia

Location: Afghanistan, Bangladesh, Cambodia, China, India, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam

Dates: Ongoing

CABI Project Manager: Malvika Chaudhary

CABI Project Team: Manju Thakur, Zakria Faizi, Naeem Aslam, Vinod Pandit, Muhamad Faheem, Sivapragasam Anamalai, Wan Min, Feng Zheng

Donors: Foreign, Commonwealth and Development Office (FCDO); the Swiss Agency for Development and Cooperation (SDC); the Directorate General for International Cooperation (DGIS), Netherlands; Australian Centre for International Agricultural Research (ACIAR); Ministry of Agricultural Affairs (MARA) People's Republic of China; the International Fund for Agricultural Development (IFAD); Koppert Foundation

Partners: Various ministries of agriculture, NGOs, extension services, private sectors, and research institutes

Plantwise is a global programme led by CABI, which helps farmers lose less of what they grow to plant health problems. Working closely with national agricultural advisory services, we have established a global plant clinic network, run by trained plant doctors, where farmers can find practical plant health advice.

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Individual country (2019-2022) progress is as follows:

Afghanistan: Operated by The Ministry of Agriculture Irrigation and Livestock, Plantwise has 258 clinics and has trained 587 plant doctors, data managers, and monitoring officers. In support, 83 pest management guides and 96 factsheets have been written. In 2021, due to security reasons, the clinics could not operate but there was a good number of stakeholder meetings discussing a way forward for plant clinics.

Bangladesh: Implemented by the Department of Agricultural Extension, Plantwise has 443 clinics and 695 trained plant doctors; 50 factsheets, 100 guides and a national forum have been created. Plantwise is considered as a national crop monitoring programme under the integrated platform of One Health, currently being institutionalized by One CGIAR and MoA.

Cambodia: Partnering with the General Directorate of Agriculture, Plantwise has 31 plant clinics that are run by 79 trained plant doctors in climate-smart villages. Experts have written 65 factsheets and 66 guides. Currently, there are no operations in Cambodia – these finished in 2019.

China: Operating in three provinces, Plantwise runs 117 plant clinics. Approximately 879 plant doctors have been trained; 174 factsheets and 67 guides created. Plantwise in China has set up a fine example of using plant clinic data for releasing subsidies for the purchase of biocontrol products. Agro dealers are also involved to give prescription-based advice.

India: Operated by State government, NGOs, and a private sector comprising of a Farmer Producer Organization, Plantwise has approximately 114 clinics and 401 trained plant doctors across five states. 142 guides and 95 factsheets are available to support the clinics. Despite the pandemic, plant doctors were able to reach a vast number of farmers through ICT approaches such as E-plant clinics, webinars, and the use of mass media campaigns.

Myanmar: Plantwise has successfully trained 189 plant doctors and has 107 clinics in four regions. 29 fact sheets and 10 guides have been written, and a national forum was created. Plantwise in Myanmar has progressed well, informing the stakeholders on the invasive species, fall armyworm, and also collaborating with IFAD-funded Fostering Agricultural Revitalization in Myanmar (FARM) plant clinics as a one-stop hub for farmers to get both information and inputs for pests and diseases.

Nepal: Operated by the Plant Protection Department of the Ministry of Agriculture and also iDE, an NGO farmer-based organization linked to the programme by community-based facilitators, there are 122 clinics in 35 districts run by 378 plant doctors. The clinics are supported by 33 guides and 41 factsheets. The iDE provides a unique community-based facilitator delivery model for both inputs and information at farmers' doorsteps.

Pakistan: Plantwise in Pakistan is the most developed programme. It has 771 clinics, including women's clinics, across all five provinces with 2085 plant doctors. Supported by 101 factsheets and 85 guides, the programme has reached sustainability with complete ownership by the government. The highlight is the newly instilled National Datacenter which uses plant clinic data to forecast pest risks.

Sri Lanka: The well-structured national forum and partnership with the Ministry of Agriculture has helped Plantwise establish 820 clinics which have since reduced to 99 due to the pandemic. Plantwise has trained 1321 plant doctors and developed 155 guides. In Sri Lanka, plant clinics have a tremendous scope with the Department of Export Agriculture owing to the requirement of reducing pesticide use for crop production.

Thailand: Working with the Rice Department of the Ministry of Agriculture and Cooperatives, 29 clinics have been established and 801 plant doctors trained. 34 guides and 37 factsheets have been written to support them. The recent scale-up by the Department of Agricultural extension has increased outreach through more clinics.

Vietnam: 25 plant clinics were established and run by the Plant Protection Department of the Ministry of Agriculture in Vietnam, whilst 35 guides and 63 factsheets have been written with the support of the Vietnam Agricultural Academy of Sciences. The partnerships with the private sector have resulted in commodity-specific clinics like pepper and coffee clinics. A recent partnership with a software company has resulted in the development of an AI-based App for dragon fruit pest management.

Plantwise China Award

An innovative extension service, promoting Integrated Pest Management (IMP) to Plantwise plant clinics in Beijing, was awarded first prize at the Beijing Municipal Agri-Tech Extension Award in March 2020. The award recognizes the significant achievement on IPM-compatible plant protection technologies through innovatively combining Beijing's "Green Pest Control Subsidy Programme" with the plant clinic network of Plantwise. By the end of September 2021, based on plant clinic prescription forms, more than CNY 220 million (USD 33.8 million) of subsidies have been paid via BPPS for IPM-compatible products in Beijing, China.

www.cabi.org/plantwise

PlantwisePlus

Location: Global

Dates: Ongoing

CABI Project Manager: Ulrich Kuhlmann

CABI Project Team: Monica Kansiime, Ivan Rwomushana, Belinda Luke, Lorna Migiro, Claire Curry

Donors: Ministry of Foreign Affairs of the Netherlands; the European Commission Directorate General for International Partnerships (INTPA); Foreign, Commonwealth & Development Office (FCDO); Swiss Agency for Development and Cooperation (SDC); Australian Centre for International Agricultural Research (ACIAR); Ministry of Agricultural Affairs (MARA) People's Republic of China

Partners: In-country partners

PlantwisePlus, an evolution of Plantwise and CABI's Action on Invasives programmes, will comprehensively support farmers and countries in a changing climate to further predict, prepare for and prevent plant health threats, helping to improve the quality and quantity of food grown.

PlantwisePlus will build on CABI core strengths and work across four specific objectives:

1. Enhance digital advisory tools to boost climate-resilient agriculture
2. Increase the supply of and demand for safer, higher quality food
3. Strengthen detection and response to pest outbreaks
4. Enhance availability of safer plant protection products

During the 10-year programme, we envisage 20 countries joining us as part of an ambition to make 50 million farmers more resilient to climate change impacts and more able to access higher value domestic markets for their produce.

An inception phase started in 2020, followed by a 3-year proof-of-concept phase. Specific interventions will be tested in 6-7 selected countries in Africa, Asia and the Americas.

Progress to-date:

Specific objective 1:

- A landscaping activity to discover available digital advisory tools was conducted
- An open-access Crop App Index website, designed to support decision making, was developed
- A new pesticide dosage calculator tool was developed as a result of consultations with agricultural service providers
- An Agriculture Skills Framework was created, followed by a business case and strategy
- CABI's Crop Pest Diagnosis and Management courses were reformatted into two online Certificate of Advanced Studies courses on Integrated Crop Management
- A Gender and Rural Advisory Services Assessment Tool assessment in Ghana was completed and shared with partners
- A validation workshop and advocacy training will take place in March 2022

Specific objective 2:

- Literature reviews were conducted for eight countries to determine evidence of pesticides exceeding maximum residual levels
- A consumer food safety awareness survey in Kenya was conducted and indicated that pesticide residues were among the key food safety concerns
- Good progress has been made in Kenya and Ghana towards understanding the existing food safety production standards and the demand
- Desk-based studies on the depth and breadth of initiatives supporting women and youth engagement in agricultural service provision was undertaken
- An in-depth skills gap analysis for farmer organizations in Kenya to identify potential target groups with which to work was completed
- Work with agribusiness service providers continues
- Agreements and discussions with partner organizations continues

Specific objective 3:

- Good progress was made towards the classical biological control of papaya mealybug, parthenium and fall armyworm in Africa and Asia
  - In Kenya, a permit was acquired to import a parasitoid of papaya mealybug from Ghana and the first field releases were undertaken
  - In Pakistan, an approval to release a parthenium stem boring weevil was granted
  - Mass production of both species will be undertaken for area wide releases in 2022
  - For fall armyworm, a mass production method was developed in Pakistan for rearing *Trichogramma chilonis*. Parasitized eggs were shared with partners in-country and in Malaysia
  - In Rwanda, work on entomopathogenic nematodes incorporated in a gel formulation continues and in Zambia, a promising entomopathogen will be investigated further in 2022

- In Ghana, Kenya and Pakistan, access to the Horizon Scanning, Pest Risk Analysis (PRA) and the Crop Protection Compendium tools were provided to undertake pest risk analysis for controlling import and trade
  - PRA reports were completed for three species in Ghana,16 species in Kenya and nine species in Pakistan
  - Pest insight reports were produced for emerging national pest risks
  - The national plant protection agencies of Burkina Faso, Niger and Mali also expressed interest in access to, and training on, the tools
  - A response plan for Ghana that identified threats present in the country was developed for two species; some elements of the response plan will be supported by CABI
- In Zambia, a study of 516 households was conducted to establish the effects of the cassava brown streak disease on farmers' livelihoods
- In Kenya, 706 farmers were interviewed about the impact of the apple snail on farmers' livelihoods; 383 farmers were asked about their knowledge, attitude and practices towards biological control of the papaya mealybug
  - Positive outcomes encouraging the use of environmentally friendly, safe pesticides, and supporting biological control initiatives were found

Specific objective 4:

- A survey on the regulations required to become an agro-input dealer was carried out across 17 countries
- In Uganda, 500 agro-dealers were targeted directly through a 'needs assessment'
- Mini-needs-surveys were completed in eight additional countries
- A policy brief was submitted to the Pakistan government relating to the 'Aflatoxin control' project
- Additional assessments on the impacts of withdrawing three common chemical pesticides and their alternatives, was compiled for Ghana, Kenya and Pakistan
- A review of major pests in Pakistan and Kenya and potential low-tech biocontrol mass production facilities was completed
  - *Trichogramma* to control *Helicoverpa* in tomatoes in Pakistan and *Acerophagus papayae* (a parasitic wasp) to control the papaya mealybug in Kenya would be taken forward

www.cabi.org/plantwiseplus

Potential invasion of *Spodoptera frugiperda* in Switzerland and options for sustainable control methods

Location: Switzerland

Dates: 01/07/2019 – 30/06/2021

CABI Project Manager: Marc Kenis

CABI Project Team: Dirk Babendreier, Lukas Seehausen

Donors: Federal Office for Agriculture (FOAG), Switzerland

Spodoptera frugiperda, fall armyworm, a highly invasive pest in Africa and Asia, is a tropical and subtropical species that is not able to survive low winter temperatures. However, it is able to migrate thousands of kilometres in summer and cause damage in temperate regions.

There is, therefore, some concern that temporary outbreaks may occur in Switzerland from populations migrating from the Mediterranean basin. The objectives of the project are to assess the risk of fall armyworm establishing and migrating to Switzerland; to review management methods appropriate for temperate climates; and to assess potential biocontrol methods available in Switzerland.

Preventing the COSTS of IAS in Barbados and the organization of Eastern Caribbean States

Location: Trinidad & Tobago, Barbados, Antigua and Barbuda, St Kitts and Nevis

Dates: 11/07/2018 – 31/05/2022

CABI Project Manager: Naitram (Bob) Ramnanan

CABI Project Team: Arne Witt

Donors: Global Environment Facility (GEF) through UN Environment Programme

Partners: Department of the Environment, Antigua and Barbuda; Ministry of the Environment and National Beautification, Barbados; Ministry of Agriculture, Dominica; Department of the Environment, St. Kitts and Nevis; Department of Forestry, St. Lucia; Ministry of Agriculture, St. Vincent and the Grenadines

Invasive alien species (IAS) can cause serious damage to livelihoods, agriculture and biodiversity across the Caribbean. This project contributes to prevention, early detection, control and management of IAS in the region by managing their risks and costs on important ecosystems, species and genetic diversity. It has also been increasing the awareness of the IAS and their negative impacts through the use of local, international and social media.

Some examples of project work include the successful removal of rats on several offshore islands in Antigua and Barbuda, work on the impact of the green monkey on and economic sectors in St. Kitts and Nevis, and how the endangered endemic leaf toe gecko can be protected from IAS.

An IAS App and field guide will also be provided to countries in the project to create greater awareness and assist those who engage in biosecurity to better conduct their surveillance at ports of entry.

PRISE: Pest Risk Information SErvice

Location: Ghana, Kenya, Malawi, Zambia

Dates: 01/12/2016 – 30/03/2022

CABI Project Manager: Charlotte Day

Donors: UK Space Agency; UK Aid; Swiss Agency for Development and Cooperation; European Union; Ministry of Foreign Affairs of the Netherlands; Irish Aid; International Fund for Agricultural Development; Australian Centre for International Agricultural Research; Ministry of Agriculture of the People's Republic of China

Partners: Assimila – Project consortium; King's College London – Project consortium; Centre for Environmental Data Analysis – Project consortium; Plant Protection & Regulatory Services Directorate (PPRSD), Ghana – International partner; Kenya Agricultural & Livestock Research Organization (KALRO), Kenya – International partner; Ministry of Agriculture, Livestock and Fisheries, Kenya – International partner; Zambia Agriculture Research Institute (ZARI), Zambia – International partner

Pests are estimated to cause typical losses of 40% to crops. A Pest Risk Information SErvice (PRISE) aims to solve this problem by using data to help farmers manage pests in sub-Saharan Africa. Since 2017, PRISE has delivered pest alerts in Kenya, Ghana, Zambia and Malawi to 1.8 million farmers.

During 2019/2020 in Kenya, PRISE model outputs were integrated into the MoA-INFO SMS service; 59% of farmers who received the service changed their practices based on PRISE recommendations for fall armyworm, resulting in a larger maize harvest. In 2020/2021, 87% of maize farmers surveyed believed the time recommended to act by PRISE was correct.

www.cabi.org/PRISE

Proactive biocontrol of Spotted Lanternfly

Location: Canada, China, Switzerland

Dates: 30/11/2019 – 01/03/2022

CABI Project Manager: Tim Haye

Donors: Agriculture and Agri-Food Canada

Partners: Agriculture and Agri-Food Canada

The spotted lanternfly is an Asian polyphagous pest that feeds on more than 70 plants by sucking the sap from leaves, stems and trunks. Whilst not present in Canada, climate models and growing populations in the US suggest easy establishment and accidental introduction. Following a 'proactive biocontrol' approach, CABI is investigating the natural enemies of spotted lanternfly in China, particularly their host specificity and population level impact.

CABI started searching for suitable biological control agents in the Beijing Province of China in 2019. In 2021, we continued sampling eggs and nymphs in the vicinity of Beijing. In total, 271 egg masses (10,227 eggs) were collected from which 709 *Anastatus orientalis* (Hymenoptera: Eupelmidae) emerged. Remaining eggs were dissected for dead parasitoids and larvae, showing that overall egg parasitism was 23%. 250 second and 718 third instar nymphs were collected and reared for parasitoids. In total, 28 (11.2%) and 85 (11.8%) were parasitized by *Dryinus sinicus* (Hymneoptera: Dryinidae), respectively.

www.cabi.org/spotted-lanternfly

Producing better cotton in Pakistan

Location: Pakistan

Dates: 01/01/2013 – 31/03/2025

CABI Project Manager: Noor Nabi Bhutto

Donors: Sustainable Trade Initiative (IDH) (BCFT Fund); Better Cotton Initiative: Growth and Innovation Fund (BCI-GIF); Managed by: the Sustainable Trade Initiative (IDH)

Partners: Department of Agriculture Research, Sindh

Cotton is Pakistan's largest industrial sector and integral to economic development. However, the industry is losing around 10–15% through poor practices such as misuse of pesticides and water, inappropriate application of chemical fertilizers, transportation, storage, and gaps in knowledge and skills.

The Better Cotton Initiative was created in 2013 with the aim to make cotton production better for people and the environment and to secure the sector's future.

Funded yearly, the initiative encourages farmers to implement Better Cotton production principles and good agricultural practices (GAP) through participatory training for farmers and their farm workers in 'learning groups' and farmers' fields.

To-date, the project has trained 32,493 cotton farmers and 75,476 farm workers and built the capacity of 56,796 female workers. In total, 262,756 metric tonnes of better cotton have been produced.

www.cabi.org/better-cotton

Promoting biodiversity in grasslands of the Swiss Jura

Location: Switzerland

Dates: 01/11/2019 – 31/12/2023

CABI Project Manager: Rene Eschen, Urs Schaffner

Donors: Fondation Sur-la-Croix, Switzerland

Partners: Fondation Rurale Interjurassienne

In Switzerland and other parts of Europe, the agricultural intensification during the second half of the 20th century has led to a homogenization of the landscape and a strong reduction in biodiversity. In the 1990s, the Federal Swiss government introduced direct payments for ecological compensation areas with the aim to promote the restoration of species-rich habitats in agricultural landscapes. As part of this, CABI is working on restoring biodiversity in grasslands in the Swiss Jura through the transfer of locally collected seed material. First experimental trials were set up in 2020 and results are due from late 2021 onwards.

www.cabi.org/swiss-grasslands

Promoting domestic coffee consumption in Africa

Location: Ethiopia, Ghana, Kenya, Nigeria, Tanzania, Uganda, Zambia

Dates: 09/09/2019 – 31/05/2020

CABI Project Manager: Charles Agwanda, Daniel K. Karanja

Donors: Inter-African Coffee Organization (IACO); International Coffee Organization (ICO)

Partners: Commodities & Export Trade Department; Zambia Coffee Growers Association; Uganda Coffee Development Authority; Tanzania Coffee Board; Agriculture and Food Authority (AFA) – Coffee Directorate; Ghana Cocoa Board; Ethiopian Coffee and Tea Authority Head Office

Coffee is a primary income source for more than 12 million households in Africa, particularly for rural populations. However, production of the crop has been on a general downward spiral in the continent for over two decades, driven by low and volatile international coffee prices. Increasing domestic coffee consumption is seen as a viable way of cushioning coffee smallholders in Africa against price decline and volatility.

CABI undertook a study to identify the factors underpinning domestic coffee consumption, the potential market size and possible paths for facilitating its growth. The study provided statistical evidence on the market landscape and investment opportunities. Results indicated that increasing domestic consumption would protect smallholder farmers against coffee price volatility and improve retention of coffee incomes.

Studies on job creation and marketing also suggested positive outlooks with investments in creating apprenticeships and access to finances for start-ups. Targeting the middle-income population with marketing campaigns would also help increase domestic consumption.

www.cabi.org/domestic-coffee-consumption-africa

Promoting sustainable organic cotton production and supply in Pakistan

Location: Pakistan

Dates: 15/09/2019 – 15/09/2020

CABI Project Manager: Ashfaq Ahmed Nahiyoon

Donors: Laudes Foundation

Partners: Central Cotton Research Institute (CCRI) Sakrand; Pakistan Central Cotton Committee (PCCC); Balochistan Agriculture Extension Wing; Balochistan Agriculture Research Institute – BARI; Federal Seed Certification and Registration Department (FSC&RD); Pakistan Agricultural Research Council (PARC); Ministry of National Food Security & Research (MNFS&R)

Certified organic cotton production contributes to less than 1% of global cotton cultivation. This is because access to organic cotton seed is so difficult. In Pakistan, the lack of policies, availability of non-Genetically Modified Organism (GMO) seed and weak links with input suppliers and supply chains makes organic cotton farming demotivating and uninteresting for farmers. This project will create a conducive ecosystem for organic cotton and contribute to the long-term availability of non-GM cotton seed and organic inputs for farmers with a self-sustaining approach.

CABI has engaged key partners in government including the Balochistan Agricultural Research Institute (BARI), Balochistan Agricultural Extension Department, Pakistan Central Cotton Committee (PCCC) and the Ministry of National Food Security & Research (MNFS&R).

Stakeholders have met to discuss the procurement of non-GMO cotton seed varieties for use by farmers in Balochistan and farmers have been identified to take part in the project.

www.cabi.org/organic-cotton-pakistan

Protecting and stabilizing agro-production through improved invasive species management

Location: Malawi

Dates: 01/02/2019 – 31/12/2025

CABI Project Manager: Arne Witt

Donors: Global Environment Facility (GEF) through Malawi Environmental Affairs Department (EAD)

Partners: Environmental Affairs Department (EAD)

The project aims to increase awareness, build capacity and develop policies to enhance the management of invasive plants, especially in protected areas and surrounding agro-ecosystems.

The main focus of the project is in Nyika National Park, Mount Mulanje Forest Reserve and adjoining agro-ecosystems. Much of the work will focus on clearing invasive plants from these protected areas, using a multi sector approach.

Protecting coconuts from pest and diseases in Papua New Guinea

Location: Papua New Guinea

Dates: 01/03/2019 – 29/02/2020

CABI Project Manager: Arnaud Costa

CABI Project Team: Sathis Sri Thanarajoo, Muhammad Faheem, Sivapragasam Annamalai, Jayne Crozier, Julie Flood

Donors: Kokonas Indastri Korporesen (KIK); local stakeholders

With a growing global demand for coconuts, there is an increasing need for the industry to be protected from emerging exotic and invasive pests and diseases. A systematic approach needs to be undertaken to manage existing pests and diseases and prevent the incursion of exotic threats. For example, the incursion of bogia coconut syndrome in Papua New Guinea could become lethal to the coconut industry and has the potential to affect the oil palm, which is a high economic value industrial crop for the country.

The objectives of the project were to identify existing pests and diseases in Papua New Guinea and any that could enter the country and threaten its coconut industry; to conduct a risk analysis on selected exotic pests and diseases identified as key threats to the coconut industry; and to develop a comprehensive biosecurity risk management and emergency response plan for the coconut industry in Papua New Guinea.

Protecting North America's wetlands from common reed

Location: USA, Canada

Dates: 01/01/1998 – Ongoing

CABI Project Manager: Patrick Hafliger

Donors: US Army Corps of Engineers; US Fish and Wildlife Service through Cornell University; New York State Department of Transportation through Cornell University, USA; New York State Department of Environmental Conservation, USA; British Columbia Ministry of Forests, Lands and Natural Resource Operations, Canada

Partners: Cornell University, Ithaca, USA; University of Rhode Island, USA

Common reed is one of the most widespread plant species in the world. It is invasive in North America where it forms large monocultures in wetlands and along riverbanks and lakesides, which reduce native biodiversity. One reason for its dominance is an absence of natural enemies to keep in check its vigour and spread. CABI is studying several stem mining moths, not currently present in North America, to see whether they would be safe and effective biological control agents, if introduced.

A field release of *Lenisa geminipuncta* and *A. neurica* in North America was accepted in 2019 for Canada and recommended by the Technical Advisory Group for Biological Control Agents of Weeds in the US. In 2020, the first releases of pupae of *A. neurica* took place in Canada and in 2021, first larvae and pupae of *L. geminipuncta* were released. Success of establishment will be monitored in 2022.

www.cabi.org/common-reed

Protecting St Helena's biodiversity and enhancing its agriculture

Location: St Helena

Dates: 01/09/2021 – 31/03/2025

CABI Project Manager: Norbert Maczey

CABI Project Team: Philip Taylor, Rob Reeder, Jayne Crozier, Harry Evans

Donors: Darwin Initiative

Partners: St Helena Research Institute (SHRI); Environment, Natural Resources and Planning Directorate (ENRP); The Birmingham Institute of Forest Research (BIFoR)

The biodiversity of the UK Overseas Territory of St Helena is almost equal to that of the Galapagos Islands. The cloud forests on the island contain 250 endemic species and entire ecosystems found nowhere else. The foundation of these ecosystems are the trees of the cloud forest, but these are under threat.

CABI has received a grant from the Darwin Initiative (with funding from Department for Environment, Food and Rural Affairs) to investigate the dieback of the cloud forest trees and the disease-related decline of the insect populations. The project also aims to catalogue the diseases affecting local farming systems and to improve management advice, thus enabling growers to increase productivity.

www.cabi.org/st-helena

Providing NPPOs of CABI Member Countries (B1-4) with free access to CABI's Crop Protection Compendium and Pest Risk Analysis Tool

Location: Global. **Member Countries benefited**: Anguilla, Bahamas, Bangladesh, Barbados, Bermuda, Botswana, British Virgin Islands, Brunei Darussalam, Burundi, Cote d'Ivoire, Cyprus, Democratic People's Republic of Korea, Ethiopia, Gambia, Ghana, Grenada, Guyana, Jamaica, Kenya, Malawi, Mauritius, Montserrat, Myanmar, Nigeria, Pakistan, Papua New Guinea, Philippines, Rwanda, Sierra Leone, Solomon Islands, South Africa, Sri Lanka, St Helena, Tanzania, Trinidad and Tobago, Uganda, Vietnam, Zambia, Zimbabwe

Dates: 01/02/2018 – Ongoing

CABI Project Manager: Gareth Richards

CABI Project Team: Lucinda Charles, Lesley Mcgillivray, Mike Frewin, Corrie Gray, Michelle Jones, Neil Docherty, Phil Barton, Hannah Fielder, and many others.

Donors: Foreign, Commonwealth & Development Office (FCDO)

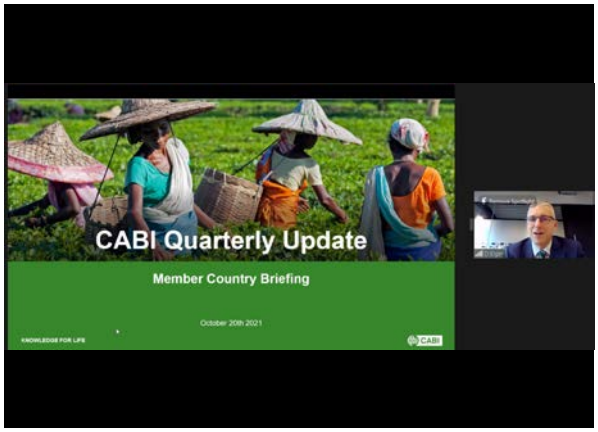
Partners: NPPOs of various CABI's Member Countries

The Pest Risk Analysis (PRA) is a decision support tool to assist risk assessors and risk managers to conduct a pest risk analysis for a plant commodity pathway or an individual pest. It provides access to the relevant data in the Crop Protection Compendium (CPC) and a framework for the PRA process that is closely aligned to international standards. The PRA Tool is provided as an add-on to a subscription for the Crop Protection Compendium (CPC).

Using CABI's Crop Protection Compendium, the tool has drawn on scientific information from over 3,800 detailed datasheets on pests, diseases and weeds. CABI is aiming for it to be used by quarantine/ plant protection staff in 37 of CABI's Member Countries (in fee bands 1 and 2).

To date, free access has been set up for 29 Member Countries. CABI is also teaching master trainers how to use the tool, together with other invasive species content, tools and best practice solutions.

Quarterly Briefings to Member Countries



Location: Global. All Member Countries

Dates: Ongoing

CABI Project Manager: Qiaoqiao Zhang

Our engagement with Member Countries in 2020-21 continued to build on the recommendations of the 2020 KPMG Review, with a focus on regular communication, optimizing our updated governance mechanisms and enhancing the package of benefits provided to Members. Regarding regular communication, CABI has set up a routine of Quarterly Update Briefings via videoconference for all Liaison Officers and Executive Council delegates. These briefings are aligned with the CABI Governing Board calendar (June, October and December) to augment the face-to-face Executive Council meeting in March so that Member Countries can be made aware of CABI's business and financial progress, risks and opportunities, programmes and projects as well as key decisions and recommendations made by the Board. These quarterly virtual briefing meetings for Member Countries have been well attended and are appreciated, according to a recent survey.

Raising awareness of cocoa pests and diseases which threaten production

Location: Cote d'Ivoire, Ghana, Indonesia

Dates: 01/01/2019 – 31/12/2019

CABI Project Manager: Jayne Crozier

CABI Project Team: Birgitta Oppong-Mensah

Donors: Mondelez International

Partners: Cocoa Research Institute of Ghana (CRIG); Centre National de Recherche Agronomique (CNRA); Indonesian Coffee and Cocoa Research Institute (ICCRI)

Pests and diseases are one of the main constraints on cocoa production. The most yield-limiting pests and diseases are currently confined to specific regions of the world: witches' broom and frosty pod rot in the Caribbean and Latin America; and vascular streak dieback and cocoa pod borer in Asia and the Pacific.

To stop the spread of these pests and diseases from one region to another, capacity-building workshops were held with extension staff in Cote d'Ivoire, Ghana and Indonesia. These helped raise awareness of non-indigenous pest and disease threats, and provided information on how to recognize the symptoms at an early stage.

Realising equitable gender opportunities to improve smallholder coffee livelihoods using digital technology

Location: Colombia

Dates: 17/05/2019 – 31/10/2020

CABI Project Manager: Steve Edgington

CABI Project Team: Yelitza Colmenarez, Steve Edgington, Natalia Corniani, Julien Godwin, Pablo Gonzalez-Moreno, Lizzie Finch, Alyssa Lowry, Sean Murphy, Rhian Whelan

Donors: Technology Strategy Board

Partners: Cafexport; Assimila; Climate Edge

The coffee berry borer is the most serious coffee pest in the world, causing crop damage in excess of US$500 million every year. Climate change is exacerbating the problem by enabling the spread of the pest, especially at higher altitudes. To overcome their losses, farmers are tending to intensify their activities and expand growing areas.

CABI and partners produced a prototype alert system that used climatic data and remote sensing technology to give farmers advance warning of coffee berry borer surges. The system enables farmers the time to access and apply controls effectively. The team also delivered a series of biopesticide messages via SMS to coffee farmers, which provided basic information on biopesticides and safety information for chemical pesticides. All the farmers involved were women, in an effort to overcome gender disparities in coffee farming.

A second phase would scale out the alert system to the wider coffee-growing regions of Colombia.

www.cabi.org/coffee-colombia

Rearing natural enemies to control crop pests in Pakistan

Location: Pakistan

Dates: 21/01/2019 – 30/09/2022

CABI Project Manager: Ashfaque Dhuanroo

Donors: Productivity Enhancement Project (SIAPEP); Sindh Irrigated Agriculture

The process of protecting crops from pests and diseases in Pakistan is still reliant on unsustainable pesticide practices. Between 1980 and 2004, the use of pesticides increased by over 6,600 percent, despite yields remaining stagnant over the same period. Since 2004, Integrated Pest Management (IPM) methods have proved successful for reducing pesticide use and protecting human health and the environment.

To address unnecessary and damaging pesticide use in Pakistan, the CABI team plans to implement a number of IPM activities, designed to promote environmentally friendly biocontrol technologies and build capacity among farmers, extension staff and other key agricultural stakeholders in Sindh province. This project aims to establish 50 Natural Enemies Field Reservoirs to tackle crop pests directly and train over 31,500 farmers and extension staff on implementing IPM technologies in the Sindh province.

www.cabi.org/nefr

Refined monitoring of sentinel plantings for improved biosecurity

Location: Global. Switzerland

Dates: 2015 – 2019

CABI Project Manager: Rene Eschen

Donors: Swiss National Science Foundation (initially Swiss State Secretariat for Education, Research and Innovation)

Partners: Federal Research Institute for Forest; Snow and Landscape Research WSL; University of Bern; others in many countries around the world

Studying pests of exotic or native trees in exporting countries is an effective method to find new organisms associated with tree species and/or to assess damage potential of pests prior to introduction into importing countries. This project looked at the experimental design for optimal sampling of potential new pests of seeds and other plant material.

Studies of traded seeds revealed high insect and fungal infestation rates in seed lots from China, the USA and Europe. The insect species were adapted to seeds and may become established if they encounter a suitable host upon arrival, but it is unclear whether the seed borne fungi can establish. Samples of dormant twigs, from around the world, reveal strong geographic patterns in the highly diverse fungal communities, illustrating that international trade in live plant material is associated with the movement of fungi, and highlighting the need for better regulation and phytosanitary measures to mitigate future pest introductions.

Regional exchange of knowledge on fall armyworm

Location: Brazil, India

Dates: 01/04/2020

CABI Project Manager: Malvika Chaudhary, Yelitza Colmenarez

Regional Coordinators of Asia and Latin America Plantwise organized an exchange between scientists on fall armyworm management via a virtual platform. Experiences on the use of biocontrol agents were discussed as well as scaling up mass production technologies.

Dr Malvika Chaudhary and Dr Yelitza Colmenarez coordinated an inter-regional exchange on knowledge regarding fall armyworm management using biological control agents with 12 scientists from leading biological control institutes of both India – Indian Council of Agricultural Research (ICAR) and National Bureau of Agricultural Insect Resources (NBAIR) and Brazil – Luiz de Queiroz College of Agriculture, University of São Paulo (ESALQ).

Presentations were made online from both regions, followed by a question and answer session. The discussions were around the mass rearing methods of biological control agents and their efficacy in combination with other management strategies. This two-and-a-half-hour interaction also identified areas for future collaborations.

Reinforcing plant clinics in Barbados with a focus on youth

Location: Barbados

Dates: 01/01/2015 – 20/12/2020

CABI Project Manager: Yelitza Colmenarez

CABI Project Team: Eduardo Hidalgo, Yelitza Colmenarez

Donors: Plantwise

Partners: Ministry of Agriculture and Food Security, Barbados

The Ministry of Agriculture and Food Security in Barbados initiated the Plantwise programme in 2012. Since then, scientists from the Ministry of Agriculture have worked in coordination with CABI scientists to reach farmers and teach sustainable practices. In 2021 young people from the national colleges were incorporated into the plant health activities implemented in the country. By improving farmers' reach and providing technical advice on sustainable practices, the Ministry of Agriculture, in collaboration with CABI scientists and CABI's global initiatives, has improved food security in the country.

www.cabi.org/plantwise

Reinforcing plant clinics in Jamaica

Location: Jamaica

Dates: 01/01/2015 – 20/12/2020

CABI Project Manager: Yelitza Colmenarez

CABI Project Team: Eduardo Hidalgo, Yelitza Colmenarez

Donors: Plantwise

Partners: Ministry of Agriculture, Jamaica; Rural Agricultural Development Authority (RADA)

The Rural Agricultural Development Authority, the Research and Development Division and the Plant Quarantine Produce Inspection – all agencies of the Ministry of Industry, Commerce, Agriculture and Fisheries in Jamaica – in coordination with CABI, have implemented the Plantwise programme in the country. By improving farmers' reach and providing technical advice focused on sustainable practices, the Ministry of Agriculture, in collaboration with CABI scientists and CABI's global initiatives, has reinforced food security in the country.

www.cabi.org/plantwise

Remote sensing use for mapping Parthenium in Pakistan

Location: Pakistan

Dates: 01/03/2018 – 31/03/2021

CABI Project Manager: Julien Godwin

CABI Project Team: Tim Beale, Elizabeth Finch, Rene Breton, Abdul Rehman, Joe Fenell

Donors: Science and Technology Facilities Council (STFC)

Partners: The University of Manchester

Astronomy has the ability to improve lives. How? By monitoring and mapping things like invasive weeds, they can be effectively managed better. This will improve food security, livelihoods, and human and environmental health. In Pakistan, we used remote sensing technologies to monitor and map Parthenium, an invasive which a huge issue for the country. Through this project, policy makers will be made more aware of the issues and be able to use satellite data to support decision-making in agriculture, livestock and human health.

Methods will also be improved to allow for automated mapping and monitoring the distribution of Parthenium in rice and wheat fields. Lastly, we will strengthen the capacity of Pakistani researchers and technicians to contribute to their ongoing work.

Results are in progress.

www.cabi.org/remote-sensing-parthenium

Repelling the invader: turning the tide on Ascension's Mexican Thorn

Location: St Helena

Dates: 01/09/2021 – 29/03/2024

CABI Project Manager: Norbert Maczey

CABI Project Team: Corin Pratt, Anita Kopera

Donors: Department for Environment, Food & Rural Affairs (DEFRA)

Partners: Ascension Island Government (AIG)

Mexican thorn is the most damaging invasive species on Ascension Island. Introduced purposely, this weed has naturalised and spread rapidly, outcompeting native vegetation and negatively impacting wildlife, while encouraging invasive rodents.

This project will take a strategic and integrated approach to controlling thorn on Ascension including a rigorous assessment of further biocontrol and improved chemical and mechanical treatment. The project will ensure local capacity is built to deliver those most appropriate and cost-effective for Ascension. The outcome will be a step-change in our ability to control Mexican thorn and result in a long-term contraction of its range and restoration of habitats.

www.cabi.org/mexican-thorn

Research, rearing and collection services on corn rootworms

Location: Hungary, Switzerland

Dates: 01/01/2010 – Ongoing

CABI Project Manager: Stefan Toepfer

Donors: GNIS – Groupement National Interprofessionnel des Semences et plants, section maïs et sorgho, gestionnaire du Fonds Diabrotica; e-nema GmbH, Germany; SCOPES, Switzerland; Syngenta Foundation; Landwirtschaftliches Technologiezentrum (LTZ), Germany; Bavarian State Research Center for Agriculture (LfL), Germany; Commission for Technology and Innovation (CTI), Switzerland; Agence nationale de la recherche (ANR), France, BioInv-4I; EU FP5 Diabrotica Marie Curie Postdoc Fellowship; EU FP6 policy support action DIABR-ACT; EU FP5 DIABROTICA

The western corn rootworm is a destructive pest of maize. Most damage is caused by larvae feeding on the roots, which becomes apparent when plants lodge. Drawing on some 15 years' experience as a research and development partner on corn rootworms, CABI has become a key service provider for field surveys, laboratory and field research on basic ecology and management of the pest, rearing including supplying eggs for research, and writing support.

CABI has been a research and development partner on corn rootworms for over 10 projects spanning a period of more than 15 years, and has contributed to over 50 papers and a book on this pest. CABI engages widely with partners to find solutions for the management of maize pests, particularly rootworms. We work with many different players, including academic researchers, SMEs, larger agri-business industries, farmer associations and farmers. CABI also delivers over 200,000 rootworm eggs annually to partners for research. We hope to expand our collaboration for a joined effort in combatting this invasive maize pest.

www.cabi.org/corn-rootworms

Researching youth engagement in agriculture

Location: Vietnam

Dates: 01/06/2019 – 31/12/2019

CABI Project Manager: Sivapragasam Annamalai

Donors: CABI Development Fund (CDF)

This study, entitled "Youth Engagement in Agriculture: a Case Study", aimed to undertake exploratory research to determine challenges, opportunities and pathways for effective youth engagement in agriculture, contributing to increased job opportunities and benefits for young people.

Funded by the CABI Development Fund, it underpinned CABI's goals and objectives towards the development of evidence to show how value chain work can drive women's empowerment and youth employment.

Restoring grasslands of the Qinghai-Tibet Plateau

Location: China

Dates: 01/08/2017 – 31/07/2019

CABI Project Manager: Urs Schaffner

Donors: University of Manchester; Lancaster Environment Centre; Northwest Institute of Plateau Biology, Chinese Academy of Sciences; Grassland Research Institute, Chinese Academy of Agricultural Sciences

Halting and reversing land degradation is one of the biggest challenges to meeting the Sustainable Development Goal targets. A landscape-scale study on the Qinghai-Tibet plateau determined how grassland degradation impacts multiple soil functions and their resilience to change. While, specific plants with traits that make the soil more resilient identified.

Through the project, a multi-disciplinary research team was created who had the capacity to address the major challenges of developing policy and management tools for restoring soil function and resilience to degraded grasslands in low or middle income countries.

The team developed a road map for future, wide-ranging research on sustainable grassland management which included consideration of agronomic practices and socio-economic factors to restore grasslands across the globe.

Publications are in preparation and a first paper on 'Combatting global grassland degradation' was published in Nature Reviews Earth & Environment.

www.cabi.org/grasslands-qinghai-tibet

Review and assessment of public agricultural extension and advisory service systems in Asia and the Americas

Location: Cambodia, Costa Rica, El Salvador, Laos, Malaysia, Mexico, Myanmar, Philippines, Sri Lanka

Dates: 20/12/2021 – 29/06/2022

CABI Project Manager: Sathis Sri Thanarajoo

CABI Project Team: Yelitza Colmenarez

Donors: Food and Agriculture Organization of the United Nations (FAO)

Partners: Extension agencies in the target countries

This project focused on understanding the current public Agricultural Extension and Advisory Services (AEAS) system and the mechanism involved in reaching out to smallholder farmers.

The study explored five different sectors of AEAS: agronomy, animal husbandry, aquaculture, agro-machinery and agro-economics management covering the aspects of institutional arrangement, mandates, funding, human resources, infrastructure, policy environment and monitoring and evaluation.

The project aimed to review and assess public AEAS systems in nine countries: Cambodia, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Costa Rica, El Salvador, Mexico, and discover the pathways of reforming and strengthening the public AEAS systems for smallholder farmers.

A desk study, structured survey and key informant interviews were conducted and findings were recorded using both conventional methods and the KoBo toolbox and analysed. A final project report incorporating key details from all nine countries was prepared together with three country case studies highlighting varied AEAS systems in Sri Lanka, Costa Rica and Malaysia.

Reviewing and revising CGIAR's Open Access and Data Management Policy and Implementation Guidelines

Location: Global

Dates: 01/03/2020 – 31/07/2020

CABI Project Manager: Chipo Msengezi

CABI Project Team: Kathryn Reynolds

Donors: Consortium of International Agricultural Research Centers (CGIAR)

Timely and accurate decisions are critical to the success of food systems. Accessible, well-managed data promotes more efficient research and greater visibility for organizations carrying it out. In 2013, CGIAR promised to publish their research data openly and without restrictions, through the development of the CGIAR Open Access and Data Management Policy.

In this project, CABI led a review of the policy to determine how it has been implemented across the CGIAR system and whether updates were required for it to remain relevant. Recommendations were then made to ensure the policy included best practice and reflected CGIAR staff experiences. A report on the key findings and recommendations was presented to CGIAR in 2020, and the revised Open Access and Data Management Policy was officially approved by the System Management Board (with effect from April 2021).

www.cabi.org/cgiar-open-access

Revised Membership benefits package

Location: Global. **All Member Countries**: Anguilla, Australia, Bahamas, Bangladesh, Barbados, Bermuda, Botswana, British Virgin Islands, Brunei Darussalam, Burundi, Canada, Cote d'Ivoire, Chile, China, Colombia, Democratic People's Republic of Korea, Ethiopia, Gambia, Ghana, Grenada, Guyana, India, Jamaica, Kenya, Malawi, Malaysia, Mauritius, Montserrat, Myanmar, The Netherlands, Nigeria, Pakistan, Papua New Guinea, Philippines, Rwanda, Sierra Leone, South Africa, Solomon Islands, Sri Lanka, St Helena, Switzerland, Tanzania, Trinidad and Tobago, Uganda, UK, Vietnam, Zambia, Zimbabwe

Dates: 2020 – 2021

CABI Project Manager: Qiaoqiao Zhang

With over 100 years' experience working in agriculture and the environment, and a physical presence in more than 20 locations around the world, CABI works with its Member Countries and vast network of partners to make a difference in the world, utilizing CABI's scientific and knowledge management expertise, publishing products, tools, biological resources and services.

In 2020, CABI undertook a review of the benefits it offers to Member Countries, informed by a survey of Member Countries. A revised membership benefits package was developed, which received an approval from the CABI Executive Council on 4th March 2021. This revised package of membership benefits represents a significant enhancement, with the total value of the package offered exceeding the membership fees paid by a majority of CABI's Member Countries. In addition to providing free and/or discounted access to a new suite of products and services, CABI is seeking to provide a more tailored approach. In this regard, CABI has introduced the idea of working with each Member Country on an action plan to select up to 10 benefits from the new offerings and ensure those are effectively taken up. And beyond this, CABI will also respond to specific/individual requests from Member Countries. Before the revised package was launched, all of our Member Countries had taken up certain forms of the membership benefits. Since its launch, several Member Countries have already taken advantage of it, for example, over 17 action plans have been developed so far, resulting in greater uptake and good prospects.

www.cabi.org/membership

Revisiting biological control of field bindweed

Location: USA, Canada

Dates: 01/01/2009 – Ongoing

CABI Project Manager: Ghislaine Cortat

CABI Project Team: Ivo Toševski, Hariet Hinz

Donors: USDA-APHIS-CPHST

Partners: Agricultural Research Service – United States Department of Agriculture (ARS-USDA); Slovak Agricultural University, Nitra; Institute for Plant Protection and Environment, Department of Plant Pests, Zemun, Serbia

Field bindweed is a noxious weed and has become invasive in North America (NA). CABI is studying sustainable control methods which could be introduced into NA as biological control agents.

Host-specificity and no-choice tests with the stem-mining agromyzid fly, *Melanagromyza albocilia*, have been conducted.

In no-choice tests, it laid eggs on six species, four NA and larvae were found on two NA Calystegia species. To assess specificity under more natural conditions, test plants were exposed at natural field sites where 20 species have been tested. Results were presented to USDA-APHIS Technical Advisory Group in 2021, and additional tests with critical NA native species in the lab were recommended.

The root-mining clear-wing moth is also being investigated. In no-choice egg transfer tests, some development of early larval stages was recorded on five of 14 test plant species. So far, complete development to the adult was tested with ten plant species and only recorded from field bindweed.

www.cabi.org/field-bindweed

Role models in Africa

Location: Kenya, South Africa

Dates: 01/08/2021 – 01/08/2022

CABI Project Manager: Ben Deighton

CABI Project Team: Fiona Broom (Editor), Paul Dawson, Calvin Otieno, Ochieng' Ogodo

Donors: Carnegie Corporation of New York

Building on our existing Role Models series, which began in 2018, this project will create 24 podcast episodes and accompanying articles that highlight the work of leading women in STEM in Sub-Saharan Africa.

Less than 3% of the world's researchers are African scientists, and only a third of Africa's researchers are women. Our Role Models project aims to inspire and encourage Sub-Saharan Africa's female science students and young researchers to stay in the field, by profiling peers who are doing interesting work and have built amazing careers.

We're building networks across academia, research and media in Sub-Saharan Africa by sharing our weekly podcasts and articles and amplifying the stories of our role models. The podcasts reach an estimated audience of 500,000 people each week, while print newspapers, magazines and online news sites are also sharing our stories. Most recently, the International Science Council – which counts hundreds of global research academies among its membership – began sharing the project's work.

Rubbervine biocontrol for Brazil

Location: Brazil

Dates: 02/01/2018 – 28/02/2022

CABI Project Manager: Marion Seier

CABI Project Team: Marion Seier, Natalia Corniani, Yelitza Colmenarez

Donors: SC Johnson and State Economic Agency Ceara, Carnauba Wax Refiners' Syndicate

Partners: Viçosa University, Ceara University,

Following a successful biocontrol project against an invasive rubbervine (*Cryptostegia grandiflora*) in Australia, the project focuses on the Caatinga habitat in the Brazilian state of Ceará, where a sister species, *C. madagascariensis* (devil's claw), is threatening the fragile ecosystem. The goal of the project is to assess and introduce a strain of the rubbervine rust *Maravalia cryptostegiae* from Madagascar for the control of devil's claw, reducing the weed's negative impact on the biodiversity and associated livelihoods.

Since most of the research into the rust was carried out during the Australian project, the focus will be to assess the safety of the rust for the native Brazilian flora. Three field stations have been established to monitor the rubbervine invasions. Should the selected rust isolate be considered safe for release in Brazil, its impact will then be monitored in the field.

www.cabi.org/rubbervine-brazil

RUFORUM: Building agricultural university capacity throughout Africa

Location: Sub-Saharan Africa

Dates: 01/01/2013 – 30/11/2020

CABI Project Manager: David Onyango, Brahim Jrah

Donors: CABI Development Fund (CDF)

Partners: Consortium of African universities

Universities play an important role in the wellbeing of small-scale farmers in sub-Saharan Africa and the economic development of their countries. The Regional Universities Forum for Capacity Building in Agriculture (RUFORUM), a consortium established in 2004 of 106 universities operating in 36 countries spanning the African continent, helps universities fulfil this important role.

The project established a collaboration with RUFORUM member universities, who now benefit from privileged access to the CAB Abstract bibliographic database. This contains over 10 million records, including 200,000 full text documents (journal articles and conference papers). Access was also provided to CABI Compendia which will improve agricultural management knowledge among RUFORUM members, enhancing the role that they play in supporting small-scale farmers. Ending in 2020, engagement with member universities has continued with a view to expanding collaborations by writing joint project proposals.

www.cabi.org/ruforum

Rwanda Soil Information Services in Rwanda

Location: Rwanda

Dates: 01/01/2020 – 31/10/2020

CABI Project Manager: Chipo Msengezi

CABI Project Team: Kathryn Reynolds,

Donors: Bill & Melinda Gates Foundation (BMGF); The International Institute of Tropical Agriculture (IITA)

Partners: World Agroforestry Centre (ICRAF); International Soil Reference and Information Centre (ISRIC); The International Institute of Tropical Agriculture (IITA); Rwanda Agriculture Board (RAB)

Overall, 70% of Rwanda's population rely on agriculture for their livelihoods. However, productivity has been severely compromised by a lack of crop- and soil-specific fertilizers and by soil erosion. Reliable soil and agronomy data can help farmers make the best decisions for their land, but this data is currently not shared between stakeholders. The Rwanda Soil Information Service will provide a centralized resource for in-country actors to better understand the state of soils in the country.

CABI's role has been to lay the foundations of a modern soil information system, specifically: to identify the key organizations and individuals; to map the flow of data; to document the barriers to data sharing; to make recommendations for interventions; and to create a Rwanda Soil and Agronomy Data Landscape Report, and a set of Soil and Agronomy Mandatory Data Sharing Guidelines.

www.cabi.org/RWSIS

SAIRLA Ghana National Learning Alliance

Location: Ghana

Dates: 01/04/2016 – 01/04/2020

CABI Project Manager: Silvia Silvestri, Solomon Agyemang Duah

CABI Project Team: Victor Attuquaye Clottey

Donors: Foreign, Commonwealth & Development Office (FCDO)

Partners: SAIRLA Research projects: (GALA, Tools and Metrics, and SITAM); Science and Technology Policy Research Institute (CSIR-STEPRI); WYG International Limited

Agricultural production must increase to help meet the challenge of food security for a growing population, but in ways that ensure environmental sustainability and social equity.

The SAIRLA (The Sustainable Agricultural Intensification Research and Learning in Africa) programme is facilitating research and social learning in Ghana and five other countries through the National Learning Alliance, established by CABI and partners. The aim of the Alliance is to generate new decision-making tools to support policymakers and investors in creating an enabling environment for women, youth and poorer smallholder farmers to engage in and benefit from sustainable agricultural intensification.

So far, CABI has identified and engaged boundary partners, and with these partners, developed project outcome mapping and progress markers. A policy symposium was also organized, two policy briefs issued and a survey conducted on stakeholder capacity needs, with the findings validated through a workshop. Knowledge products have also been developed for strategic stakeholders and decision makers.

www.cabi.org/sairla

Santé, Science et Développement podcast

Location: Global

Dates: 01/02/2020 – 31/12/2020

CABI Project Manager: Ben Deighton

Donors: International Development Research Centre (IDRC)

Santé, Science et Développement is a weekly podcast produced by SciDev.Net's sub-Saharan Africa French edition covering science news that impacts on French-speaking Africa. The podcast is re-broadcast by over 14 radio stations across the region, reaching over eight million people weekly. For many of our listeners, the podcast is the only science news they are exposed to, and during the COVID-19 pandemic, we were able to use the podcast to debunk fake news and explain the science behind government policies such as social distancing and vaccination.

The podcast is in its second year, and is funded by Canada's International Development Research Centre.

Saving Tristan da Cunha's only native tree

Location: Tristan da Cunha, St Helena

Dates: 01/07/2020 – 31/03/2024

CABI Project Manager: Norbert Maczey

CABI Project Team: Corin Pratt, Anita Kopera

Donors: Darwin Initiative

Partners: Tristan da Cunha Government; FERA; Royal Society for the Protection of Birds (RSPB)

Invasive non-native species are a major threat on oceanic islands due to the vulnerability and endemism of island ecosystems. On Tristan da Cunha, Brown soft scale (*Coccus hesperidum*), an invasive alien scale insect, has infested the only native tree, *Phylica arborea*, and is now threatening the rare endemic Nesospiza buntings. The project aims to select and test suitable biocontrol agents to reduce insect numbers below a damaging threshold.

Testing of a first biological control agent took place in 2020. Cultures of *Coccus hesperidum* and one parasitoid control agent were established in the quarantine facilities at CABI Egham. The efficacy of the control agents was then tested under conditions similar to those on Tristan da Cunha. A first release of the control agent took place in April 2021, followed by additional releases later in the year. Further releases and testing of additional agents will take place until 2024.

www.cabi.org/saving-tristans-buntings

Scaling-up interactive ICT to increase agricultural innovation in Tanzania

Location: Tanzania

Dates: 01/01/2016 – 31/06/2019

CABI Project Manager: Daniel Karanja

CABI Project Team: Rahab Njunge

Donors: New Alliance ICT Extension Challenge Fund; International Fund for Agricultural Development (IFAD)

Partners: Farm Radio International (FRI)

Despite Tanzania's immense agricultural potential, productivity is hindered by inadequate farming knowledge and customary farm management practices. The project 'Upscaling Technologies in Agriculture through Knowledge Extension' used mobile and radio campaigns to help small-scale farmers improve agricultural technologies and approaches.

Approximately six million messages were disseminated across four campaigns. Briefs on cassava, maize, potato and common bean provided content for SMS and radio campaigns, and were repurposed for print materials. Over 120 team members were trained to use ICT to promote the adoption of improved agricultural technologies in rural communities.

The project has increased farmer awareness and demand for higher yielding and more disease resistant cassava varieties, as shown by inquiries about improved planting materials received on the radio and mobile platforms during the campaigns. This has led more farmers to venture into multiplication of planting materials, increasing supplies of improved varieties and diversifying income sources.

www.cabi.org/scaling-up-ict

SciDev.net

Location: Global

Dates: Ongoing

CABI Project Manager: Ben Deighton

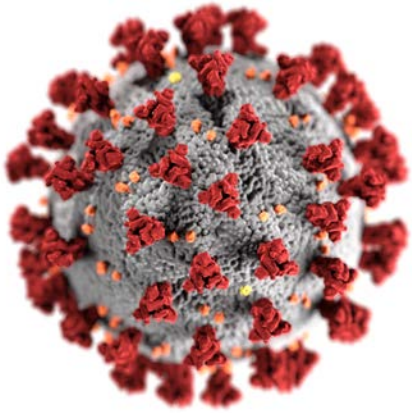
Donors: Sida (The Swedish International Development Cooperation Agency); Robert Bosch Stiftung; Science; Wellcome Trust; Alpha Galileo; IDRC (International Development Research Centre; Bill & Melinda Gates Foundation; iRD le Mag; Carnegie Corporation of New York

SciDev.Net, owned by CABI, is an independent source of news, views and analysis about science and technology for global development. Sci-dev's mission is to use independent journalism to help individuals and organizations apply science to decision-making in order to drive equitable, sustainable development and poverty reduction.

As part of the membership benefits package, there is an opportunity for researchers and journalists in Member Countries to obtain tailored advice on access to, and use of high-quality online training programmes, resources and consultancy on effective science communication provided by SciDev.Net.

www.scidev.net

SciDev.Net launches free course to help journalists report the science of COVID-19



Location: Global

Dates: Ongoing

CABI Project Manager: Charles Wendo

A free self-paced online course has been launched introducing journalists to credible COVID-19 news sources and empowering them to spot the news and report to their audiences.

The 'Reporting the science of COVID-19' course – developed by SciDev.Net's Script training programme is aimed at journalists who report on the coronavirus but have little or no experience in science journalism.

Consisting of three modules – each taking no more than an hour to complete – the course will provide the participant with a substantial amount of learning within a short time and at their convenience.

Module one looks at 'Emerging respiratory viruses: why COVID-19 might not be the last', Module two considers 'sources of COVID-19 research information' and Module three examines 'Packaging the COVID-19 science story'.

Image: © Alissa Eckert, MS, Dan Higgins, MAMS

www.scidev.net

SciDev.Net launches free science communication course for press officers in Africa

Location: Africa

Dates: Ongoing

CABI Project Manager: Charles Wendo

A free self-paced online course to teach press officers in Africa how to communicate science to journalists and the wider public is now being offered as part of the Script project.

The Science Communication Skills for Press Officers course features 10 short, user-friendly and interactive modules including understanding the basics of scientific research, what makes news in science and how to simplify science without compromising its meaning.

The online course for Press Officers will improve students' ability to get the media interested in science and present it to them in a language they understand. It aims to give students the skills they need to generate media coverage of the scientific research coming from their institution. Successful completion of the course results in a certificate.

www.scidev.net

Scientists exchange expertise on biocontrol agents for the management of devastating fall armyworm

Location: India, Kenya, Pakistan, Switzerland, Zambia

Dates: May 2021

CABI Project Manager: Malvika Chaudhary, Manju Thakur

Partners: Indian Council of Agricultural Research (ICAR); National Bureau of Agriculturally Important Insect Resources (NBAIR); Bangladesh Agricultural Research Institute (BARI)

CABI has been actively supporting research on fall armyworm (FAW) management in India and Bangladesh while working closely with their national research institutes.

The aim was to bring the global experiences on FAW to South Asia that CABI has accumulated through its work in Latin America and Africa – especially in the focal area of biological control.

The main objectives were exchange knowledge protocols pertaining to native natural enemy survey and testing the cost-efficient biological control agents.

CABI South Asia and partner institutes organized a two-day virtual webinar, attended by 16 scientists from the institutes along with participation from CABI experts from CABI centres.

It was envisaged that there is a need to strengthen the management strategy with exchange of knowledge across the region. Since FAW is a transboundary pest, the solutions could suit across the region due to similarity in agroclimatic conditions.

Scoping study on Digitalisation of Value Chains and Small and Medium Enterprises (SMEs) in Asia

Location: Bangladesh, India, Pakistan, Thailand, Indonesia

Dates: 01/11/2021 – 30/06/2022

CABI Project Manager: Muhammad Salman Zafar

CABI Project Team: Gopi Ramasamy, Kritika Khanna, Muhammed Faheem, Chan Fook Wing

Donors: Food and Agriculture Organization of the United Nations (FAO)

The FAO Regional Office for Asia and the Pacific (FAO RAP) is expanding its support for inclusive digitalization along the value chain and food systems through its '1,000 Digital Villages Initiative.'

A scoping study, carried out by CABI, presented results on the enabling environments of each country with the focus on programmes, policies, initiatives by the government and other institutes. A desk study, literature review, focus group discussions, key informant interviews and a PESTLE analysis resulted in the learnings and recommendations. Twenty-five selected SMEs, from participating countries, involved in the value chain have been presented with the findings.

Key learnings and outcomes focus on the need for a stable political and economic situation, national policy support, digital infrastructure improvement, digital literacy and a national communication programme to promote the digital innovations supporting the agri-food value chain and ease of licensing.

Script

Location: Global. **Member Countries**: Kenya, Nigeria, Tanzania, Uganda

Dates: 01/09/2019 – 28/02/2023

CABI Project Manager: Sarah Hebbes

Donors: Robert Bosch Stiftung

Script is a free training and networking resource for journalists, scientists and anyone who wants to communicate science in an engaging and accurate way.

By connecting reporters and researchers, and giving both groups the skills to understand and communicate with each other, Script aims to increase the quantity and quality of science-related stories in the news. We believe this is essential to enable informed, evidence-based decision-making, by everyone from individuals to policymakers.

Script is made possible by funding from the Robert Bosch Stiftung and is implemented by SciDev.Net

www.scripttraining.net

Second International Conference on Biological Control

Location: Global

Dates: 01/05/2021

CABI Project Manager: Malvika Chaudhary, Ulrich Kuhlmann

The Second International Congress of Biological Control (ICBC2) – co-organized by CABI and the International Organisation for Biological Control (IOBC) was held successfully despite the COVID-19 pandemic.

World-leading experts in invasive crop pests and diseases and biological controls met, via online video conferencing, for the ICBC2 which provided a platform for multi and inter-disciplinary biological control research and application to tackle pests including the fall armyworm (*Spodoptera frugiperda*) and South American tomato pinworm (*Tuta absoluta*).

The event, which took place from 26-30 April, 2021, built upon the 1st International Congress of Biological Control held in Beijing, China, and the 1st International Conference of Biological Control held in Bengaluru, India, during 2018. Eight scientists from CABI, working on various aspects of biocontrol, presented an oral paper and were part of discussion panels across various sessions.

Secretariat for the International Research Consortium on Animal Health (SIRCAH)

Location: Global

Dates: 01/11/2016 – 31/10/2022

CABI Project Manager: Robert Taylor

Donors: STAR-IDAZ International Research Consortium on Animal Health

Partners: DEFRA (UK Department for Environment, Food and Rural Affairs); World Organisation for Animal Health (OIE); CABI; Biotechnology and Biological Sciences Research Council (BBSRC); International Federation of Animal Health – Europe (IFAH-Europe)

In 2016, CABI joined four other organizations (Defra, UK; OIE; BBSRC, UK; HealthforAnimals, Belgium) to establish a Scientific Secretariat for the International Research Consortium (IRC) on Animal Health. The Secretariat, approved by the European Union's Horizon 2020 programme for Research and Innovation, aims to deliver measurable advances to control animal diseases.

It will do this by aligning both public and privately funded animal health research around the world. Partners of the IRC have agreed to coordinate research programmes to address agreed research needs, share results and, together, seek new and improved animal health strategies for at least 30 priority diseases, or issues (eg AMR). These include candidate vaccines, diagnostics, therapeutics and other animal health products, procedures and/or key scientific information and tools to support risk analysis and disease control.

SIRCAH provides support to the IRC to help set up working groups of experts on particular priority issues, and to develop roadmaps to achieving disease control outcomes. CABI provides information support, maintains the website and roadmaps system and provides administrative support, as well as communications.

Seeing is believing

Location: India

Dates: 06/05/2019 – 30/06/2020

CABI Project Manager: Arun Jadhav

Donors: CGIAR Inspire Challenge Grant

Partners: International Food Policy Research Institute (IFPRI); Kisan Sanchar (Edata services) (Phase one); MS Swaminathan Research Foundation (MSSRF) (Phase two)

Many farmers in India still rely on inefficient agricultural practices that are unsuited to climate change. Data can help them. Customized advice, based on localized weather and soil data, pests and diseases, as well as input availability, can improve management practices, productivity and profitability.

This project used crop pictures, taken by farmers using their smartphones, as part of wider personalized advisory services that aimed to strengthen advice and help farmers make timely decisions. Images supplied were also used for Picture Based Insurance (PBI) services to support sustainable and scalable risk management. Collected camera data can be stored and organized in a systematic way for different types of plots, weather conditions and practices, empowering farmers and experts to detect patterns and how they relate to crop growth.

A study conducted found that 82% of farmers applied the provided picture-based advice, 76% farmers agreed the advice was based on the pictures and 65% farmers adopted rational use of pesticides.

www.cabi.org/seeing-is-believing

Sharing expertise at the 3rd International Phytosanitary Conference

Location: Global

Dates: October 2021

CABI Project Manager: Joseph Mulema

CABI Project Team: David Onyango, Abigael Mchana, Joseph Mulema, Daniel Karanja

Donors: CABI; Kenya Government; the Centre of Phytosanitary Excellence (COPE); the Common Market for Eastern and Southern Africa (COMESA); the International Maize and Wheat Improvement Centre (CIMMYT); Syngenta; the Food and Agriculture Organization (FAO); the International Year of Plant Health 2020

CABI shared its expertise at the 3rd International Phytosanitary Conference in October 2021. Scientists from CABI's regional centre for Africa in Nairobi took part in two special sessions – hosted by the Kenya Plant Health Inspectorate Service as part of the International Year of Plant Health 2020 – on enhancing phytosanitary systems for healthy plants, and safe and sustainable trade.

Dr Joseph Mulema provided an overview of CABI's global programmes, before CABI intern Mercy Rono spoke about how extensive surveillance of key potato growing areas in Kenya confirmed the absence of potato ring rot. Lucy Karanja presented on the issue of Pectobacterium species in the soils of smallholder potato farmers in Kenya. Dr Joseph Mulema gave an overview of CABI digital tools, and then Dr Mary Lucy Oronje and George Momanyi, Chief Inspector at the Kenya Plant Health Inspectorate Service, spoke about the use of digital tools to manage phytosanitary risks.

Spotted lanternfly in China

Location: China, New Zealand

Dates: 10/01/2022 – 31/12/2022

CABI Project Manager: Jinping Zhang

CABI Project Team: Feng Zhang

Donors: Zespri

Partners: Plant and Food Research, New Zealand; Kiwifruit Station; Northwest Agriculture and Forestry University (NWAFU)

The spotted lantern fly, *Lycorma delicatula* (Hemiptera, Fulgoridae), is an Asian polyphagous pest of many arboreal plants. This species is native to China and Vietnam, and was accidentally introduced into South Korea and Japan, with outbreaks reported since mid-2000s. More recently, this pest was found in Pennsylvania, USA, and its geographical distribution has steadily expanded since the introduction with increasing population densities in the USA. The spotted lantern fly is known to attack at least 65 host plants, including so-called preferred host plants such as *Ailanthus altissima* and *Vitis vinifera* are present in all invaded countries.

This species is becoming a threat to grape industries in China, South Korea, USA, and the impact on other crops is still unknown. This project is to understand its population dynamics of spotted lanternfly on kiwifruit as well as its potential impact on quality and yield of kiwifruit.

Image: spotted lanternfly (Lycorma delicatula) © Rebekah D. Wallace, University of Georgia, Bugwood.org

Steering Committee meeting of MARA-CABI Joint Lab for Biosafety

Location: China, Malaysia

Dates: 2009 – Ongoing

CABI Project Manager: Feng Zhang

Donors: Chinese Ministry of Agriculture and Rural Affairs (MARA); Chinese Academy of Agricultural Sciences (CAAS); CABI

In September 2008, with joint efforts made by the Chinese Ministry of Agriculture and Rural Affairs (MARA), Chinese Academy of Agricultural Sciences (CAAS), and CABI, the MARA China-CABI Joint Lab for Bio-safety was launched and hosted by The Institute of Plant Protection (IPP) of the Chinese Academy of Agricultural Sciences (CAAS) in Beijing.

The Steering Committee acts as the governing body of the Joint Lab, meet once a year, and are responsible for reviewing research activities and approving work plans as well as financial statements. Since Joint Lab launched in 2008, 13 Joint Lab Steering Committee meetings have been held.

The Joint Lab aims to become a world-recognized centre of excellence for collaborative research and technology transfer in green plant protection technology development. In the 13th Steering Committee meeting in 2021, members were unanimous that outstanding progress made despite the implications of COVID-19. At the 14th Steering Committee meeting in 2022, continued progress was reported despite the prolonged pandemic, with exceptional performance in its governance, management, scientific exchanges and research, and development co-operations.

Stemming the spread of Russian olive

Location: USA, Canada

Dates: 01/01/2007 – Ongoing

CABI Project Manager: Philip Weyl

Donors: United States Department of the Interior (USDI) Bureau of Indian Affairs through MSU, USA; United States Department of the Interior Bureau of Land Management (USDI BLM) through MSU, USA; British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Canada; Montana Noxious Weed Trust Fund through Montana State University (MSU), USA; Wyoming Biological Control Steering Committee, USA

Partners: University of Belgrade, Serbia; Biotechnology Biocontrol Control Agency (BBCA), Italy

Russian olive is a significant invasive weed in North America. but perceived by some as attractive. It affects many natural habitats, altering the ecosystem and its functions. Biological control is a useful approach to stem the damage of the invasive without damaging established trees.

The host specificity of the mite, *Aceria angustifoliae*, was assessed and found to have a very narrow host range and likely to be restricted to Russian olive under natural field conditions. The petition for field release was submitted to the USDA Animal and Plant Health Inspection Service Technical Advisory Group (TAG) and the Canadian Biological Control Review Committee (BCRC) in November 2019, however it was not approved by the Canadian Food Inspection Agency, despite the BCRC and TAG recommending release. Supplementary information has been submitted. Supplementary information was submitted to both TAG and the CFIA who has now granted permission for *A. angustifoliae* to be released in Canada under the authority of the Canadian Plant Protection Act and the scientists hope that field releases will take place by spring 2023.

Work with the moth, *Anarsia eleagnella*, is currently suspended while field surveys in Kazakhstan are ongoing to find additional potential biological control agents.

www.cabi.org/russian-olive

Strengthening food systems in Pakistan

Location: Pakistan

Dates: 22/02/2021 – 30/11/2022

CABI Project Manager: Kazam Ali

Donors: Asian Development Bank (ADB)

The rapid spread of COVID-19 and subsequent Government restrictions impacted Pakistan's food supply chain. The largest locust infestation in 25 years added to the problems when swarms devastated large areas of agricultural land in 2020, including cotton, wheat, maize, and other crops. In addition, recent extreme weather events have demonstrated that Pakistan's food security and agriculture are critically exposed to the adverse impacts of climate change.

CABI will support the Ministry of National Food Security and Research and four provincial agriculture departments in adopting technologies and advanced practices to manage these impacts. Disseminating these technologies and practices to stakeholders, CABI will recommend measures for building long term resilience and sustainable food security systems.

Activities to-date include a project inception report, the development of a two-year work plan and a baseline consultation for farmer training has been prepared, with training programmes now in place. Research activities have been finalized and service providers of pest management technologies have been identified.

www.cabi.org/strengthening-food-systems

Strengthening pest and disease management in Southern African Development Community Member States

Location: Angola, Botswana, Comoros, Democratic Republic of the Congo, Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Tanzania, The Seychelles, Zambia, Zimbabwe

Dates: 08/03/2021 – 30/09/2021

CABI Project Manager: MaryLucy Oronje

CABI Project Team: Ivan Rwomushana

Donors: FAO, with funding from the European Union

Partners: Southern African Development Community (SADC) Secretariat

Transboundary plant pests and diseases threaten food security and adversely affect trade and agricultural competitiveness. In Southern African Development Community Member States, the five priority pests are maize lethal necrosis disease, tomato leafminer, oriental fruit fly, fall armyworm and banana fusarium wilt.

CABI supported a project led by the Food and Agriculture Organization to strengthen capacities to manage these plant pests and diseases. The project sought to support Member States in developing harmonized national strategies for the key pests, while providing training on pest risk analysis and on sanitary and phytosanitary measures.

The support covered the development of national pest management strategies for the priority pests and diseases, and technical assistance on integrated strategies. Additionally, a regional strategy on maize lethal necrosis disease was developed, and a virtual pest risk analysis training session was held, along with a series of webinars on topical sanitary and phytosanitary issues.

www.cabi.org/pest-and-disease-management-sadc

Strengthening the potato value chain in the Kurdistan Region of Iraq

Location: Kurdistan Region of Iraq, The Netherlands

Dates: 01/01/2021 – 30/11/2025

CABI Project Manager: Anna Wood

CABI Project Team: Janny Vos

Donors: The Netherlands Enterprise Agency, on behalf of the Dutch Ministry of Foreign Affairs; KH

Partners: Ministry of Agriculture & Water Resources in Kurdistan Region; University of Duhok; KH; HZPC

This project aims to strengthen the potato value chain in the Kurdistan Region of Iraq through improved production and processing, access to markets, training and employment opportunities for internally displaced people and refugees, and the capacity building of farmers and other stakeholders. Expected outcomes and outputs include:

- 8000 farmers reached through capacity building activities on good agricultural practices with access to high-quality seed potatoes
- One potato processing facility with capacity to process 6000 tonnes of french fries per year
- One cold storage unit built with a 1750 tonnes capacity
- 800 farmers guaranteed access to market of french fries' factory
- 10,000 workers provided with job opportunities in potato farming
- 160 jobs created and skills developed in potato processing
- 8000 farmers with increased income/productivity and more resilient to income shocks

The inception phase is complete. It included setting up finance systems, drafting agreements and budgets and baseline surveys.

www.cabi.org/potatoes-kri

Strengthening vegetable value chains in Pakistan

Location: Australia, Pakistan

Dates: 15/02/2018 – 31/12/2022

CABI Project Manager: Muhammad Asif

CABI Project Team: Babar Ehsan Bajwa, Zeeshan Butt, Mehmood Ur Rehman, Haibat Ullah Asad, Rehan Riaz

Donors: Australian Centre for International Agricultural Research (ACIAR)

Partners: The University of Queensland, Australia; Women Agriculture Development Organization, Pakistan; University of Agriculture Faisalabad; Sindh Agriculture University; National Agricultural Research Centre; Agriculture Research Sindh; Department of Agriculture Extension Punjab; Department of Agriculture Extension Sindh

Small scale vegetable farmers in Pakistan encounter a number of issues that compromise their sustainable livelihoods; particularly for women and youth. Through the project, an alliance of selected organizations is aiming to improve the livelihoods and household incomes of rural communities in Sindh and Punjab through strengthening horticultural value chains, and promoting sustainable production and marketing opportunities.

The project has already demonstrated that the value chain approach can deliver community-wide benefits to smallholder farmers. The interventions introduced by the project and adopted by farmers have resulted in a significant increase in crop yield and production for tomato, onion and potato.

The value chain approach not only improved the efficiency of the value chain through improving quality and reducing wastage, but also strengthened the value chain through improving relationships between farmers and customers.

Women's engagement in value chain activities has been significantly improved. Through value chain analysis, the project team has identified activities for the involvement of women in creating market value along the chain.

www.cabi.org/svvcp

Study on plant protection in cocoa production in Cote d`Ivoire and Ghana

Location: Cote d'Ivoire, Ghana

Dates: 01/12/2022 – 30/09/2022

CABI Project Manager: Jayne Crozier

CABI Project Team: Lakpo Agboyi, Birgitta Oppong-Mensah, Victor Clottey

Donors: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

This study is being conducted in two major cocoa producing countries (Cote d`Ivoire and Ghana). Information is being collected on the existing legal framework for plant health (including pesticide use), the status of integrated pest management (IPM) in cocoa production, extension and farmer knowledge and current Good Agricultural Practices and other standards applied.

This study is in response to major concerns about the uncontrolled use of plant protection products and IPM inhibitions in cocoa pest and disease management. Information will be gathered through desk studies and interviews with cocoa farmers and other relevant stakeholders. The results will inform GIZ and support the German Initiative on Sustainable Cocoa (GISCO).

Supporting and strengthening the competitiveness of the African, Caribbean and Pacific (ACP) states

Location: Kenya

Dates: Ongoing

CABI Project Manager: MaryLucy Oronje

CABI Project Team: Washington Otieno

Donors: COLEACP

The focus of the framework contract is to strengthen the competitiveness of the horticultural sectors of the African, Caribbean and Pacific states and their compliance with the regulatory requirements of national, regional and international markets through training and technical assistance.

Several New Terms of Reference (Ordering Letters) have so far been signed. These cover: (i) a sectoral good practice guide for the avocado value chain in Kenya; (ii) reviewing and updating the current sampling methodology and procedures for value chains so that they conform with EU compliance requirements; (iii) developing a digital training module and distance learning course for inspectors on the implementation of official controls; and (iv) a gap analysis of the compliance of mango producers with a quality management system in accordance with the requirements of the GLOBALG.A.P. set of standards for good agricultural practices.

Supporting Data Ecosystem Mapping for the 50x2030 initiative

Location: Cambodia, Ethiopia, India, Uganda

Dates: 01/09/2021 – 31/12/2021

CABI Project Manager: Chipo Msengezi

CABI Project Team: Arun Jadhav, Akanksha Nagpal, Ruthie Musker

Donors: International Fund for Agricultural Development (IFAD)

The 50×2030 Initiative to Close the Agricultural Data Gap has been developed to transform country data systems across 50 countries in Africa, Asia, the Middle East, and Latin America and make evidence-informed decision-making in agriculture the norm in these regions by 2030. It is hoped that the initiative will contribute to increased agricultural productivity and sustainable food production, which are crucial to alleviating hunger and poverty.

IFAD's programmatic approach to promote the use of data begins with assessing the status of agricultural data and relationships between stakeholders around that data through an Agricultural Data Ecosystem Map and Report. CABI is supporting IFAD to design interview and survey tools, analyse data and illustrate the different actors in a data ecosystem, and how value is exchanged across it. In addition, CABI provided training on using Data Ecosystem Mapping which examined the community of actors, stakeholders and entities who engage with data and data assets that are present.

Supporting the elaboration of a national strategy for the management of Prosopis in Kenya

Location: Kenya

Dates: 01/01/2020 – 31/03/2022

CABI Project Manager: Urs Schaffner

Partners: Kenya Forestry Research Institute (KEFRI) Kenya; University of Bern, Switzerland; Centre for Training and Integrated Research in ASAL Development, Kenya; University of Nairobi, Kenya

Linked to Woody Weeds, TAG (Transformation Accelerating Grant) was granted to develop transformation knowledge.

The project aims to support transformation in woody invasive alien species management and therefore halting land degradation in Kenya, targeting the flagship species *Prosopis juliflora*.

While the overall implementation strategy includes activities at regional, national, subnational and local scales, we will focus in this project on:

a. participation in the development of the National Prosopis Strategy (NPS) in Kenya
b. upscaling activities in the Woody Weeds project at the local scale to co-design Prosopis management at the subnational (County) level and therefore accelerate implementation of the NPS.

Supporting the implementation of a Plant Health Strategy for Africa

Location: African Union Member States

Dates: 09/07/2021 – 30/09/2023

CABI Project Manager: MaryLucy Oronje

CABI Project Team: Roger Day, Melanie Bateman, Washington Otieno, Ivan Rwomushana, Lorna Migiro

Donors: US Department of Agriculture (USDA) Foreign Agricultural Service (FAS)

Partners: African Union Inter-African Phytosanitary Council (AU IAPSC)

The main challenges faced by the Inter-African Phytosanitary Council (IAPSC), as presented at the 2020 African Union (AU) Continental Sanitary and Phytosanitary (SPS) Policy Framework Meeting, include an absence of national and regional coordination frameworks of National Plant Protection Organizations (NPPOs) that are underfunded and unequipped to implement international standards as well as insufficient scientific and research capacity to address and implement SPS measures.

To help improve regional coordination and strengthen the capacity of NPPOs, the African Union Plant Health Strategy is being developed.

The project shall provide technical expertise to assist AU-IAPSC in implementing their Plant Health Strategy and associated activities.

So far, a study on pesticide and biopesticide regulatory guidelines and the development and validation of protocols for field testing and registration in AU Member States has been carried out.

Phytosanitary capacity building for AU Member States and an assessment on the adoption of ePhyto in AU Member States are underway.

Surveillance of potato diseases in Kenya

Location: Kenya

Dates: 01/11/2019 – 30/10/2020

CABI Project Manager: Joseph Mulema

CABI Project Team: Lucy Karanja, Willis Ochillo, Duncan Chacha, Idah Mugambi, Fernadis Makale, Monica Kansiime, Daniel Karanja, Washington Otieno

Donors: Wageningen Centre for Development Innovation

Partners: TechnoServe, Kenya; University of Nairobi; National Potato Council of Kenya (NPCK); International Potato Center (CIP); Kenya Agricultural and Livestock Research Organization (KALRO); Kenya Plant Health Inspectorate Services (KEPHIS); Ministry of Agriculture Livestock and Fisheries

Potatoes are one of the most widely grown crops in Kenya, but yields have reduced significantly over the last decade as the result of soil- and seed-transmitted pests. To tackle this, CABI developed a protocol for the identification of blackleg, tuber soft rots and bacterial ring rot. This was followed by a fact-finding mission, which aimed to explain the rationale of the potato disease surveillance exercise in six selected counties in Kenya and share the surveillance protocol.

The mission covered 1,002 potato farms, from which potato samples were collected. The owners of the farms provided valuable social economic information, and useful insights into potato production and pest management. The results of the study will help to improve the required regulatory framework for the certification of potato seed, and provide information for better pest management and control.

www.cabi.org/potato-diseases-kenya

Survey of herbivores and pathogens living on *Rubus anglocandicans* in central and Eastern England

Location: Australia, UK

Dates: 01/06/2021 – 03/05/2022

CABI Project Manager: Norbert Maczey

CABI Project Team: Corin Pratt, Lisa Offort, Alan Buddie, Daisuke Kurose

Donors: Agriculture Victoria, Department of Jobs, Precincts and Regions, Victoria, Australia

Further research is required to develop a multipronged attack strategy against blackberry, several taxa of which are highly invasive in Australia. This project aims to identify natural enemies of *Rubus anglocandicans*, the most widespread taxon of the *Rubus fruticosus* aggregate in Australia.

The project has included the surveying of *Rubus anglocandicans* stands in the UK during 2021 for insects and pathogens, and taking plant specimens for identification. The MALDI technique, supported by DNA barcoding, was used to confirm the identity of the specimens, against reference specimens provided by Agriculture Victoria. A first progress report on the natural enemy surveys and preliminary results of specimen identifications was provided in January 2022. A final report on the natural enemies of *Rubus anglocandicans* in the UK and their prospects as candidate biological control agents will be delivered by May 2022.

Sustainable management of the fall armyworm in Botswana

Location: Botswana

Dates: 15/07/2019 – 31/07/2021

CABI Project Manager: Ivan Rwomushana

Donors: Food and Agriculture Organization of the United Nations (FAO) – Sub Regional Office for Southern Africa, and the Government of Botswana

Partners: Ministry of Agricultural Development and Food Security

Botswana was infested by the fall armyworm in January 2017, and CABI was subsequently contracted to provide technical assistance in managing the pest.

One training of trainer session and four district-level sessions on fall armyworm digital tools were conducted, as was a socio-economic survey on yield losses, which reached 220 respondents.

CABI distributed 45 manuals on community-based fall armyworm management and 400 copies of a pocket guide to stakeholders; posters and brochures were developed for wider distribution. Six media training sessions were conducted, reaching 180 participants. A policy brief and a national strategy for sustainable fall armyworm management were also produced.

A visit to Malawi by key personnel enabled them to observe the different integrated fall armyworm management methods, and share the knowledge in Botswana. However, implementation towards the end of the project was affected by COVID-19, and an in-person validation workshop for the strategy and policy brief was not feasible.

www.cabi.org/fall-armyworm-botswana

Sustainable strategies for managing Sweet Potato Weevils in the Caribbean

Location: Barbados, Bahamas, Bermuda, British Virgin Islands, Guyana, Jamaica, Trinidad & Tobago

Dates: October 2021

CABI Project Manager: Naitram (Bob) Ramnanan

CABI Project Team: Eduardo Hidalgo

Donors: CABI Development Fund (CDF)

Partners: Caribbean Agricultural Research and Development Institute (CARDI); MAFAS Ltd

Sweet potato is the 6th most important commodity crop globally, and it has a high contribution to food security in tropical regions, in particular. It has also been identified as a priority crop within the wider Caribbean Community region, and is important in the context of climate smart agriculture. However, sweet potato weevils can cause up to 80% loss in some regions but there are potential biocontrol agents to help manage these losses.

A webinar was held to build partnerships between CABI's Member Countries, academia, research institutions and the private sector with the aim to enhance yields and reduce losses of sweet potato production. Further objectives included to promote greener value chains for sweet potato production resilient to climate change in the Caribbean, and to share information and experiences among extension, research and farmers. This information was utilized to develop a PRISE proposal for donor funding.

Tackling common tansy in North America

Location: Canada, USA

Dates: 01/01/2006 – Ongoing

CABI Project Manager: Sonja Stutz

Donors: Agriculture and Agri-Food Canada (AAFC), Lethbridge Research and Development Centre; Montana Noxious Weed Trust Fund through Montana State University, USA; Ministry of Forests, Lands, Natural Resource Operations and Rural Development, British Columbia, Canada

Partners: Zoological Institute, Russian Academy of Sciences, St Petersburg; McClay Ecoscience, Alberta, Canada; Agriculture and Agri-Food Canada (AAFC), Lethbridge Research and Development Centre

Common tansy is an aromatic Eurasian plant species with a long history of use as a medicinal herb. Introduced for this purpose to North America, it has since become invasive. CABI has been tasked with identifying specialist natural enemies from Eurasia that can be introduced into North America as biological control agents.

Tests showed most insects were not specific enough for release in North America. But tests with the stem-mining weevil, *M. millefolii*, showed more promise. Work on the shoot-tipboring moth *P. ochrodactyl* has stopped due to its complicated life-cycle and limited funding but work with the leaf feeding beetle, *Chrysolina eurina*, showed that the species was mostly limited to *Tanacetum* species. The next step is to set up an open-field test with *Tanacetum* species. In 2021, open-field test were set up with these species which we will evaluate in 2022.

www.cabi.org/common-tansy

Technical assistance to establish e-pest surveillance system in Bangladesh

Location: Bangladesh

Dates: 01/01/2020 – 31/03/2021

CABI Project Manager: Malvika Chaudhary

CABI Project Team: Dr Manju Thakur, Sudhanshu Jain

Donors: Food and Agriculture Organization for the United Nations (FAO)

Partners: DAE Bangladesh; EFOS d.o.o. ; Tene Ag (Pvt) Ltd

Invasive pests can have detrimental effects on the economy, the environment and society, if not properly managed. Regular monitoring to determine the presence, absence and population levels of pests is an essential part of managing and maintaining healthy crops.

Although Bangladesh had already implemented a pest surveillance, the Food and Agriculture Organization (FAO) recognized CABI's expertise in this field and commissioned CABI to utilize new technologies to establish an e-pest surveillance system for faster and accurate monitoring of plant diseases and insect pests, as well as to gather surveillance data to support decision making.

The Belt and Road Plant Protection Collaboration

Location: China, Pakistan

Dates: 01/10/2016 – 31/12/2022

CABI Project Manager: Feng Zhang

Donors: CABI Development Fund (CDF); Chinese Academy of Agricultural Sciences (CAAS) Science & Technology Innovation Programme

Partners: Chinese Academy of Agricultural Sciences (CAAS); International of Plant Protection – Chinese Academy of Agricultural Science (IPPCAAS)

This project was designed to provide decision support and facilitate international collaboration between China and the Belt and Road Initiative countries in the field of plant protection. Under this project, a tripartite Memorandum of Understanding between China, Pakistan and CABI was signed to strengthen the collaboration on plant protection research, technology transfer and capacity building. The project also responded to the invasion of fall armyworm in China and assessed its economic impact on maize and smallholder farmers in Dehong Prefecture of Yunnan province.

The Joint Laboratory for Bio-safety between Chinese Ministry of Agriculture and Rural Affairs (MARA) and CABI

Location: China

Dates: 01/08/2008 – Ongoing

CABI Project Manager: Ulrich Kuhlmann

CABI Project Team: Feng Zhang, Qiaoqiao Zhang, Hariet L Hinz, Li Hongmei, Wan Min, Zhang Jinping, Tang Rui, Liu Zhi, Stefan Toepfer, Tim Haye

Donors: Chinese Ministry of Agriculture and Rural Affairs (MARA); various donors for specific projects (incl, EuropeAid, Department for International Development (DFID); Swiss Agency for Development and Corporation (SDC); Newton Fund

Partners: Various Chinese, Asian, African, European and American partners

The Joint-Laboratory for biosafety between the Ministry of Agriculture and Rural Affairs (MARA) and CABI provides a platform for research collaboration and technology transfer, a centre for training and scientific exchanges, an open platform for joint collaboration with third parties, and a consultancy service.

The Joint-Laboratory is well-positioned to facilitate triangular and multilateral collaboration, and agricultural technology transfer from China to other developing countries.

By the end of 2020, the Joint Lab had successfully led and/or implemented 32 international cooperation projects on research and technology transfer in the broad plant protection area. More than 80 Chinese and overseas organizations have participated in these projects, with a total funding of approximately US$ 33 million. After 12-years of operation, the Joint Lab is now widely regarded as one of the top platforms of its type within the Chinese agricultural research and development community.

The role of media and their interaction with science and politics in water diplomacy

Location: The Netherlands

Dates: 01/01/2017 – 31/03/2022

CABI Project Manager: Brahim Jrah

CABI Project Team: Bothina Osama, Ben Deighton, Paul Dawson

Donors: IHE Delft Institute for Water Education (IHE)

Partners: University of the Witwatersrand; UNESCO-IHE; Nile IWRM-Net; UNDP Cap-Net

The project addressed an overlooked area in water diplomacy: the role of the media and its interaction with science and politics in advancing narratives that contribute to defining the scope of water debates and negotiations. The project brought together water scientists, water journalists and water diplomats in a laboratory – Open Water Diplomacy – that addressed related research questions.

The project delivered a training course and workshop (both face-to-face and virtually), after carrying out research into developing the course within academic conferences and international events. It produced reports on the courses in Arabic and English, created a portal and a podcast with an interactive story summarizing the journey, and published a handbook on water diplomacy.

The UK Crop Microbiome Cryobank

Location: UK

Dates: 01/10/2020 – 01/10/2025

CABI Project Manager: Matthew Ryan

Donors: Biotechnology and Biological Sciences Research Council (BBSRC)

Plant microbiomes are microbial communities essential to the whole ecological area of a plant's phytobiome – a plant's specific ecological area. A healthy phytobiome is critical to crop health, improved crop yields and high-quality food. However, crop microbiomes are relatively under-researched.

The UK Crop Microbiome Cryobank project will develop a unique, exploitable and integrated resource providing the biological and bioinformatic tools to improve soil and crop health. Six of the UK's key crops will be the focus and usable outputs will underpin UK research activity, in line with the Biotechnology and Biological Sciences Research Council's strategic priorities in agriculture and food security. The project will support three of the UN's Sustainable Development Goals: Zero Hunger, Responsible Consumption, and Production and Life on Land. The resource will begin to be made available during the first year of the project, expanding in subsequent years.

www.cabi.org/the-uk-crop-microbiome-cryobank

Trade and value chain strategy implementation

Location: Global. Ghana, India

Dates: 2020 – 2021

CABI Project Manager: Suzanne Neave

CABI Project Team: Julie Flood, Jayne Crozier, Vinod Pandit, Walter Hevi

Donors: CABI Development Fund (CDF)

CABI's ambition is to position itself as a major player in agribusiness development and the agricultural value chain, implementing projects and programmes across multiple countries to support the development of value chain integrity and to promote the inclusion of smallholder farmers in national, regional and global markets.

Consultants were hired to assess CABI's operations and review the external landscape to identify CABI's unique offerings. In 2020, CABI undertook an initial market analysis to inform its broad strategy, including a competitor analysis and business plan. In 2021, CABI explored business opportunities in India and Ghana, and secured a contract at the end of 2021 with Sustainable Action Network to deliver training to spice suppliers in India. It is engaging with a third-party certification company in Ghana to support their programme. CABI has also signed a contract to facilitate the development of a leading cocoa manufacturing company's research road map.

Training farmers in sustainable pomelo production in Vietnam

Location: Vietnam

Dates: 01/01/2019 – 01/04/2019

CABI Project Manager: Muhammad Faheem

Donors: Bayer AG Crop Science Division

Partners: Southern Horticultural Research Institute, Vietnam (SOFRI)

CABI, in collaboration with the Southern Horticultural Research Institute, Vietnam, developed a fully-fledged manual on sustainable pomelo production in Vietnam covering crop management, pest management, and resistance management if relevant with the objective of supporting smallholders in Vietnam to improve their yields.

Training on sanitary and phytosanitary measures for the East African Community

Location: Tanzania

Dates: 29/04/2019 – 12/07/2019

CABI Project Manager: MaryLucy Oronje

CABI Project Team: Rahab Njunge, Linda Likoko

Donors: DAI Global LLC with funding from USAID

CABI was commissioned by the USAID-supported East Africa Trade and Investment Hub (EATIH) to provide sanitary and phytosanitary (SPS) (Animal health, Plant health and Food safety) capacity development services to authorities and experts from the public and private sector in countries of the East African Community.

The project work included the development of manuals on risk analysis and inspection procedures, training workshops on practical risk analysis, status reviews of SPS Official Controls in accordance with international standards, proposed recommendations for institutionalizing SPS risk-based approaches, and the establishment of a rapid response mechanism.

In total, as part of the workshops, 440 participants, a mixture of male and female, were trained.

Training plant doctors on safe pesticide use on coffee plants in Vietnam

Location: Vietnam

Dates: 01/07/2019 – 01/12/2019

CABI Project Manager: Muhammad Faheem

Donors: ECOM SMS, Vietnam

Through CABI's engagement and further technical discussions with Sustainable Management Services (SMS) Vietnam, a project was proposed with the aim of improving the capacity of SMS Vietnam's staff as Coffee Crop Doctors.

The Plant Doctor training was conducted by CABI in three modules. The training methodology consisted of presentations from trainers and participants, group discussions, role play, as well as individual and field exercises.

Further training focused on the safe application of pesticides for pest and disease treatment, including calibration of equipment, use of Personal Protective Equipment, safe manipulation of pesticide, and pesticide resistance management.

Using beneficial maize-rhizosphere microbials against western corn rootworm

Location: France; Hungary; USA

Dates: 01/07/2016 – 31/12/2021

CABI Project Manager: Stefan Toepfer

Donors: Groupement National Interprofessionnel des Semences et plants (GNIS), section maïs et sorgho, gestionnaire du Fonds Diabrotica

Partners: Proteus, France; UMR 7265 CNRS-CEA AMU CEA/DRF/BIAM/ LEMiRE, CEA Cadarache, France; Genoscope UMR8030, CEA/DRF/IBFJ, France; Biogemma, France; Genective, France and USA

The western corn rootworm – a leaf beetle, is a major invasive maize pest in North America and Europe, however, control options are limited due to the phase-out of certain pesticides.

New technologies are being researched, and by using field surveys and candidate gene searches through database-mining, CABI is investigating bacterial proteins for insecticidal effects. Promising strains are then examined to develop biocontrol options.

In this project, more than 400 bacteria have been identified, and several microbial collections have been screened based on a bioinformatic approach. Genomes from about 2500 bacterial strains were also sequenced. Over 300 unique proteins were produced as crude lysates and tested on larvae of western corn rootworms, with some promising result being detected.

Follow up activities will focus on mass culturing the bacteria and a further understanding the of the considered proteins. This lays the base for potential developments of novel microbial biopesticides urgently needed for the management of soil insect pests.

www.cabi.org/western-corn-rootworm

Using insects to improve smallholders livestock production and food security in West Africa

Location: Benin, Burkina Faso, Ghana

Dates: 01/01/2015 – 31/12/2021

CABI Project Manager: Marc Kenis

Donors: Swiss Agency for Development and Cooperation (SDC)

Partners: Université de Neuchâtel, Switzerland; Université d'Abomey-Calavi, Bénin; Institut National des Recherches Agricoles du Bénin, Bénin; Council for Scientific and Industrial Research, Ghana; Fish for Africa, Ghana; Université Polytechnique de Bobo-Dioulasso, Burkina Faso

As a natural food source, endorsed by the FAO, CABI is promoting the use of insects to help alleviate poverty.

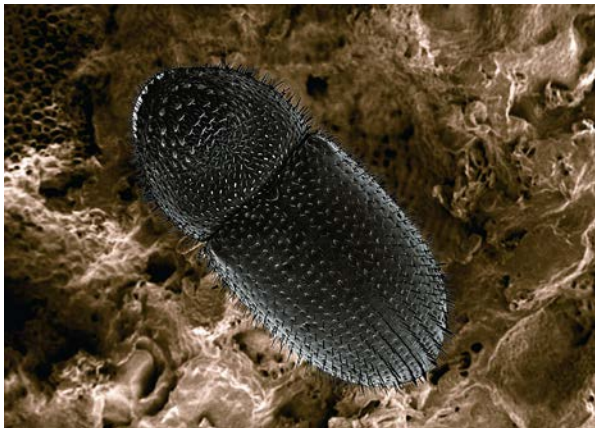
The project is developing innovative and appropriate methods for fly larvae and termite production and utilization in smallholder farming systems in West Africa. The innovations are tested and validated with potential end users, and findings disseminated to stakeholders, communities, scientists and policy makers.

Various methods to produce larvae of two fly species, the domestic fly and the black soldier fly, have been developed for those wanting to produce fly larvae as commercial products. Sustainable collection techniques developed and based on trapping systems are being disseminated in regions where farmers collect termites from the wild. Studies have been completed on:

- The use of termites as poultry feed for smallholder farmers
- The nutritional quality of fly larvae and termites as poultry feed
- Potential health issues
- Social acceptability of fly larvae as animal feed

www.cabi.org/insects-as-feed

Using parasitoids from Kenya to control coffee berry borer in Puerto Rico



Location: Kenya, Puerto Rico

Dates: 2020 – 2023

CABI Project Manager: Ivan Rwomushana

CABI Project Team: Joseph Mulema, Duncan Chacha

Donors: United States Department of Agriculture (USDA)

Partners: Kenya Wildlife Service; The County Governments of Busia, Kisumu, Kisii; USDA-APHIS; USDA-ARS; University of Puerto Rico; University of Hawaii; Centro Nacional de Investigaciones de Café-Colombia; Kenya Agricultural and Livestock Research Organization (KALRO)

Coffee berry borer (CBB) has spread around the world to new coffee production areas, including Puerto Rico, without the insect's natural enemies, which would normally help limit its population growth. The project's focus is on the implementation of classical and augmentative biological control methods in Puerto Rico to help control CBB populations and prevent their spread.

The goal is to make augmentative biological control releases in CBB-infested production areas, and preventative releases in zones where the pest is not established but is expected to appear. The focus will be on three species of parasitoids that have been successfully reared in the laboratory and are widely used in augmentation programmes in other countries, particularly in Latin America. The project will involve the collection of the parasitoids from Kenya and their shipment to Puerto Rico, in accordance with the Nagoya Protocol on Access and Benefit Sharing of Biological Diversity.

Image: coffee berry borer (*Hypothenemus hampei*) © Eric Erbe, USDA Agricultural Research Service, Bugwood.org

Utilizing Earth Observation and Unmanned Aerial Vehicle technologies to deliver pest and disease products and services in China

Location: China, UK

Dates: 01/06/2019 – 31/05/2022

CABI Project Manager: Belinda Luke

CABI Project Team: Hongmei Li, Feng Zhang , Alyssa Lowry

Donors: Technology Strategy Board; Innovate UK

Partners: Assimila; King's College London; Loughborough University; Aerospace Information Research Institute-Chinese Academy of Sciences (AIR-CAS); National Agro-tech Extension and Service Center (NATESC); Peking University; Anyang Quanfeng Aviation Plant Protection Technology Co. Ltd; Waobot

Rust pathogens and locusts are major problems in China and are currently treated with blanket applications of chemical pesticides, which is inefficient and environmentally damaging. The aim of the project is to utilize advances in Unmanned Aerial Vehicle (UAV) technology to combat this threat, improving farming effectiveness.

The project will provide a comprehensive approach to dealing with these pests, combining cutting-edge technology, modelling and biological information. It will develop pest and disease monitoring, forecasting and management service products at national and local levels, including crop pest and disease warning maps, which will enable service providers to determine spray areas and plan UAV flight paths for precise spraying. To date, the project has conducted field demonstrations on wheat rust in the Henan Province on rice planthopper and rice sheath blight in Hunan Province, and on locusts in Hebei Province.

Virtual conference supports efforts to tackle fall armyworm in South Asia

Location: SAARC Member Countries: Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka

Dates: 01/03/2021

CABI Project Manager: Malvika Chaudhary

Partners: South Asian Association for Regional Co-operation (SAAC); International Maize and Wheat Improvement Center (CIMMYT)

Farmers need significant support to manage fall armyworm (FAW) sustainably in their cropping systems through Integrated Pest Management (IPM) activities. Awareness raising and empowerment of farming communities with knowledge of the pest, along with suitable technologies and management practices is key. The exchange of information within this region is crucial for researchers, as well as extension workers, to combat the pest cost-effectively.

A two-day virtual conference among the South Asian Association for Regional Cooperation (SAARC) member states was conducted to discuss joint efforts to mitigate this devastating pest. Recommendations from the conference was to strengthen surveillance, research and extension of FAW on maize and potential non-maize host crops while developing biologically intensive IPM programmes against the pest.

The forum strongly supported the evolution of national FAW task forces into standing cross-sectorial invasive pest species and the communication of uniform FAW management recommendations.

Wellcome Global Monitor Hack 2021

Location: Kenya, UK (organizing team). Global (participants expected from many countries with a focus on Africa)

Dates: 01/01/2021 – 01/01/2022

CABI Project Manager: Tim Beale

CABI Project Team: Tom Chaloner, Ben Deighton, Hildah Nyakwaka (Data Consultant)

Donors: The Wellcome Trust

Partners: The Wellcome Trust; SciDev.Net; CABI

A virtual hackathon was held in December 2021, with support from dedicated facilitators and a prize for the best hack. The event focused on combining available datasets and analysing data from a local or regional perspective in Africa. Participants were also asked to consider the policy implications of their insights, as well as how these insights could lead to future research opportunities.

One of the datasets the hackathon focused on was the Wellcome Global Monitor – a comprehensive survey of more than 140,000 individuals from 140 countries on their attitudes to science and health. Stakeholders developed increased capacity to analyse various health and other datasets, and there was increased awareness of the 2018 and 2020 Wellcome Global Monitors in Africa, and within Wellcome of data challenges in Africa. The event will inspire future research projects that draw on the Wellcome Global Monitor themes and data.

Woody Weeds in East Africa

Location: Ethiopia, Kenya, Tanzania

Dates: 01/01/2015 – 31/12/2023

CABI Project Manager: Urs Schaffner, Rene Eschen

CABI Project Team: Arne Witt, Winnie Nunda, Fernadis Makale

Donors: Swiss National Science Foundation; Swiss Agency for Development and Cooperation (SDC)

Partners: Water and Land Resource Centre (WLRC), Ethiopia; Haramaya University, Ethiopia; Kenya Forestry Research Institute (KEFRI) Kenya; Sokoine University of Agriculture, Tanzania; Tanzania Forestry Research Institute (TAFORI), Tanzania; University of Bern, Switzerland; Centre for Training and Integrated Research in ASAL Development, Kenya; University of Stellenbosch, South Africa

Many exotic trees and shrubs have been introduced into Africa and become destructive invasive species, reducing native biodiversity and limiting the livelihoods of rural communities. CABI is trying to mitigate these impacts in East Africa by generating and sharing knowledge on their effects and finding control options.

The initial 'Woody weeds' project, which finished in 2021, generated knowledge about the invasion of Prosopis. Experimental studies showed another woody invader, Lantana camara, also negatively affects crop plant growth. Through the six years of the project, cooperation with stakeholders from local and national levels in the three target countries was key to understanding the social and ecological effects of the two species and how to manage them.

Woody Weeds + was launched in 2021 and will build on the previous work but will support a National Prosopis Strategy for Kenya, helping to sustainably manage the invasive weed.

www.cabi.org/woody-weeds

Working together to improve Pakistan's food export capabilities to China and beyond

Location: Pakistan, China

Dates: 24/09/2019 – Ongoing

CABI Project Manager: Feng Zhang

Partners: Chinese Academy of Agricultural Science (CAAS); CABI; Pakistan Agriculture Research Council (PARC)

A collaborative effort between CABI and the Chinese Academy of Agricultural Science (CAAS) aims to help Pakistan's Ministry for National Food Security & Research (MNFS&R) enhance the country's capacity to increase food exports to China and other countries around the world.

There are plans to cooperate with agricultural research, capacity building of agro-scientists, regional pest management, quarantine facilities and technology transfer initiatives.

The project team agreed to enhance research and development – mainly in respect of increasing Pakistan's Sanitary and Phytosanitary (SPS) measures to enhance its exports – as part of the Belt & Road Initiative, which aims to improve regional integration, trade and economic growth between Asia, Africa and Europe.

It was agreed that CABI and the Pakistan Agriculture Research Council (PARC) will develop an initial list of biocontrol research ideas, establish a joint laboratory and necessary quarantine facilities to help find biological controls for crop pests and invasive species such as the noxious Parthenium weed.

Working together to intensify pest control in Eastern Africa

Location: Burundi, Djibouti, Ethiopia, Eritrea, Kenya, Rwanda, Somalia, South Sudan, Uganda

Dates: 21/11/2020 – 30/05/2021

CABI Project Manager: MaryLucy Oronje

CABI Project Team: Daniel Karanja, Rahab Njunge, Ivan Rwomushana, Fredrick Mbugua, Fernadis Makale, Winnie Nunda, Duncan Chacha

Donors: Food and Agriculture Organization of the United Nations, Subregional Office for Eastern Africa (FAOSFE)

As part of a broad-based initiative to address the plant protection needs of the Eastern Africa nations, a practical training programme on Pest Risk Analysis (PRA) was delivered to experts drawn from the National Plant Protection Organizations. The training programme was focused on early warning, preparedness, and response systems for regional plant pest risk reduction and mitigation. Practical sessions on the PRA process, the Crop Protection Compendium, which is set to gather pest information, and the Horizon Scanning Tool, that assists countries to identify priority pest candidates for regulation, were explored.

As part of the capacity development initiative, the FAO and CABI have also delivered over 35 published resources to strengthen sanitary and phytosanitary (SPS) efforts in the nine countries in the subregion. The resources constituted 11 International Standard for Phytosanitary Measures Manuals, 13 Diagnostic Protocols and 14 CABI-published books covering various SPS-related topics that were sent to the countries in Eastern Africa.

Yellow Spotted Stink Bug literature review

Location: China, New Zealand

Dates: 01/08/2019 – 31/01/2020

CABI Project Manager: Jinping Zhang

Donors: Zespri, New Zealand

The Yellow Marmorated Stink Bug (YSSB) is one of the most widely distributed phytophagous pests in Asia. Host plants include some commercially important fruits, and its damage has caused some economic losses. Considering its similarity with the brown marmorated stink bug, and under proper condition and circumstances, YSSB could also become an ecological and economic danger to the world as a representative of a group of agriculturally significant true bugs.

Known as a hitchhiker pest, YSSB could be introduced into other areas outside its current distribution in a variety of ways, eg cargo or used machinery. In 2014, the species invaded New Zealand which resulted in harmful impacts on key exports, such as kiwifruit.

It is critical to obtain more detailed knowledge and information of YSSB in China and elsewhere, particularly its damage and impacts on kiwifruit, or other economic important horticulture crops, basic biology and ecology, and control methods.

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