



CABI News Bulletin Asia

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News and Stories

China visit strengthens partnership for sustainable food security

CABI has paid a high-level visit to China to further strengthen partnerships that support progress towards sustainable food security and celebrate 15 years of the Chinese Ministry of Agriculture and Rural Affairs (MARA)-CABI Joint Laboratory for Biosafety (Joint Lab).

Dr Daniel Elger, CABI CEO, led a delegation of senior officials and scientists from CABI's centres in China, Africa and Europe, to take part in the 7th Global Forum of Leaders for Agricultural Science and Technology (GLAST 2023) and the International Symposium on Plant Biosafety (ISPB).

The week-long visit also provided an opportunity for CABI to hold high-level meetings with the MARA and the Chinese Academy of Agricultural Sciences (CAAS), as well as to meet other partners from China and elsewhere.

Strengthening partnerships in agricultural policymaking, research, innovation, and application

GLAST, initiated by CAAS in 2006 together with FAO and CGIAR, and then joined by the International Atomic Energy Agency (IAEA) in 2019, has addressed the essential role of agricultural technology and innovation in transforming global agri-food systems to become more efficient, inclusive, resilient, and sustainable.

CABI has participated in all seven GLAST meetings since 2006. GLAST 2023, which brought together over 580 policymakers, research leaders, scientists, and practitioners from more than 50 countries and 15 international organisations, focused on Science and Technology leading the transformation of global agri-food systems. Led by Dr Elger, the CABI Delegation at GLAST 2023 included Dr Qiaoqiao Zhang, Director of Memberships, and Dr Feng Zhang, Regional Director, East & South-East Asia. Dr Elger gave a presentation at the session on "The role of cutting-edge and game-changing technologies in agricultural transformation."

Here he spoke about the importance of increasing the reach, application and impact of sustainable practices and technologies in crop production, highlighting how CABI's PlantwisePlus programme provides information to farmers through a mixture of face-to-face, digital and 'mass extension' approaches.

On partnership with China, Dr Elger said, "CABI and China have enjoyed a long history of successful partnership, particularly through the China MARA-CABI Joint Laboratory hosted by the Institute of Plant Protection of the Chinese Academy of Agricultural Sciences (IPPCAAS).

"Thanks to substantial support from MARA, CAAS, IPPCAAS and CABI, the Joint Lab has driven innovation and outputs of real relevance to both Chinese and global needs in food and nutritional security, plant biosafety, food safety and sustainable development.

"As a valued Member Country, China played a key role in the development of CABI's latest Medium-Term Strategy, which sets out five goals to help tackle hunger, poverty, gender inequality, climate change and the loss of biodiversity. We are working closely with China and our other Member Countries on the implementation of this strategy," Dr Elger added.

Promoting international co-operations in plant biosafety

Dr Elger was joined by seven CABI senior managers and scientists at the International Symposium on Plant Biosafety held in Kunming, China.

Co-organised by CAAS, CABI and other partners, this symposium brought together 300 participants from 16 countries to share experiences and promote international cooperation around plant biosafety and building solid biosafety management systems to combat cross-border incursions by pests and diseases.

In recent years, transboundary pests, and diseases, such as fall armyworm and desert locust, have provided significant challenges to food security.

Dr Ulrich Kuhlmann, Executive Director, Global Operations and Co-Director of the Joint-lab for CABI, delivered a keynote presentation on the importance of pest preparedness approaches to improve food security and food safety.

Dr Kuhlmann also highlighted some of CABI's work to help smallholder farmers combat crop pests and disease outbreaks through CABI's digital tools under the PlantwisePlus programme.

This includes the Crop App Index which is helping extension workers and smallholder farmers discover and select tools to support decision making in crop production and plant health.

Several other CABI scientists also presented on pest threats and their management at the ISPB meeting.

Celebrating 15 years' milestone of the Joint Lab

A video was shown at IPSB highlighting successes of the Joint Lab over the past 15 years. Awards were given to six managers and scientists (in recognition of their efforts in the establishment of this important platform for joint research, capacity building, scientific exchange, technology transfer and policy consultancy.

Since its establishment in 2008, the Joint Lab has led or implemented more than 40 international cooperation projects involving research and technology transfer in the plant protection area.

Over 80 Chinese and overseas organizations have participated in these projects, with a total funding of around US\$36 million. In 2021, a CABI-CAAS joint study reviewed the achievements of the Joint Lab and showed that it provides excellent value for money with an investmentbenefit ratio of 1:4.

Professor Wu Kongming, President of CAAS (the first Co-Director of the Joint Lab for China), said, "The Joint Lab has played an important bridging role in some major triangular collaboration and South-South cooperation initiatives including the facilitation of agricultural technology transfers from China to other countries during the past 15 years.

"Building on what has been achieved, China looks forward to deepening our collaboration with CABI towards robust partnerships among China, CABI and CABI's other Member Countries to ensure global food security and contribute to the realisation of the SDGs." At his opening remarks at ISPB, Dr Wei Zhenglin, Deputy Director General for International Co-operations at MARA, said, "The recently concluded 'Belt and Road Summit' held in Beijing stressed the importance of scientific and technological innovation – working with other countries to promote scientific and technological exchanges, build joint laboratories, and transfer technology.

"The China MARA-CABI Joint Lab will, therefore, have an even more important role to play, and greater opportunities for strategic research and innovation contributing to this important initiative and helping more of CABI's Member Countries in their endeavours to ensure national food security."

Dr Kuhlmann (the Co-Director of the Joint-lab for CABI), said, "15 years of outstanding research and innovation towards our shared vision of more sustainable food security have made the Joint-Lab one of the top institutions of its type within the Chinese agricultural research and development community. We stay ready to embrace more challenges and look forward to many more years of successful collaboration."

Additional information

Main image: The visit provided an opportunity for CABI to hold high-level meetings with the MARA, the Chinese Academy of Agricultural Sciences (CAAS), and other partners.

Biocontrol training in Pakistan helps farmers prevent harmful aflatoxins in chillies

Pakistan is the world's fourth-largest producer of chillies. The country accounts for around 4-5% of global chilli production. Sindh province is where 85% of Pakistan's chillies are grown, making it one of the biggest chilli-producing regions worldwide. The province is well-known for the town of Kunri, home of the world-famous Dundicut red chillies.

But here, chilli growers face significant agricultural challenges that threaten their livelihoods. One of the biggest problems they face is aflatoxin contamination of their crops.

According to the World Health Organization, aflatoxins are among the most poisonous mycotoxins. They are produced by moulds that grow in the soil, decaying vegetation, hay, and grains. Aflatoxins are mainly produced by fungi known as Aspergillus flavus and Aspergillus parasiticus. These highly toxic compounds pose a serious risk to human health. As such, they are a considerable challenge for chilli growers in Sindh province.

Mitigating aflatoxin risks

CABI in Pakistan recognizes the gravity of aflatoxin contamination. It is not only an important agricultural issue, but also one of public health. The centre has been working to limit the risks for the country's chilli growers. Collaboration is crucial. CABI has teamed up with several organizations to address the issue including:

Pakistan Agricultural Research Council (PARC) United States Agency for International Development (USAID) United States Department of Agriculture (USDA) Rafhan Maize Products Co. Ltd

The organizations are working together on an important project in Pakistan on regulatory harmonization for maximum residue limits and biopesticides. What sets this project apart is its focus on addressing aflatoxins. Uniquely, it explores the use of a unique biocontrol technology at farm level to reduce aflatoxins in red chillies.

Mr Azhar (left) and the master trainer – proudly showing off the premium quality harvested potatoes (Credit: CABI).

As part of this project, funded by USAID and USDA, CABI implemented a comprehensive training programme for chilli growers in Sindh Province. CABI designed the training to focus on the adoption and utilization of aflatoxin biocontrol techniques. These approaches were tailored to the specific needs of chilli cultivation.

Farmers benefit from aflatoxin training

Farmers are determined to overcome the threat of aflatoxins. So, they were keen to take part in the training programs. They especially wanted to learn how to use biocontrol technology to reduce aflatoxin levels. The training provided also emphasized the importance of Good Agricultural Practices (GAPs). To deliver the training, CABI used various media including engaging animated videos. The materials were crafted in the local Sindhi language to ensure their accessibility to the target audience.

The farmers learnt improved harvesting and post-harvesting handling methods. For example, they learnt the technical drying techniques for red chillies. The training also included techniques for regular crop monitoring to discover pests and diseases.

Sharing information to help chilli farmers address aflatoxins

Knowledge sharing about chilli production can change lives. In 2023, for example, a progressive chilli grower and entrepreneur from Sindh came across one of the project's blogs. Intrigued by the project's potential benefits, he shared the insights he had gained from the blog with his farm team.

This kickstarted their journey towards producing healthier and safer chilli crops. Outreach and research efforts can directly benefit individuals and communities. Knowledge fosters positive change across the agricultural landscape.

Addressing the bigger picture

One of the bigger picture benefits of the training is addressing issues with international trade.

As a global exporter of chillies, Pakistan has experienced problems in meeting market requirements. This includes Sanitary and Phytosanitary (SPS) standards of trading countries.

When the standards are not met, the country's ability to export agricultural products is reduced. Exports are sometimes rejected because of aflatoxins. Through targeted training, CABI is working to find sustainable solutions to address the issue at the farmer level with the aim that benefits will be felt at a much broader level, too.

Safeguarding farmers' futures from aflatoxins

Implementing these practices should give farmers in Pakistan a big boost. Primarily, it should help them minimize conditions favourable to aflatoxin contamination and this will further safeguard their chilli crops. It will also ensure the chillies are suitable for local consumption as well as profitable for exports.

Adopting biological control solutions and GAPs is an essential step for chilli production. With time, farmers in Sindh province should see reduced aflatoxin concentration in chilli crops.

In the coming months, farmers can build their reputation for growing high-quality chillies with reduced levels of aflatoxins. A decrease should then lead to an improvement in both the quality and market value of the produce to attract new buyers and expand their market reach.

This should significantly benefit whole farming communities. Beyond that, it should also boost local economies. And eventually it could foster development of the region. Revolutionizing crop protection: Success of a novel approach to combatting fall armyworm in India

The global battle against invasive pests has found a new champion with pioneering efforts to combat the fall armyworm (*Spodoptera frugiperda*) in India.

This is thanks to a sensor-based pheromone trap – that can be operated remotely anywhere in the world – and which has been created as part of a project funded by the UK Foreign, Commonwealth & Development Office's (FCDO) Science and Innovation Network in India.

The work was led by CHAP together with consortium partners CABI, food chain data specialists Knowmatics and sensor experts Ystumtec. The project was also delivered in conjunction with the M S Swaminathan Research Foundation (MSSRF).

Highly invasive pest

The fall armyworm is a highly invasive pest, notorious for its capacity to inflict extensive damage to crops worldwide and has been the scourge of agricultural communities across continents.

After wreaking havoc on the cornfields of sub-Saharan Africa, the fall armyworm ominously arrived in India in 2018, heralding a new era of challenges for the agricultural landscape.

The scale of fall armyworm's devastation cannot be underestimated. Its relentless assault quickly spread across the Indian subcontinent, infiltrating maize farms in 20 states.

This pest has posed a grave threat to smallholder farmers, especially due to the prevalence of maize monoculture and the escalating resistance resulting from overuse of pesticides.

The ripple effects of fall armyworm extend beyond corn crops, as it has demonstrated a voracious appetite for over 350 plant species, including rice, sugarcane, beet, potato, cotton, and grassland.

Crisis required a multifaceted approach

Addressing the fall armyworm crisis required a multifaceted approach. Recognizing the need for a coordinated sentinel network capable of collecting precise data on pest presence to predict risks for growers and communities, researchers embarked on a transformative journey.

This collaboration aimed to alert farmers to impending risks in a cost-effective manner, necessitating data that correlates commodity sensor signals and pheromone trap morphology with the presence of known pest species.

The absence of such critical datasets has impeded the establishment of a reliable sentinel network to generate timely alerts and guide farmers in adopting sustainable crop protection strategies.

In a ground-breaking leap toward solutions, the FCDO's Science and Innovation Network in India provided essential funding for a phase one feasibility study in 2021. This monumental endeavour marked the inception of a novel sensor node, capable of transmitting vital data from fields at risk of FAW attack directly to farmers' mobile devices.

Potential to optimise farming operations

Beyond merely bridging the information gap, this ingenious remote sensing device holds the potential to optimise farming operations, elevate yields, and offer valuable intelligence on pest presence. As the project advanced, collaboration emerged as the cornerstone of success. The transformative phase sought to redesign hardware and quantify device efficacy through a partnership with Tamil Nadu-based entomology research.

This collaboration aimed to establish datasets that correlate sensor signals and pheromone trap morphology with known pest species' presence, a crucial stride toward predictive analysis.

Yet innovation went beyond technology. Recognizing the diverse landscape of farmers, especially the approximate 30% of illiterate farmers in Tamil Nadu, the project employed generative user research methods.

Progressive web app

This approach delved into the motivations, pain points, and behaviours of farmer groups, leading to the creation of a user experience pathway that catered to all farmers, transcending literacy barriers.

The fall armyworm mobile app.

The culmination of this effort was a progressive web app accessible to all farmers facing threats from invasive species like the fall armyworm.

The hardware aspect of the project was equally visionary. Focused on creating an accessible wind tunnel without compromising functionality, project partners embarked on a thorough literature search and design process. The outcome was a wind tunnel predominantly constructed from locally available materials, ensuring ease of access and assembly. The incorporation of tools like 3D printers and laser cutters facilitated continuous improvements based on user feedback, reinforcing the project's adaptive nature.

Revamped moth trap

Dr Jenna Ross from CHAP with the new version of the trap.

Transitioning into the second phase, the project achieved significant strides. A revamped moth trap, designed by Ystumtec, underwent rigorous testing, yielding a version capable of reliably transmitting data over a range of 16 kilometres.

This advancement indicates that a single gateway installed at Pushkaram College of Agriculture Science could cover an impressive area of over 800 square kilometres.

Additionally, the user interface was enhanced to cater to diverse stakeholders, including farmers and agronomy advisors, fostering a robust information-sharing platform.

The project did not confine itself to technology development but delved into risk prediction as well. An essential component for farmers and advisors alike, the risk model aimed to forecast fall armyworm outbreaks.

By analysing crop, pest, and environmental factors, the model equips farmers with timely insights

to alert supply chains, apprise local farmers of potential threats, and mitigate yield loss.

Dedicated research plot established

In tandem with these efforts, meticulous research and experimentation were conducted. A dedicated research plot was established in Tamil Nadu, observing the behaviour and lifecycle of the fall armyworm.

Facilities were set up for observing pupae and adult emergence, egg-laying processes, and flight behaviour. This foundation laid the groundwork for a multi-stakeholder 'show and tell' event, celebrating the culmination of phase two.

Testament to innovation, collaboration, and perseverance

The project to tackle the fall armyworm in India succeeded through innovation, collaboration and perseverance.

In conclusion, the project stands as a testament to innovation, collaboration, and perseverance. From the establishment of new facilities and protocols to the development of user-centric apps, risk models, and culturing facilities, the team's accomplishments are undeniably substantial.

The insights garnered from device installation and user training processes will guide future iterations and testing in the next phase. This endeavour signifies not only a resolute fight against fall armyworm but a model for addressing complex global agricultural challenges.

Additional information

Main image: Vinod Pandit (far right), CABI's Deputy Director, visits the research plot.

Training workshop held on risk assessment for pesticides use to help safeguard crops in Thailand

Pesticides are a double-edged sword in agriculture. On one hand, they play a crucial role in protecting crops from pests, increasing smallholder farmers' profits, and enhancing food security. On the other hand, their misuse or excessive use can have detrimental effects on human health, the environment, and non-target organisms.

To strike a balance, it is essential to regulate and assess the risks associated with pesticide use as part of an Integrated Pest Management plan that also considers safer-to-use and more environmentally friendly biological control agents (BCAs).

This is precisely why the Department of Agriculture (DOA) in Thailand, in collaboration with the United States Department of Agriculture – Foreign Agricultural Service (USDA-FAS) and CABI, organized a three-day training workshop on pesticide risk assessment.

Specific focus on Maximum Residue Limits (MRLs)

The workshop brought together fifty-two officials

from various government departments and the private sector in Thailand. These participants aimed to equip themselves with the knowledge and tools necessary for assessing the risks linked to pesticide usage, with a specific focus on Maximum Residue Limits (MRLs) estimation, establishment, and dietary risk assessment.

MRLs are legal limits set by regulatory authorities to specify the maximum concentration of pesticide residues allowed on food products. One of the key takeaways from the workshop was a better understanding of what MRLs are and why they are essential.

They are fundamental to ensuring food safety and adhering to international trade standards, all while facilitating trade by meeting import requirements. Setting accurate MRL limits is crucial to safeguard consumers from harmful levels of pesticide residues through their diet.

Committed to implementing technical assistance programmes

Maria Rakhovskaya, Agricultural Attache of USDA-FAS, highlighted the importance of harmonized MRL standards in the region. Harmonization facilitates mutual understanding and promotes trade between local and international markets. To support this endeavour, USDA-FAS committed to implementing technical assistance programmes to improve standards and systems in the country.

Mr Pisan Pongsapitch, Secretary General of the National Bureau of Agriculture Commodity and Food Standards (ACFS), provided insights into existing regulatory requirements, procedures, and guidelines for MRLs estimation, establishment, and dietary risk assessment in Thailand.

The establishment of MRLs involves a multifaceted procedure that considers toxicological data, residue data, and good agricultural practices (GAPs). Workshop participants delved into the intricacies of the process, which includes MRL estimation, the supervision of residue trials, and the collection and analysis of data.

The establishment of MRLs involves a multifaceted procedure that considers toxicological data, residue data, and good agricultural practices (Credit: CABI).

To make these concepts more tangible, the participants engaged in a practical exercise using the Organisation for Economic Co-operation and Development (OECD) calculator. Canada and the United States, along with other OECD member countries, use the OECD MRL Calculator to calculate pesticide tolerances or MRLs.

Scientific principles underpinning the establishment of MRLs

It is essential for regulators, researchers, and industry professionals involved in the pesticide supply chain to comprehend the scientific principles underpinning the establishment of MRLs, such as the type of crop, pesticide application rates, and pre-harvest intervals.

Dietary risk assessment is another critical aspect of pesticide risk evaluation. It plays a pivotal role in evaluating potential health risks associated with pesticide residues in the human diet. The workshop offered a comprehensive view of the various steps involved in dietary risk assessment, including hazard identification, dose-response assessment, exposure assessment, and risk characterization.

By acquiring expertise in dietary risk assessment, the workshop participants are now better equipped to make informed decisions about the safety of pesticides in food, ensuring that consumers are protected from harmful pesticide exposure.

Biological control agents as alternatives

While pesticides are used to control pests, it's also essential to encourage the use of alternatives, such as BCAs. These alternatives are safer for the environment and pose fewer risks to human health.

To promote the use of biological control agents, Chubashini Suntharalingam, Agricultural Value Chains Coordinator at CABI, introduced the participants to the CABI BioProtection Portal. This web-based tool provides free access to information about registered biocontrol and biopesticide products from around the world.

The portal enables growers and agricultural advisors to identify, source, and correctly apply biocontrol and biopesticide products to address problematic pests in their crops. CABI extended an invitation to Thailand to join the portal, making valuable information readily accessible to those who need it.

Sustainable and safe pesticide use

The collaboration between DOA, ACFS, CABI, USDA-FAS, and CropLife Asia is making significant strides in addressing the challenges and responsibilities associated with pesticide use in agriculture.

Their efforts are geared toward improving production and ensuring the safety of both consumers and the environment. The DOA and ACFS in Thailand are currently working on a concept note outlining the needs and topics for future support from USDA and CABI under this bilateral engagement, which will be utilized for programming in 2024.

In conclusion, the training workshop on pesticide risk assessment held in Thailand is a step in the right direction towards sustainable and safe pesticide use.

By equipping professionals with the necessary knowledge and tools to assess risks associated with pesticide usage, establish MRLs, and conduct dietary risk assessments, Thailand is taking important strides in safeguarding its agricultural practices, protecting its consumers, and promoting international trade standards.

This collaborative effort underscores the importance of comprehensive and well-informed pesticide management in the modern agricultural landscape.

Participants at the workshop on pesticide risk assessment (Credit: CABI).

Additional information

Main image: MRLs are fundamental to ensuring food safety and adhering to international trade standards, all while facilitating trade by meeting import requirements (Credit: Pixabay).

PlantwisePlus News & Stories

Biocontrol agent released to safeguard crops from parthenium weed in Pakistan

Parthenium weed can produce large quantities of seed, up to 100,000 per plant.

Invasive plants can be extremely harmful to crops. "Famine weed" or parthenium is one such plant. Native to tropical America, it was accidentally introduced to several countries. In Pakistan, the weed now covers thousands of hectares of agricultural and rangeland. And it poses an economic burden to farmers.

Parthenium can reduce crop yields by between 46% to 90%. This harms not only farmers' livelihoods, but also food security. Furthermore, the weed has severe health effects on humans and livestock. It's poisonous, causing allergic reactions. And it hosts malaria-carrying mosquitoes. With no natural enemies to control it in its invasive range, it grows in vast monocultures. This displaces native plant species causing biodiversity loss.

Chemical pesticides can partially control parthenium. But they're harmful to human health and the environment. However, natural alternatives are proving helpful in the control of parthenium. Biological control (biocontrol) is turning the tide on parthenium. Beneficial insects are bringing about a more sustainable approach to managing this dangerous weed in Pakistan.

PlantwisePlus – controlling parthenium weed naturally

To control parthenium naturally, PlantwisePlus has been collaborating with partners in Pakistan. The main project partner is the National Agricultural Research Centre (NARC) in Islamabad. PlantwisePlus is also working closely with universities in Faisalabad, Mardan, Swabi, Tandojam, Multan, Bahawalpur and Rawalpindi.

Invasive species like parthenium invade new locations without their natural enemies. And this is a big problem. Without these beneficial plant diseases and insects, the weed spreads out of control. Biocontrol re-introduces these beneficial enemies. The aim of biocontrol isn't to eliminate the weed; it's to control it.

A parthenium infestation lines this street in Pakistan.

To control *Parthenium hysterophorus*, the PlantwisePlus project team has been looking for a suitable biocontrol agent. 'Biocontrol agent' is the term that describes natural enemies of the weed, insects, for example. In the wild, these organisms naturally control the weed's spread. The scientists have been looking for an agent that won't impact other native species.

Scientists need to select biocontrol agents that specifically target the pest or weed. The agent must not pose a threat to other species. Parthenium hysterophorus has a number of natural enemies. And it's these enemies that the project team has been researching.

The benefits of biocontrol for controlling parthenium weed

For several years, the team has been studying the effectiveness of *Listronotus setosipennis* in controlling parthenium. This is a stem boring weevil native to the Americas. The team has rigorously tested the weevil for its host specificity in quarantine laboratory. They've been able to confirm the weevil has a narrow host range. This means it only develops and feeds on parthenium and no other plants.

The weevils work by laying eggs in the plant's flowers. The hatched larvae then tunnel into the stem and feed on the plant. By feeding on the plant, they control its ability to grow and spread. In Australia, the weevils have successfully controlled parthenium, particularly in droughtprone areas.

Local authorities in Pakistan have approved the weevils' release into the wild. Ongoing monitoring has been essential to ensure that the weevils survive the winter. The weevil has shown great promise. Dr Phil Weyl leads the project under the PlantwisePlus programme. In the spring of 2023, he reviewed the weevils at the release sites. And he found that they had successfully overwintered.

Upscaling the release of the weevil

PlantwisePlus has trained people in many institutions in Pakistan to manage more releases in their local areas. The goal is to release 10,000 adult weevils by the end of 2023. So far, they have released about 10,150.

In June 2023, the project team released 500 *Listronotus setosipennis* weevils at multiple sites in Pakistan. The release ceremony at NARC was attended by Dr. Ghulam Muhammad Ali, Chairman of the Pakistan Agricultural Research Council (PARC). Dr. Babar Bajwa, Senior Regional Director, Asia, represented CABI at the event.

This PlantwisePlus collaboration has brought about a breakthrough in combating parthenium weed. The introduction of the stem boring weevil shows signs of great success. It offers a more sustainable way to manage the spread of parthenium without relying on harmful chemicals or machinery.

CABI aims to publish the project results in 2023, contributing valuable data to further control parthenium weed in Pakistan.

For more information about, see CABI's parthenium weed portal.

Also published recently:

- Role of plant clinics in Nepal highlighted at 10th International Plant Protection Symposium
- Workshop helps prepare survey to assess food safety practice in Bangladesh

Meetings and Events

Upcoming meetings and events CABI colleagues will be attending:

- UN Climate Change Conference | 30 November 12 December | two of CABI's climate change experts, Lydiah Gatere and Srijita Dasgupta, will be attending this high-level event to exchange knowledge on climate-smart adaptation and technologies
- National Entomology Conference | 8-9 December | CABI colleagues attended this event hosted by Banaras Hindu University
- Crop Pest Management & Trichogramma Production Workshop | 13-14 December | Chinese experts are being invited as part of the MARA-CABI Joint Lab network to this workshop coorganized by CABI and MARDI
- PlantwisePlus National Forum Meeting, Pakistan | 22 December | stakeholders are invited by CABi to attend this important meeting to discuss the pilot and scale-out phases of the programme in Pakistan

Recent Publications

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- Zhang, F, Thanarajoo, S., Faheem, M., Kuhlmann, U. (2023). Uptake of natural pest control solutions through digital tools (Abstract). International Symposium on Tropical Fruits (ISTF), 21-23 November 2023, Guangzhou, China

Products and Resources

CABI supports study, practice and professional development through our array of publishing products, research services and support tools.

| | Product | More information |
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| | Distribution Maps of Plant Pests ■ www.cabi.org/dmpp | https://www.cabi.org/publishing-products/distribution- maps-of-plant-pests/ |
| | Distribution Maps of Plant Diseases ■ www.cabi.org/dmpd | https://www.cabi.org/publishing-products/distribution- maps-of-plant-diseases/ |
| | Descriptions of Fungi and Bacteria www.cabi.org/dfb/ | https://www.cabi.org/publishing-products/descriptions-of- fungi-and-bacteria/ |

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Asia

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