A smiling man in a tan jacket holding a large bunch of green bananas. The background is a lush green banana plantation.

# PlantwisePlus Annual Review 2024





**PlantwisePlus** enables countries to face the challenges of plant health threats in a changing climate by empowering smallholder farmers to increase income, food security and food safety by producing more and higher quality food.

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## Abbreviations

ACIAR	Australian Centre for International Agricultural Research
ASEAN	Association of Southeast Asian Nations
CBSD	Cassava brown streak disease
COLEAD	Committee Linking Entrepreneurship-Agriculture-Development
CSA	Climate-smart agriculture
DGIS	Directorate General for International Cooperation (Netherlands)
EAC	East African Community
FAIR	Findable, accessible, interoperable, reusable
FAO	United Nations Food and Agriculture Organization
FAW	Fall armyworm
FCDO	UK Foreign, Commonwealth and Development Office
GTWG	Gender technical working group
HST	Horizon Scanning Tool
INTPA	European Commission Directorate General for International Partnerships
IPPC	International Plant Protection Convention
IPM	Integrated pest management
KALRO	Kenya Agricultural and Livestock Research Organization
KEPHIS	Kenya Plant Health Inspectorate Service
MEL	Monitoring, Evaluation, and Learning
NDCs	Nationally Determined Contributions
NICE	Nutrition in City Ecosystems
NPPO	National plant protection organization
PCPB	Pest Control Products Board (Kenya)
POC	Proof of concept
PPE	Personal protective equipment
PRA Tool	Pest Risk Analysis Tool
PRiM	Pest Risk Monitoring
PRISE	Pest Risk Information Service
SBCC	Social and behaviour change campaign
SDC	Swiss Agency for Development and Cooperation
STDF	Standards and Trade Development Facility
ToT	Training of trainers
TRF	<i>Trichogramma</i> rearing facility





# Executive summary

PlantwisePlus is a global programme led by CABI, dedicated to enhancing food security and improving the livelihoods of smallholder farmers through sustainable crop production practices that deliver safer, higher-quality food for domestic markets. The programme focuses on three key impact pathways: (i) pest preparedness, (ii) pesticide risk reduction, and (iii) farmer advisory services.

In 2024, PlantwisePlus made significant strides in strengthening plant health systems, improving pest preparedness, and reducing pesticide risks across its six focus countries and twenty-one core countries, working with nearly 300 partners across Africa, Asia, and the Americas.<sup>1</sup> The programme expanded its reach by adding Sri Lanka as the seventh focus country, formalizing a five-year partnership with the Department of Agriculture (DoA) to align with national agricultural strategies and reinforce its commitment to sustainable farming and food security.

Key achievements under the pest preparedness pathway included the expansion of pest risk assessments across South Asia, West Africa, and the Association of Southeast Asian Nations (ASEAN) region and the establishment of national pest risk registers in five countries, greatly enhancing risk management frameworks.

Furthermore, PlantwisePlus addressed gender disparities in pest management, ensuring that both men and women had equitable access to solutions. Large-scale campaigns reached thousands of farmers, raising awareness of invasive pests and Integrated Pest Management (IPM) strategies. Additionally, over 900,000 farmers in Kenya received SMS pest alerts and management advice enabling them to improve yields and reduce pesticide costs.

The programme achieved significant milestones in pesticide risk reduction and biological control implementation. Through collaborations with policymakers, regulators, the private sector, and farming communities, PlantwisePlus promoted sustainable plant protection strategies, including strengthening regulatory frameworks for biopesticides in Pakistan and expanding IPM adoption. Behaviour change campaigns in Kenya, Ghana, and Pakistan raised awareness about pesticide risks and promoted lower-risk pest control methods. Noteworthy biological control successes included controlling papaya mealybug in Kenya and Uganda, significantly reducing pesticide use. Farmers in these areas also show greater engagement in activities to protect biodiversity and natural pest enemies, such as agroforestry and windbreaks, cover crops, planting flowering hedges along field edges, and more careful use of chemical pesticides. Biological control mass rearing facilities in Pakistan were initially subsidized by PlantwisePlus, but in 2024 the programme began scaling back its direct involvement. Local governments stepped in to either partially or fully subsidize the cost of the mass-produced natural enemies for farmers, ensuring continued access to this nature-based pest control solution. This transition from external to local support strengthens the long-term viability of biological control, embedding sustainable pest management within national systems.

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1. See the 'Partnerships' section for more details.

To address challenges such as limited rural advisory capacity and geographic constraints, PlantwisePlus focused on expanding farmer advisory services through innovative digital solutions and training initiatives. This effort enhanced the accessibility and effectiveness of plant health information for smallholder farmers, driving more sustainable and profitable crop management.

The PlantwisePlus Knowledge Bank solidified its role as a vital provider of agricultural information, attracting a record 1.8 million visits and experiencing significant growth in climate-smart pest management content. The training of over 870 new plant doctors across 11 countries strengthened local extension networks, while Nepal adopted nationwide plant clinic guidelines. Studies in Pakistan and Bangladesh led to the development of actionable strategies for gender inclusion, with female-led initiatives and cooperatives gaining increased recognition. The programme also saw a 92% increase in digital tool use across eight countries, spurred by targeted marketing and the influence of social media.

PlantwisePlus also focused on improving gender equality in agriculture. By addressing barriers such as limited access to information on IPM, the programme increased economic opportunities for women, youth, and smallholder farmers across countries including Pakistan, Uganda, Kenya, Zambia, and Ghana. These efforts led to improved agricultural productivity, greater IPM adoption, and enhanced food security. Notably, the programme trained over 1,150 service providers, including a significant number of women and youth, and established youth- and women-led citrus and mango tree nurseries and seed businesses in Kenya and Uganda, empowering local communities and supporting sustainable agriculture.

Looking ahead to 2025, PlantwisePlus will scale up its activities to enhance its impact and foster long-term agricultural resilience. The programme will expand farmer advisory services, digital pest risk monitoring, and regional pest preparedness, with a continued focus on inclusive and gender-sensitive approaches to ensure equitable access to pest management solutions for women, youth, and smallholder farmers.

Key priorities for 2025 include scaling up biological control interventions, piloting Kenya's National Pesticide Residue Monitoring Programme and integrating gender-sensitive strategies into agricultural practices. PlantwisePlus will strengthen collaborations with policymakers and the private sector to improve regulatory frameworks and increase market access for lower-risk plant protection products. The programme will also explore more private sector involvement in India and Vietnam to create sustainability models for digital tools and assess the impact of digital advisory services at the farm level.

Additionally, efforts will continue to promote IPM, train agro-input dealers in Bangladesh and Uganda, and expand opportunities for youth and women in agribusiness. The programme will advance the commercialization of *Metarhizium rileyi* to control fall armyworm (FAW) in Zambia and form new global partnerships to support sustainable agricultural practices (i.e. IPM, nature-based solutions, and lower-risk pesticides), ensuring continued progress toward environmental health and food security worldwide.

Notable achievements in 2024 included the following:

#### **Pest preparedness:**

- A study showed that Pest Risk Information Service (PRISE) time-to-act pest alerts sent to farmers via SMS led to decreased use of pesticides and significant improvements in yield and income.
- The Horizon Scanning Tool (HST) and Pest Risk Analysis (PRA) Tool saw strong engagement from programme target groups, with just under a third and just under half of users coming from PlantwisePlus countries, respectively. Horizon scanning and PRA activities in PlantwisePlus countries and regions led to tangible results for phytosanitary resilience, such as action plans and the formation of working groups to monitor risk registers.
- Pest response plans were developed for all PlantwisePlus focus countries, improving their capacity to manage pests using climate and gender-responsive approaches.

**Pesticide risk reduction:**

- Endorsement of gender-sensitive advisory approaches in Pakistan, with high-level buy-in from government officials, supporting women's access to pest management information.
- Implementation of the National Pesticide Residue Monitoring Programme in Kenya, which will coordinate pesticide residue monitoring for domestic and export value chains.
- Scaling of the award-winning social and behaviour change campaign (SBCC) Ukulima True across Kenya, encouraging the use of sustainable practices for managing pests, including using lower-risk plant protection products.
- First evidence that the biological control mass rearing facilities in Pakistan are proving to be successful initiatives, with the local partners taking more responsibility.
- Approval by Kenyan authorities for the release of a classical biological control agent for papaya mealybug across all counties in Kenya, following successful management of the pest in original release areas.

**Farmer advisory:**

- Directly reached 4.3 million smallholder farmers with plant health and pesticide risk reduction advice, leading to increased yields for an estimated 1.3 million farmers and increased incomes for 1.1 million.
- The Ministry of Agriculture and Livestock Development in Nepal approved a comprehensive document outlining guidelines for nationwide operation of plant clinics.
- Seven new e-learning courses launched by the CABI Academy, with nearly 8,000 new learners enrolled. Overall completion rates (28%) surpass the industry average of 12% for online learning.<sup>2</sup>
- Over 600 agro-input dealers in Uganda underwent training using new content on pesticide risk reduction and post-training surveys found evidence of changing behaviours towards pesticide risk (e.g. managed their shops and stock more safely, and encouraging farmers to use IPM approaches and lower-risk plant protection products where possible). The government of Uganda is now seeking PlantwisePlus support to update their entire agro-input dealer course in 2025.
- 1,151 agri-service providers (900 of whom were under 35 years old and 445 were women) received training in technical and business skills through a Training of Trainers (ToT) and peer mentoring approach to enable them to establish or broaden their services for smallholder farmers. 85% of the previously trained cohorts in Kenya and Uganda are already economically active with their new skills.

**Scaling out in Sri Lanka:**

- Sri Lanka became the seventh PlantwisePlus focus country, via a five-year partnership agreement with the Department of Agriculture.

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2. Jordan, K. (2015). Massive open online course completion rates revisited: Assessment, length and attrition. *The International Review of Research in Open and Distributed Learning*, 16(3), <https://doi.org/10.19173/irrodl.v16i3.2112>







A woman in a red sari is holding a tomato plant with several green tomatoes. She has a red tilak on her forehead and is wearing a necklace and bangles. The background shows a rural setting with a utility pole and some buildings under a clear sky.

# Introduction

Food security, food safety, and agricultural sustainability are critical for a growing global population. Poor crop management leads to severe production losses, with pests destroying 20–40% of global crops annually.<sup>3</sup> A 2021 review by the International Plant Protection Convention found that climate change is worsening these risks by expanding pest distribution, increasing introductions of new threats, and accelerating pest population growth.<sup>4</sup>

Smallholder farmers, who form a significant part of the global agricultural workforce, are particularly vulnerable to crop threats, lacking access to reliable information and resources to manage them. Weak coordination at national and regional levels further limits effective responses. Women – who make up over half of the agricultural workforce – face barriers such as unpaid care burdens, restricted mobility, and limited financial access. Similarly, young people, who are vital for sustaining agriculture, struggle with discrimination and high unemployment.

Rising plant health challenges and pressure to boost production have led to a doubling of pesticide use between 1990 and 2022, particularly in low- and middle-income countries.<sup>5</sup> In many countries, smallholder farmers and advisers still lack access to unbiased information on pesticide risks, mitigation measures, and lower-risk alternatives. These challenges threaten consumer health and trade opportunities, highlighting the urgent need for sustainable plant health management solutions.

PlantwisePlus is a global programme, led by CABI, that contributes to improving incomes and livelihoods for smallholder farmers through sustainable approaches to crop production such as IPM, leading to safer and higher-quality food in domestic markets. IPM approaches, which are consistent with principles of agroecology and climate-smart pest management, offer sustainable solutions by enhancing biodiversity, improving soil health, and reducing reliance on chemical inputs. Through digital and face-to-face approaches, the programme provides access to accurate information, training, and support to a range of agricultural service providers, who play a critical role in making agriculture a more productive and resilient business. These interventions ultimately help to empower farmers to safeguard their crops and livelihoods against the impacts of pests, diseases, and climate change.

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3. Food and Agriculture Organization of the United Nations (2025). Pest and Pesticide Management. <https://www.fao.org/pest-and-pesticide-management/about/understanding-the-context/en/>

4. IPPC Secretariat (2021). Scientific review of the impact of climate change on plant pests – A global challenge to prevent and mitigate plant pest risks in agriculture, forestry and ecosystems. Rome. FAO on behalf of the IPPC Secretariat. <https://doi.org/10.4060/cb4769en>

5. Wanner, N., Alcibiade, A., and Tubiello, F. (2024). Pesticides use and trade 1990–2022. FAOSTAT Analytical Briefs, No.89. Rome <https://doi.org/10.4060/cd1486en>

2024 marked the beginning of the programme's scale-out phase. Building from lessons learned from the proof-of-concept (POC) phase, CABI has streamlined the programme by reducing the number of outputs and consolidating activities, to ensure a targeted and efficient approach to addressing key challenges. The programme now features an updated logframe and structure, with 11 global team leaders overseeing the delivery of the 11 programme outputs across three impact pathways: (i) pest preparedness, which focuses on strengthening detection and response to pest outbreaks; (ii) pesticide risk reduction, which works to improve the use of low-risk plant protection solutions and drive demand for safer food ; and (iii) farmer advisory, which is aimed at enhancing the capacity of both private and public actors to support farmers. Cross-cutting themes such as gender, youth, climate adaptation, and digitalization are integrated across the programme.

The focus for 2024 was institutionalizing tools and approaches with national and regional partners to establish solid foundations for sustainability and long-term benefits. Key activities included engaging stakeholders to minimize pesticide risks, promoting biological control solutions, and strengthening local ownership and commercial viability of biological control agent-rearing facilities. Efforts also centred on enhancing gender- and youth-inclusive farmer advisory services, securing sustained investment from partners, refining agribusiness development strategies, and expanding the adoption of digital agricultural practices.

PlantwisePlus includes both global and country-specific activities. The countries where programme activities were implemented in 2024 are highlighted in the map below. In 2024, Sri Lanka became the seventh focus country, marking the scaling up of country-specific activities. The other six focus countries are Kenya, Ghana, Pakistan, Zambia, Uganda, and Bangladesh. The programme continued to support 21 core countries (medium green) across Africa, Asia, and the Americas to strengthen their plant health systems and build capacity across agricultural service or extension providers.

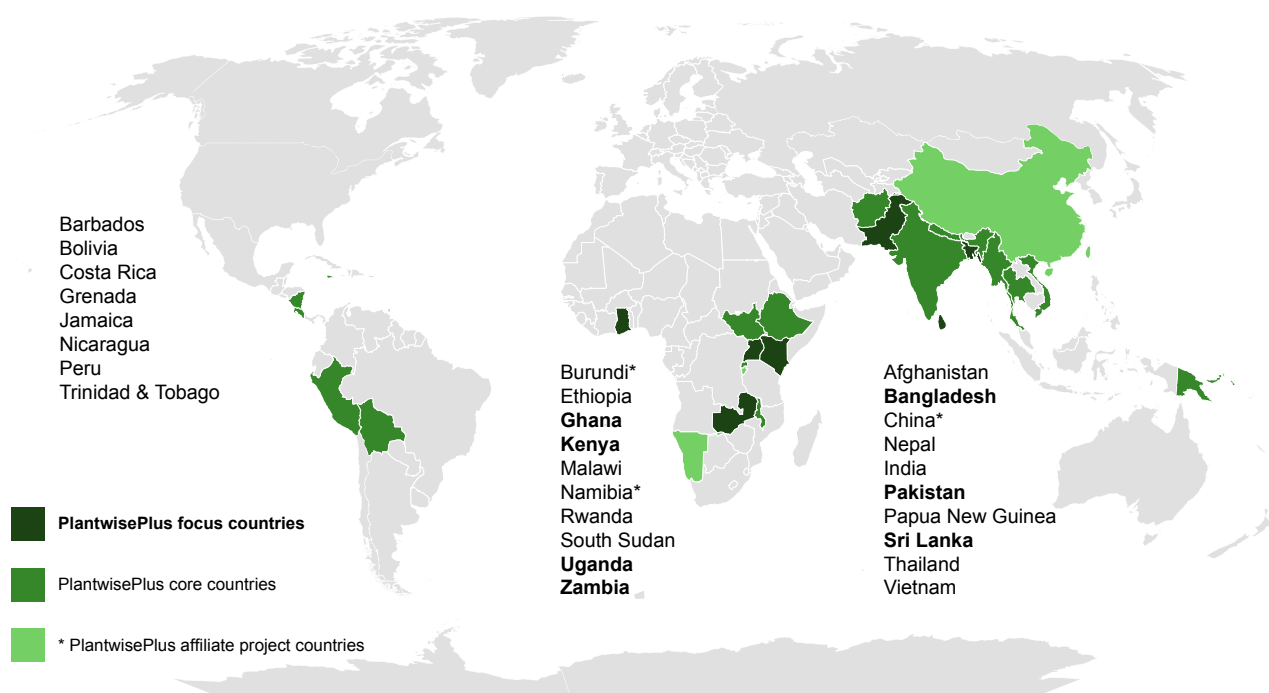


Figure 1: The seven PlantwisePlus focus countries are shown in dark green and bold text. The 21 core countries appear in medium green. Countries marked with an asterisk and shown in light green are supported exclusively by PlantwisePlus affiliate projects.

Following a discussion between PlantwisePlus management and programme donors at the annual Donor Forum event in May 2024, it was agreed that funding restricted to specific countries or activities will be treated as 'PlantwisePlus affiliate projects' (light green). Going forward, these affiliate projects will be managed under the PlantwisePlus programme banner but will have separate project boards. Moreover, formal reporting of their results will be kept separate from the direct results of the core, global programme funding. However, this annual report includes a mention of the affiliate projects that were running in 2024, as they do make an important contribution to the overall reach and impact of the PlantwisePlus approach. Countries supported exclusively by PlantwisePlus affiliate projects in 2024 included Burundi, China, and Namibia.



The following donors contributed to the global implementation of PlantwisePlus in 2024: the Directorate General for International Cooperation of the Netherlands (DGIS); the Swiss Agency for Development and Cooperation (SDC); the European Commission Directorate General for International Partnerships (INTPA); the UK Foreign, Commonwealth and Development Office (FCDO); and the Australian Centre for International Agricultural Research (ACIAR). Furthermore, country- and activity-specific funding for activities related to PlantwisePlus was provided by various donors and collaborators: the Embassy of the Netherlands for Burundi; the Ministry of Agriculture and Rural Affairs of the People's Republic of China for China; ACIAR for Zambia; the Food and Agriculture Organization (FAO) of the United Nations for Namibia; and Syngenta Foundation for Kenya.

This report presents an update on PlantwisePlus implementation between January and December 2024. The report describes selected highlights, challenges, and progress relating to the 11 outputs of the programme's scale-out phase, following the three-impact-pathway structure. Annex I presents new infographics that were produced under PlantwisePlus in 2024.

## Sustainable Development Goals

PlantwisePlus contributes to the 2030 Agenda for Sustainable Development. It builds on a whole-system approach to the agricultural sector and its interventions address multiple Sustainable Development Goals (SDGs).





# Revision of programme indicators for new phase

The end of the POC phase provided invaluable lessons on how the programme could refocus efforts and maximize its impact while being both scalable and sustainable. The first months of implementation of the scale-out phase offered the newly appointed global team leaders and the country teams the opportunity to assess whether the updated logframe reflected the reality of work on the ground while also correctly measuring the programme's successes and gaps. In parallel, the CABI Monitoring, Evaluation, and Learning (MEL) Team guided the global team leaders to create output-level and pathway-level theories of change to support MEL activity planning and target setting. With the approval from core donors to make minor changes without consultation, several revisions were made to the logframe to reflect these changes. These changes fell into three broad categories:

- removing indicators for activities that were being discontinued in the scale-out phase or adding new indicators for new activities
- revising indicator wording, to make them more precise and relevant to the nature of PlantwisePlus support and to facilitate monitoring (e.g. 'Number of expert working groups functioning' changed to 'number of functional working groups supported')
- changes to disaggregations to either remove extraneous categories or add relevant ones

In the last months of 2024, two more substantial decisions were taken, this time in consultation with donors and with their explicit written agreement. These were:

- formulating more precise indicators for pesticide risk reduction, differentiating between lower-risk, IPM-compatible *products* and lower-risk, IPM-compatible *practices*, and associating targets<sup>6</sup>
- confirming that we would, where practical and where costs allow, expand the methods used to measure resilience beyond the Food Insecurity Experience Scale, to include further resilience indicators (e.g. household assets)

These adjustments ensure that the MEL framework for the programme is robust and will track the target measures. It is expected that no further revisions will be made until the findings of the 2026 external review are shared.

6. Lower risk means the reduction of use of highly hazardous pesticides within the context of an IPM approach. When alternatives to highly hazardous pesticides are being sought, all suitable options (products and agroecological practices) that remove hazards and minimize risks to the greatest possible extent should be considered. As an interim measure, it may be beneficial to replace a highly hazardous pesticide with a lower-risk, readily available control option such as a World Health Organization (WHO) Class III or U pesticide.





# Pest preparedness

The rise in trade and travel between countries, along with shifting weather patterns, is worsening the spread of invasive pests and leading to unpredictable outbreaks of existing pests. Unfortunately, there is often a lack of national and regional coordination for effective pest surveillance, detection, and response, particularly in low-income and lower-middle-income countries. This oversight results in many instances in significant crop losses, which should be preventable. The pest preparedness impact pathway aims to improve the coordination of rapid and effective responses to pest outbreaks at regional, national, and local levels when prevention has failed and to bolster community preparedness for future outbreaks. These efforts aim to develop improved early warning systems and integrated management plans for emerging pests, prioritizing lower-risk plant protection products. To strengthen pest preparedness and risk management, it is crucial to establish expert groups at both national and regional levels. These groups can facilitate knowledge sharing and support effective, coordinated decision making. Through horizon scanning, CABI and its national partners have evaluated numerous pests for risk, contributing to the creation of operational risk registers in several countries.

## Prioritizing national and regional pest threats

Identifying and prioritizing highly damaging pests and diseases before they arrive in a country is crucial for creating effective preparedness strategies. PlantwisePlus develops and provides analytical tools that assist national and regional governments and institutions in formulating these strategies. CABI's HST and PRA Tool are enhancing global biosecurity by equipping national plant protection organizations (NPPOs) with vital pest risk intelligence, which supports them in fulfilling their duties under the International Plant Protection Convention (IPPC). In 2024, these tools were used in 141 and 165 countries, respectively, helping NPPOs strengthen pest risk management and make informed decisions.

The HST is freely accessible to 63 low- and lower-middle-income countries, enabling NPPOs to rapidly identify and prioritize invasive threats. In 2024, it was used by 141 countries, with 28% of all engaged use sessions (1,429 out of 5,087) from PlantwisePlus countries. Similarly, 71 countries have free access to the PRA Tool, which generates commodity pest lists to support evidence-based risk assessments. This tool was used in 164 countries in 2024, with PlantwisePlus countries accounting for 48% of all engaged use sessions (6,935 out of 14,258). By enabling governments to assess pest risks and implement risk reduction measures within pest risk registers, these tools drive coordinated decision making and proactive pest management. Their increasing adoption highlights their growing impact in strengthening global phytosanitary resilience and safeguarding agricultural systems worldwide.

In 2024, PlantwisePlus facilitated horizon scanning at the national level in Pakistan, Rwanda, and Uganda, and the process for doing this is now well established. During the year the process was tested at the regional level with the East African Community's (EAC) informal pest risk technical working group, representing all member states<sup>7</sup> except Rwanda, which was unable to attend. This followed a similar process led by CABI for 15 West African and six Central African NPPOs<sup>8</sup> that was funded separately by FAO. In each case, pests were prioritized for further risk management actions, ultimately enabling countries to make more informed decisions on resource allocation for plant protection.

To address the growing NPPO demand for pest risk assessment support, a regional approach has been adopted to build capacity among participating countries while delivering pest risk assessments with broad regional impact. In South Asia, NPPOs from five countries<sup>9</sup> received training with India's National Institute for Plant Health. In West Africa, 15 NPPOs<sup>10</sup> developed full PRAs for priority pests during a week-long workshop. In Malaysia, representatives from nine ASEAN NPPOs<sup>11</sup> participated in the inaugural workshop of the Task Force on an ASEAN Pest Database. The workshop resulted in a strategic action plan, with a strong focus on conducting PRAs for priority regional quarantine pests. CABI has been appointed as the Technical Secretariat for the Task Force.

Building on horizon scanning activities, pest risk registers were established in Pakistan and Bangladesh, with dedicated committees formed to oversee regular updates and initial meetings already held. In Ghana, Kenya, and Zambia, PlantwisePlus assisted the working groups established in 2023 in managing their risk registers, with meetings occurring at least once every two months. Encouragingly, in all three countries, there are signs that the processes are taking root, which will be further explored in 2025.

To support the maintenance of these registers, CABI collaborates with organizations such as the European Food Safety Authority, Epidemic Intelligence from Open Sources/WHO, and the IPPC to develop an automated system for generating Pest Risk Monitoring (PRiM) reports (formerly Pest Insight reports). This system uses a machine learning model to streamline report creation for NPPOs, reducing the resources required to source pest data. Once pest lists and search terms are established, CABI can automatically generate reports for specific countries or regions. In partnership with the European Food Safety Authority, CABI is establishing a Plant Health Community within the Epidemic Intelligence from Open Sources system and has drafted initial onboarding procedures for new organizations. Despite slower-than-expected IT developments, progress continues, and CABI will soon be able to independently add new species to the system.

## Supporting governments to prepare and protect countries from pest threats

Following the identification and prioritization of pest threats – and studies on their potential impact – CABI works closely with national partners to develop pest response plans. These plans provide structured frameworks that enable national systems to respond to pest outbreaks in a timely and coordinated manner. Insights from pest risk assessments contribute to active and passive surveillance systems in high-risk areas. In parallel, awareness campaigns empower farmers, extension workers, and local communities to recognize and report high-risk pests. This grassroots involvement complements the systematic monitoring enabled by pest registers.

In 2024, efforts to strengthen the implementation of pest management strategies focused on prioritizing established pests, developing response plans, and incorporating gender-specific considerations into decision-making processes. Information on pest distribution and severity was collected from a range of sources, including surveillance data and climate-adjusted predictive models that considered both economic and environmental factors. This data supported the development of country-specific activity plans to address key pests in PlantwisePlus focus countries. CABI also designed communication strategies to provide timely pest alerts and facilitate large-scale outreach, ensuring equitable access to sustainable pest management tools and technologies for farmers in Kenya, Uganda, and Zambia.

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7. Burundi, Kenya, South Sudan, Tanzania, Uganda, and Democratic Republic of the Congo.

8. Benin, Burkina Faso, Cabo Verde, Cameroon, Chad, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Republic of the Congo, Senegal, Sierra Leone, and Togo.

9. Sri Lanka, Bhutan, Bangladesh, Nepal, and India.

10. Benin, Burkina Faso, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, and Togo.

11. Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, and Thailand.



## Preventing the coconut hispine beetle invasion in Bangladesh

Bangladesh is the twelfth biggest coconut producer globally. However, production may be threatened by an invasive pest that causes **losses as high as 50%-70% in Vietnam and Samoa** respectively.

### The case of the coconut beetle

PlantwisePlus supported Bangladesh's National Plant Protection Organisation (NPPO) to take steps to prepare for an invasion of the coconut hispine beetle (CHB, *Brontispa longissima*). CHB damages young leaves and stunts growth. Severe infestations can kill entire coconut palms.

Horizon scanning identified **CHB** as a **high-risk threat** and pest risk analysis (PRA) subsequently confirmed its significant risk of invasion and potential socio-economic impacts.



**Risk communication** is an important part of addressing pest threats. A campaign was undertaken via various media channels to raise awareness about the risk of CHB among key stakeholders.



**Horizon scanning**, pest risk analysis and robust preparedness measures are essential in preventing high risk pests from threatening vital agricultural sectors and livelihoods. Bangladesh has put mechanisms in place to prevent, detect, and respond to this destructive pest.

In East Africa, a response plan for Uganda and Kenya targeted the mango mealybug, detailing actions to contain its spread in Uganda and prevent its entry into Kenya. The plans were developed based on pest surveillance carried out in collaboration with NPPOs and a rapid farm survey involving 880 farmers. This survey revealed a low infestation rate of just 6% in Uganda, with no occurrences in Kenya. A predictive model was used to estimate the potential spread of the pest across Eastern Africa, and the data gathered contributed to an evidence note detailing its biological and socioeconomic effects. In response to these findings, Uganda adopted a regional approach. This included revamping educational materials and rolling out public awareness campaigns.

In Ghana, recent initiatives have emphasized pest risk communication regarding the banana bunchy top virus, as well as strategic response planning for the bacterium *Xylella fastidiosa* (the cause of several significant plant diseases). Surveillance efforts have also been conducted for Citrus Greening Disease (Huanglongbing) and the banana bunchy top virus. It is noteworthy that no instances of either the banana bunchy top virus or citrus greening were detected during the surveys. However, the Asian citrus psyllid (*Diaphorina citri*), the vector associated with Citrus Greening Disease, was identified and is now being evaluated as a target for classical biological control within the pesticide risk reduction pathway.

In Asia, pest surveillance in Bangladesh focused on detecting the three priority insect pests identified by local partners: the coconut hispine beetle, tobacco thrips, and grey pineapple mealybug. Despite the political crisis in late 2024, which disrupted progress, the surveillance was completed and no evidence of these pests was found. In Pakistan, efforts centred on raising awareness about Parthenium weed and conducting surveillance for spiralling whitefly and woolly whitefly.

## Providing farmers with direct, timely, and accurate pest preparedness information

PlantwisePlus develops targeted, large-scale communication campaigns aimed at farmers, to provide information on sustainable pest management using IPM approaches. Several communication campaigns were launched in 2024 to prevent the introduction and spread of invasive pests, including papaya mealybug and apple snail in Kenya, mango mealybug in Kenya and Uganda, cassava brown streak disease (CBSD) in Zambia, and Parthenium weed in Pakistan. The campaigns utilized communication channels including radio, plant health rallies, targeted information materials, press briefings, and capacity strengthening of extension and intermediaries to reach farmers and other key stakeholders with information on the risk of these pests.

In Zambia, journalists were invited to a meeting with researchers to discuss communication on CBSD. The resulting media coverage is estimated to have reached more than 240,000 farmers. The campaign focused on raising awareness about the disease, ensuring access to clean planting materials, and empowering farming communities with the knowledge needed to protect their crops. Lead farmers, who were trained the previous year, played a crucial role in disseminating disease prevention practices in the Nsama District, North Province. By utilizing media, lead farmers, and plant health rallies, the campaign effectively engaged diverse audiences, fostering awareness and driving the behaviour change essential for managing cassava diseases and ensuring food security.

Alongside communication campaigns, PlantwisePlus also reaches farmers through PRISE. This service provides plant doctors with pest bulletins and farmers with SMS alerts offering timely pest management advice. The PRISE system uses a novel combination of earth observation technology, real-time field observations and plant-pest lifecycle analysis to deliver science-based advice tailored to the specific agro-climatic conditions in each country. The service continued to provide farmers in Kenya, Zambia, Malawi, and Ghana with early action alerts to respond promptly to pest threats. In Kenya, working in partnership with the Kenya Agricultural and Livestock Research Organization (KALRO), PRISE delivered time-to-act alerts and messages on IPM practices to over 900,000 maize, beans, and tomato smallholder farmers. A randomized controlled trial of active tomato farmers across five counties in Kenya demonstrated that the time-to-act alerts increased tomato yield and income. The study also found a reduction in pesticide use frequency and related costs.

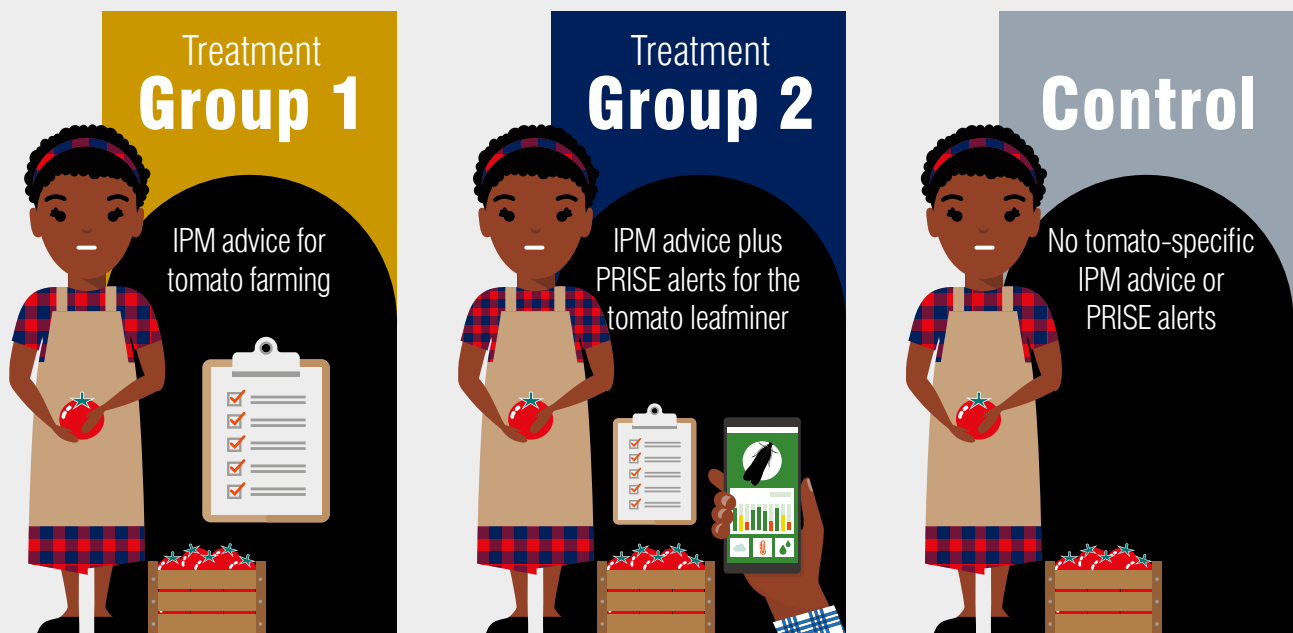


## Transforming tomato farming in Kenya through the power of pest information

In Kenya, smallholder farmers **lose up to 100% of their yield and income** due to the invasive and destructive tomato leafminer (*Phthorimaea absoluta*) pest. CABI researchers conducted a study across five counties in Kenya to investigate whether **integrated pest management (IPM) advice** and timely pest information through the **Pest Risk Information Service (PRISE)** could effectively improve crop yields, increase incomes, and reduce the reliance on pesticides.

### Testing the PRISE intervention

PRISE uses data from various sources – satellite observations, weather data, geographic data, and details about the spread and biology of pests – to produce pest risk forecasts. These are used to give farmers **timely alerts and advice** to help manage local pest outbreaks. The field experiment used three groups to test the effectiveness of the PRISE alerts.



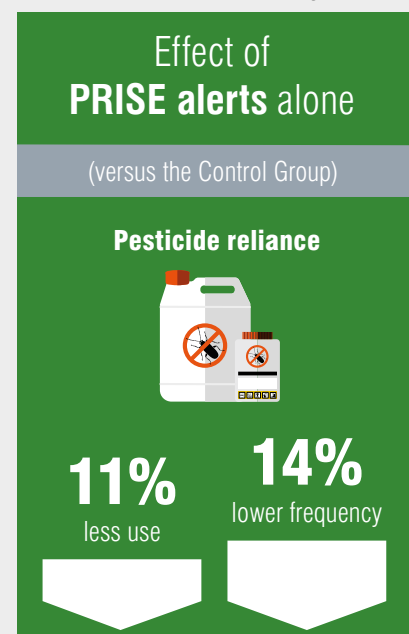
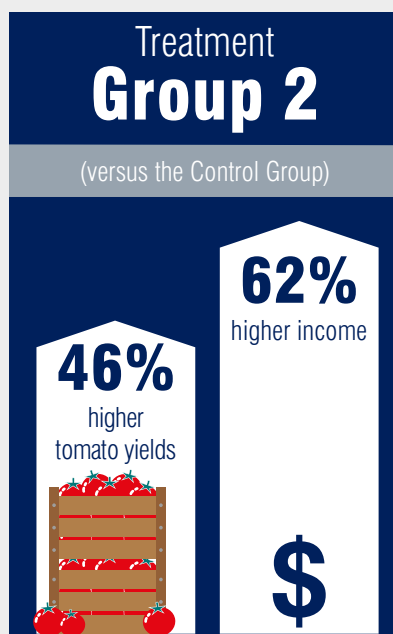
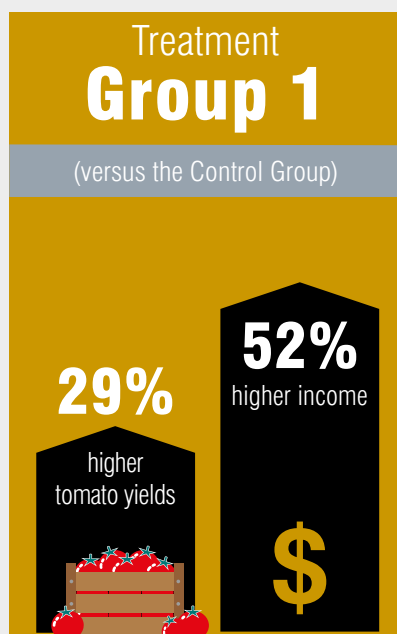
In the treatment groups, lead farmers conducted training and field demonstrations with their community after receiving the messages.

**1,306**



active tomato farmers surveyed

### Results after 15 weeks





# Pesticide risk reduction

There is increasing global awareness of the risks associated with chemical pesticides. However, the adoption of risk-mitigating production practices by farmers, particularly those in low- and lower-middle-income countries, is not progressing at the pace required to prevent harm to human, livestock, and environmental health. Increasing the use of lower-risk alternatives is a key part of transforming the global food system to make it more resilient, healthier, and more sustainable.

Working across the plant health system, the programme seeks to encourage the adoption of lower-risk IPM alternatives, including bioprotection solutions, and to reduce the indiscriminate use of the most toxic products. Through education about pesticide risks and how to identify lower-risk alternatives, the PlantwisePlus programme empowers farmers, agri-service providers, and agro-input dealers to use and promote these lower-risk products. The programme also supports governments to strengthen their institutional capacity in areas relating to pesticide and bioprotection regulation.

## Identifying and promoting lower-risk alternatives to chemical pesticides

In 2024, the programme progressed efforts to expand understanding of and access to lower-risk pesticide alternatives and address critical gaps in policy and institutional capacity. This section highlights milestones and achievements across different plant health system levels (from farmers to national and international entities).

In 2024, CABI conducted farm-level surveys and analyses in Ghana, Uganda, and Pakistan to identify hazardous pesticide use and assess related risks, including residues. Collaborating with partners, CABI also established baselines for institution-level interventions in Pakistan, Ghana, and Bangladesh, evaluating regulations and identifying gaps.

Women play a crucial role in agriculture, participating in all farming activities from seeding to harvesting. However, studies undertaken by PlantwisePlus in 2024 and previous years show that they often lack access to training, decision making, and protective measures against pesticide exposure. Indeed, in Sri Lanka, a national gender assessment revealed that, although men primarily carry out pesticide application, women's limited access to information about pesticide risks and safety means that they face greater risks when carrying out supporting roles such as assisting in spraying and mixing pesticides or storing them. Interestingly, very similar results were found in Uganda. In both countries, these results serve to inform all future activities, to ensure that they consciously engage women and contribute to equal access to information and alternatives.

To address these challenges, PlantwisePlus implements gender-sensitive pesticide risk reduction initiatives including cascading training sessions and inclusive advisory services on pesticide use and IPM, with the ultimate aim of reducing pesticide risks and empowering women in agriculture.



In Pakistan, this approach led to the sensitization of over 200 farmers in Kyber Pakhtunkhwa province on lower-risk pesticide practices like the importance of personal protective equipment (PPE), and the risks associated with handling agrochemicals. Special emphasis was placed on women's exposure, particularly through washing contaminated clothing and providing first aid to affected family members. PlantwisePlus also introduced gender-sensitive IPM strategies, ensuring equal access to information, training, and decision making. Recommendations included recognizing women as farm workers, increasing their awareness of pesticide risks, developing targeted educational materials, and involving them in advisory services, media campaigns, and policy discussions. Flowing from this work, the team developed gender-inclusive tomato IPM guidelines and secured commitments from senior experts and government officials to integrate gender inclusivity into training and materials. In a clear endorsement of these approaches, discussions at the 17th Annual Rural Women Leadership Training Conference in Islamabad in October 2024 emphasized gender-inclusive advisory services and reducing the risks associated with pesticides, further promoting awareness at the national level.

## Gender technical working groups (GTWGs)

Across all programme activities, CABI recognizes the unique challenges associated with age and gender. Gender and youth experts provided input into plans, concept notes, reports, IPM guidelines and handbooks, communication materials, and mass communication campaigns to ensure that approaches and messages were gender sensitive and, in particular, empower women and youth to adopt lower-risk products and practices.

In response to recommendations from prior research, CABI has established a GTWG and Multi-Stakeholder Forum model that brings together key stakeholders – including government ministries, civil society organizations, international non-governmental organizations, universities, and private sector institutions – to address gender disparities in agriculture and ensure equitable access to agricultural extension support for women.

First launched in Pakistan and Ghana in 2022, GTWGs operate by fostering stakeholder collaboration on gender equity in agricultural extension. They develop a roadmap outlining key actions and responsibilities, bridging policy–practice gaps and strengthening commitments to gender equality. CABI's regional gender coordinators facilitate training sessions on gender-sensitive strategies in agricultural projects. GTWGs also serve as platforms for discussing policy interventions, tracking gender-transformative actions, and addressing challenges. Through knowledge sharing and policy advocacy, GTWGs influence decision making and drive structural changes in national agricultural extension systems, promoting inclusive participation in agricultural and environmental development.

## Sustainability and local ownership

Gender directorates and Ministries of Agriculture lead the GTWGs, ensuring local ownership and supporting long-term impact. A sustainability strategy, including an exit plan for CABI, is developed from the outset and periodically reviewed. As part of this plan, CABI provides capacity-building support and facilitates a gradual transition, with full handover expected after three to four years.

By embedding GTWGs within national frameworks, the initiative fosters accountability and long-term commitment to gender-inclusive agricultural policies. Following proven success in Pakistan and Ghana, this model will be scaled up to Zambia and Bangladesh in 2025.

## Engaging with policymakers

PlantwisePlus contributes to long-term, sustained impact in pesticide risk reduction by engaging with policymakers and regulators on all facets of plant protection policies, including those concerning synthetic chemicals and biopesticides.

CABI's position as an independent, science-based organization enables teams to bring together actors and stakeholders with diverse perspectives. In 2024, through PlantwisePlus, CABI continued its key convening role, bringing together multi-level and multi-sectoral bodies including Ghana's National Multistakeholder Forum on Pesticide Risk Reduction and the Food Safety Committee, Kenya's Minor Crops Technical Working Group, and Uganda's Food Safety Coalition. The Ghanaian Multistakeholder Forum was particularly notable, bringing together 50 participants from public agencies, private input dealer associations, producers (like CropLife and Ghana Agri-Input Dealers Association) and traders' associations. Attendees committed to an action plan on managing and gradually phasing out highly hazardous pesticides, strengthening the pesticide risk reduction mandate of the National Food Safety Committee, and establishing a sustainable national pesticide monitoring framework.

This roadmap echoes the process undertaken in Kenya, whereby CABI collaborated with the Pest Control Products Board (PCPB), the Kenya Plant Health Inspection Service (KEPHIS), the Ministry of Health, international experts, and private sector stakeholders to draft a National Pesticide Residue Monitoring Programme. The programme will coordinate pesticide residue monitoring for domestic and export value chains, focusing on six key areas, and will be piloted in 2025.<sup>12</sup> Engagement with the PCPB was facilitated by signing a Memorandum of Understanding whereby CABI and the PCPB agreed to collaborate on strengthening the registration of plant protection products and assessing previously registered active ingredients, including those for minor use crops.

In Bangladesh, the focus of PlantwisePlus was also on managing the health and environmental risks associated with currently available pesticides. PlantwisePlus collaborated with policymakers and regulators to develop Standard Operating Procedures and a capacity strengthening plan for pesticide waste management, including guidelines on safe and effective removal. By improving the policy and enforcement measures, PlantwisePlus supports governments across programme countries to ensure communities and the environment face less risk from stockpiles of obsolete pesticides or persistent organic pollutants.

PlantwisePlus also continued to support governments in regulating biopesticides. In Pakistan, it contributed to the publication of a Statutory Regulatory Order that outlines new rules for biopesticide registration. This development follows the successful implementation of a biopesticides registration guidance document in November 2023. The programme also provided training to officials from governmental agencies, research organizations, and the crop protection industry on the new approval process. The success of this approach has led to it becoming a blueprint for initial engagements in Sri Lanka.

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12. This includes laws and regulations, national Maximum Residue Limits, pesticide screening and risk assessment, and data management and reporting.



## Changing attitudes and behaviours across the value chain

PlantwisePlus collaborates with actors across the value chain to prioritize pesticide risk reduction, from farmers and community members to agro-input dealers, service providers, market traders, and local government officials.

In 2024, the programme continued to run awareness campaigns designed to help people understand and adopt safer farming practices. These campaigns focused on encouraging the use of sustainable methods for managing pests, as well as promoting lower-risk products for protecting plants and effective strategies to reduce potential risks. The messages were tailored to reach farmers and important community members, including health workers in Kenya, journalists in Pakistan, agricultural advisors in Ghana and Kenya, spray service providers in Ghana, and sellers of farming supplies in Kenya.

Social and Behaviour Change Campaigns (SBCCs) also continued to promote the understanding and adoption of sustainable IPM practices in 2024. These campaigns encouraged the use of lower-risk plant protection products and effective risk mitigation measures. Messages were tailored for farmers and the other influential stakeholder groups noted above.

In 2023, the Ukulima True SBCC in Kenya proved very successful, with a 26% average increase in farmers engaging in key risk reduction behaviours such as pest monitoring, seeking professional advice on pesticides, using PPE, calibrating their sprayers, and contacting spray service providers. This success was recognised with a silver DMA award in the sustainability category in January 2025. In 2024, CABI decided to partner with the MicroEnterprise Support Programme Trust, the Cereal Growers Association, and the Farm to Market Alliance to scale up the campaign to five sub-counties in Nakuru, six sub-counties in Nyandarua, and Trans Nzoia County. Training opportunities on spray service provision were also provided to youth, connecting this activity to the programme's work on agri-entrepreneurship. These trainings play a crucial role in reducing pesticide-related risks, by ensuring that spraying is carried out by trained individuals rather than untrained farmers or youth. Additionally, they contribute to economic development in communities by generating income for the young people involved. As the initiative scales, the programme team is managing the risk of losing focus on key pesticide risk reduction practices by providing comprehensive technical backstopping in the form of a support supervision plan. Jointly supported by the Food Safety Committee and other partners, and subject to quarterly reviews, the plan prioritizes continuous engagement and refocusing on key messages when working with partners and the community.

A similar approach to Ukulima True was launched in a tomato-producing area of Ghana in 2024, drawing on expertise from leading institutions to develop targeted communication tools and training extension staff and radio hosts who were disseminating information to ensure consistent, impactful messaging. PlantwisePlus also offered training to people already working as spray service providers, who in a baseline study had expressed the need to get more training on specific topics such as pest diagnosis, sprayer calibration, safer use of pesticides, and use of PPE.

Information about pesticide risks or other aspects of farming is often better received when shared by peers. In Pakistan, CABI worked with a street theatre company to develop an entertaining and interactive production about the risks of pesticides to human and environmental health and opportunities to manage these risks effectively. A total of 20 performances took place in rural locations within Muzaffargarh and Multan and were accompanied by Q&A sessions with plant doctors. Female participation was encouraged and facilitated, resulting in 37% female participation out of a total audience of 2,258 farmers. Lessons learned from this will inform a second phase in 2025.

## Biological control of invasive species

Biological control is a key component of IPM and uses living organisms, such as insects or pathogens, to manage or reduce the population of invasive species. It provides a sustainable method of managing invasive species, especially when other control methods are limited or not feasible. This nature-based solution helps to restore ecological balance by reducing the negative impacts caused by invasive species on native ecosystems and agriculture.

## Classical biological control

Classical biological control consists of the introduction of a natural enemy (often a parasitoid or predator) of exotic origin. Once released, the agent self-replicates, providing long-term, sustainable control, without any cost for the farmer. By selecting biological control agents that specifically target the focus pest, scientists can ensure there is minimal risk to other species.

Since 2021, CABI and its partners in Kenya – KEPHIS, KALRO, and the National Museums of Kenya – have been introducing a parasitic wasp, *Acerophagus papaya*, as a biological control agent to help manage papaya mealybug. The invasion of papaya mealybug poses a significant direct threat to papaya and other fruit and vegetable crops across many African countries. Historically, farmers have relied heavily on chemical pesticides to control it, which are not very effective and pose threats to human and environmental health. Post-release surveys published in 2024 showed that the deployment of the biological control agent has been a great success, with papaya production fully recovering and farmers achieving an average of 196kg greater harvest than on control farms and discontinuing the use of insecticides.<sup>13</sup> Local biodiversity also increased, including previously absent natural enemies, thanks to farmers applying environmentally friendly practices such as intercropping, crop diversification (growing various crops or different varieties), agroforestry and windbreaks, cover crops, natural or planted fallows around fields and flowering hedges along field edges, and more careful use of chemical pesticides. In a strong official endorsement of classical biological control, KEPHIS approved the nationwide release of the parasitic wasp across all counties in Kenya. As a result, the biological control agent was introduced on 300 farms across four new inland counties—Baringo, Embu, Tharaka Nithi, and Machakos.

Building on successful examples like this, the same approach is being undertaken in Uganda, in collaboration with the National Agricultural Research Organisation. Releases continued in 2024 and the same positive results were observed. In the release areas, the parasitoid is quickly spreading and papaya mealybug infestations are declining.

Elsewhere in Africa, PlantwisePlus is focused on identifying possible predators for the tomato pinworm (*Phthorimaea absoluta*), a pest that, like papaya mealybug, has driven a sharp rise in insecticide use in tomato production. In Zambia, assessments of five native parasitoids of the tomato pinworm revealed low parasitism rates, resulting in the decision to assess parasitoids from South America, its region of origin. The pest's main parasitoid in South America, *D. gelechiidivoris*, has now been introduced in East Africa by the International Centre of Insect Physiology and Ecology, and CABI is considering its introduction in Zambia for 2025.

## Augmentative biological control

Augmentative biological control is a shorter-term solution than classical biological control as the natural enemy needs to be reared in large numbers and reintroduced regularly because it does not persist naturally in high-enough numbers to maintain the desired level of control. Because of this, it is more suited to commercialization. PlantwisePlus works with government and private sector organizations on the research, development, and commercialization of augmentative biological control solutions.

While the CABI teams in Zambia investigated classical biological control agents against tomato pinworm, teams in Ghana focused on a locally occurring predator, *Nesidiocoris tenuis*, as a potential augmentative biological control solution. PlantwisePlus provided training to partners at Plant Protection & Regulatory Services to improve production methods and rearing efforts showed promising results. Rearing requires a commercial greenhouse tomato grower to act as a host, and this was initially challenging as farmers' lack of experience with biological control made them hesitant. When a company was found, they were happy to observe that the pest was effectively controlled. This was an important reminder of the value of demonstrating value to farmers before asking them to trial a new product.

Augmentative biological control solutions proposed by CABI have already proven commercially successful, most notably in Pakistan, where the programme supported the setting up of *Trichogramma* rearing facilities (TRFs). Despite challenges with an inconsistent supply of materials, the two original TRFs in Mardan and Muzaffargarh successfully established sustainable production of *Trichogramma*, a biological control agent targeting tomato pests. As a result, the programme scaled back its direct involvement in 2024, with local governments stepping in to either partially or fully subsidize the cost of *Trichogramma* cards for farmers, ensuring continued access to this nature-based pest control solution.

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13. Miller, S. and Constantine, K. Biocontrol for papaya mealybug: lessons learnt from Kenya. CABI. March 2024. <https://www.cabi.org/cabi-publications/biocontrol-for-papaya-mealybug-lessons-learnt-from-kenya/>



## Farmer engagement and gender inclusion in sustainable pest management

One of the key lessons learned from CABI's work on biological control is that, for a programme to be successful, farmers need to be engaged in an area-wide, integrated approach, beginning with thoroughly understanding their needs and attitudes toward pest management.

Survey findings feed into continuous improvement of programme interventions across all PlantwisePlus countries. For example, this year in Pakistan, in response to previous survey findings, PlantwisePlus brought together government representatives and CABI staff to run gender-awareness sessions with the aim of empowering women to access the same information and opportunities as men. Since these awareness campaigns have taken place, women have been included for the first time in the Mardan TRF outreach and egg card supply. The programme also connected them with women extension staff, who visit them regularly. Men from the same communities were offered sessions on gender inclusivity and on reducing risk of pesticides and are now involving women and youth in farming activities, setting a foundation for greater gender inclusivity in future efforts.

It is also critical to train farmers on biological control safety and benefits – both to the environment and human health – and to encourage farmers to reduce their chemical pesticide use prior to releasing agents. In Uganda, a regional ToT programme was held to promote gender-integrated approaches for classical biological control in pest management across Kenya, South Sudan, and Uganda. The training engaged 44 participants from various sectors, including smallholder farmers, research organizations, NPPOs, government, policymakers, and donors. Through interactive discussions, participants explored the advantages of shared responsibilities and decision making in farming, emphasizing how gender equality enhances farm productivity and sustainability. The training not only equipped farmers with essential pest control skills but also fostered a sense of shared responsibility. Through partnerships, over 2,600 farmers were sensitized to classical biological control via plant health rallies, ensuring inclusive outreach. Additionally, 200 extension officers and 624 farmers were trained on managing papaya crops while minimizing harm to the biological control agent, with a focus on reducing chemical pesticide use. A key focus was recognizing and promoting the significant contributions of women in papaya farming and ensuring their equal participation in pest management strategies.



# Farmer advisory

PlantwisePlus is applying a range of strategies to address the important challenge of providing up-to-date, objective and science-based advice to smallholder farmers, enabling them to sustainably and profitably manage their crops. The distances between farming communities, costs of transportation, and limited availability and resources of rural advisors with plant health expertise are significant barriers to covering the 'last mile' in knowledge and solution dissemination. The PlantwisePlus programme continues to increase the number of frontline plant health workers by developing that capability in people who are based in rural areas and are well positioned to serve the farmers around them. In most cases, this involves equipping existing agricultural service providers (e.g. extension personnel, agro-input dealers, and lead farmers) with the necessary knowledge and support tools, but may also include bringing new people into the business of providing advisory and other related services for smallholder farmers.

## Digital solutions for knowledge and outreach

### Digital decision support tools

In 2024, the focus shifted away from creating more digital decision support tools to instead monitoring their use, gathering feedback on their performance, identifying ways to ensure they reach the right audiences with the right information, and exploring sustainability models. These were important steps to set the scene for a more intensive assessment of their use and impact, which will be conducted in 2025. These mobile apps and web-based tools are designed to enable decision making in, or close to, the field. While smallholder farmers are the intended main beneficiaries, the tools are designed with the knowledge that, in many countries, they are more likely to be in the hands of intermediaries, such as government extension and plant protection officers, agro-input dealers, etc. The digital decision support tools therefore empower agricultural advisors and other service providers to more effectively support farmers in rural communities.

The Crop App Index held information on 958 tools by the end of 2024. In late 2023, CABI had developed and launched a methodology for assessing the quality of decision support tools listed in the Crop App Index based on a set of objective and measurable criteria, drawing from established benchmarks in human health app evaluations. Throughout 2024, external reviewers from Africa and South Asia assessed 40% of the apps listed on the site. The average score was 83%, which CABI considers to be quite a strong overall result. The top scoring tools were typically those with a limited geographic focus (country specific) or crop focus (single crop). Plantix, an image recognition app supporting diagnostics in the field, scored exceptionally well (94%) in the assessment, even though it has a relatively broad coverage of crops and countries compared to most other tools. As a result, CABI is exploring potential new areas of collaboration with the creators of Plantix, which would build on support CABI had provided under the previous Plantwise programme. CABI had helped facilitate the collection of pest and pest damage photos to train the AI behind the image recognition, and also by providing content on best practices for managing the pests identified.



Use of the PlantwisePlus digital tools increased across the board. In 2024, the PlantwisePlus Knowledge Bank reached a significant milestone, with over 1.8 million visits to the site by at least 577,000 different users. The newest tool, Crop Sprayer, experienced a five-fold increase in use, reaching 85,000 users, with the highest adoption in India, Pakistan, Bangladesh, Nepal, and Kenya. A key factor behind this growth was the integration of 10 additional languages into the app, significantly expanding its accessibility and contributing to the surge in user engagement. The Factsheet Library App also had a very successful year, with a 56% increase in users compared to 2023, taking the total number of users in 2024 to 19,000 (with the highest use in India, Ghana, Zambia, Malawi, and Bangladesh).

The CABI BioProtection Portal continued to go from strength to strength in 2024. The Portal welcomed an additional six countries during the year, including two PlantwisePlus countries Vietnam and Barbados, as well as Egypt, Saudi Arabia, South Africa, and the Philippines. There were also nine new associates. This growth coincided with further improvements to the site, such as redesigning the partner dashboard, which provides partners with tailored product search data alongside traffic and search data. The onboarding of private sector partners, associates, and sponsors is an essential part of the sustainability model for the CABI BioProtection Portal, which aims to have their financial contributions replace the donor support over time for the continuous running of the tool.

Discussions on the sustainability of PlantwisePlus digital advisory tools in 2024 led to the development of two new business models: a freemium model for the PlantwisePlus Knowledge Bank and a commodity-specific spin-off product. The business case for the PlantwisePlus Knowledge Bank freemium model would require users from the Global North to pay for access to technical factsheets, generating revenue to support the ongoing maintenance of digital tools. In addition, a special content-sharing agreement would be required for organizations wishing to use the PlantwisePlus content beyond the use permitted by its creative commons licence, which is restricted to non-commercial uses. This special agreement would also consider the uses of the content in AI-driven technology. As a pilot in 2024, CABI agreed to license a third party to use programme content in their digital tool for 12 months. The renewal will be considered in 2025 based on the initial trial.

Going forward, the existing technical infrastructure will be used to create single crop-country tools. These tools will bring together PlantwisePlus data and content into a clear workflow, helping users make informed decisions with a focus on IPM. Initial feedback from potential customers was positive, with a particular interest in the IPM content and the use of AI-driven technologies to enhance the retrieval of information. This increasing interest and availability of AI-driven technology has highlighted a need for AI tools that can be relied on and trusted, unlike some of the generalist AI tools. With CABI's technical skills in IPM and information technology, there is potential to fill a gap in this area.

## Digital learning

The scope of 2024 activities included delivering new learning products on the CABI Academy platform, enriching the user experience, aligning new courses with cross-cutting themes, and boosting visibility and awareness of the platform and contents. Seven new e-learning courses were finalized and released on the CABI Academy, increasing the total offering to 10 short courses. The new courses consist of the following free-to-access, self-guided short courses: (i) Improving crop nutrition practices; (ii) Sustainable soil management practices; (iii) Introduction to seed and planting materials; (iv) Introduction to water management; (v) Gender-inclusive strategies for improving agricultural productivity; (vi) Entrepreneurship in agribusiness; and (vii) Digital skills training materials. One of the courses has a sole focus on gender, as indicated by its title, while three others incorporated gender-related content into their design.

There were nearly 8,000 new enrolments in CABI Academy courses in 2024, with use in every PlantwisePlus country, bringing the cumulative total to over 14,000. This penetration of the digital learning courses into all target countries is an important result because it shows how much greater the programme reach can be through virtual solutions. Increasing the plant health knowledge of those who serve smallholder farmers will ultimately translate into more impactful services and greater benefits for the farmers served. India had the highest number of users (2,079), followed by Pakistan (1,198), Kenya (936), Bangladesh (694), and Ghana (626). The two most popular courses in 2024 were 'Introduction to bioprotection products' and 'Sustainable soil management practices', each with around 2,500 enrolled users. CABI Academy data analysis showed that around 65% of users are male and 59% fall into the 18–25 age group, while 28% are aged 26–35 years. This shows a slight bias toward male users and a very evident age effect, with youth making up nearly 90% of all digital learning users. These statistics provide a baseline to track improvements in 2025 as CABI focuses efforts on the cross-cutting themes of gender and youth.

Users of the CABI Academy receive a certificate for each course assessment successfully completed. Certificate completion rates were 32% across the whole collection of courses. By comparison, the industry average sits at a 12% conversion rate from learning to certification. This is evidence that the CABI Academy certificates across a range of important topics are truly in demand.

User feedback, collected through face-to-face interactions and a pilot avatar-based AI-powered digital survey, contributed to CABI's understanding of user perceptions and needs when using digital tools. This feedback is critical for enhancing the user experience and increasing reach, enrolments, and the number of certificates achieved.

## Promoting safer farming through gaining knowledge and certification

As an agro-input dealer in Uganda, Judith Nassuuna supports farmers in her community, and the agro-dealer training she attended expanded her understanding of pesticide safety. After receiving her certification, she began advocating for the safe use of pesticides.

***“Before training, I could not put emphasis on PPE when selling chemicals to farmers. But after the training, I emphasize that farmers should buy and put on the PPE during applications of chemicals,”*** she explains.

Now, she actively advises farmers on protective measures and encourages the use of lower-risk products. Through her guidance, she is helping to promote responsible pesticide use and contribute to safer, more sustainable farming.



Judith Nassuuna receiving her certificate

## Promotion of decision support tools and e-learning products

CABI teams and in-country partners advocated for the uptake of PlantwisePlus digital tools in all programme countries in 2024, but eight of those countries were targeted with the most intensive promotional activities: India, Bangladesh, Nepal, Ghana, Uganda, Kenya, Peru, and Costa Rica. This selection was based largely on the status of local infrastructure and digital literacy, plus an aim to have broad geographical representation. Awareness-raising and training activities focused on driving uptake of the PlantwisePlus Knowledge Bank, PlantwisePlus Factsheet Library app, Crop Sprayer, CABI BioProtection Portal, and the CABI Academy with its multiple online short courses.

The programme engaged stakeholders from the eight targeted countries to understand the digital landscape and jointly develop country-specific roadmaps for implementing and integrating digital tools, especially in three focal areas: governance, education, and extension. In total, CABI worked with 82 partner organizations (two-thirds public sector and one-third private sector) to facilitate activities that raised awareness and encouraged various stakeholders to try using digital tools in their work.

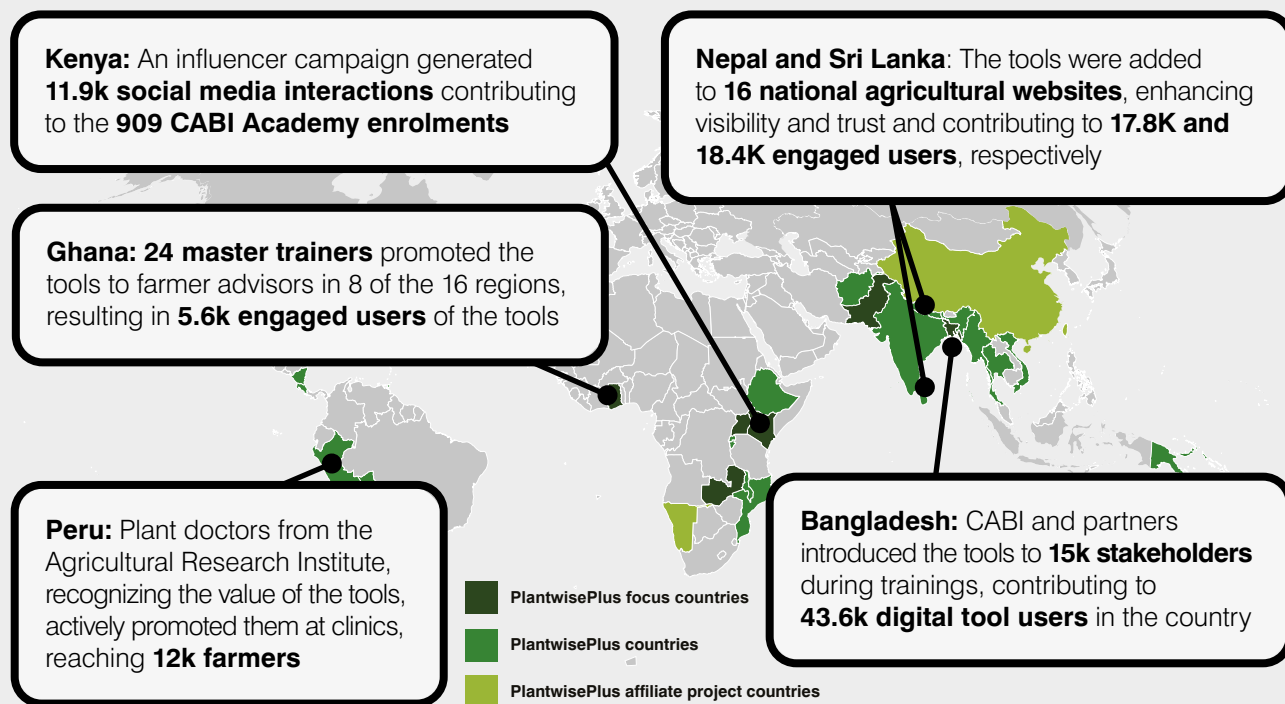
Various approaches were employed to promote the tools, with the common high-level aim of strengthening the knowledge and skills of existing agricultural advisors so that they could deliver their mandates more effectively. The choice of approach was made taking the country context into consideration. Targeted awareness-raising and training events for plant doctors and extension agents, university faculty, and other relevant agricultural intermediaries were held in 13 countries in 2024. Due to a low level of digital literacy still being common in many parts of the world, practical interactive sessions ensure participants are confident using digital tools correctly and effectively. To manage the costs of this relatively expensive outreach method, some countries adopted a

## Reaching new users with the PlantwisePlus digital tools

CABI and its partners continued to promote the PlantwisePlus digital tools and online courses to potential users through diverse campaigns using various approaches and media.

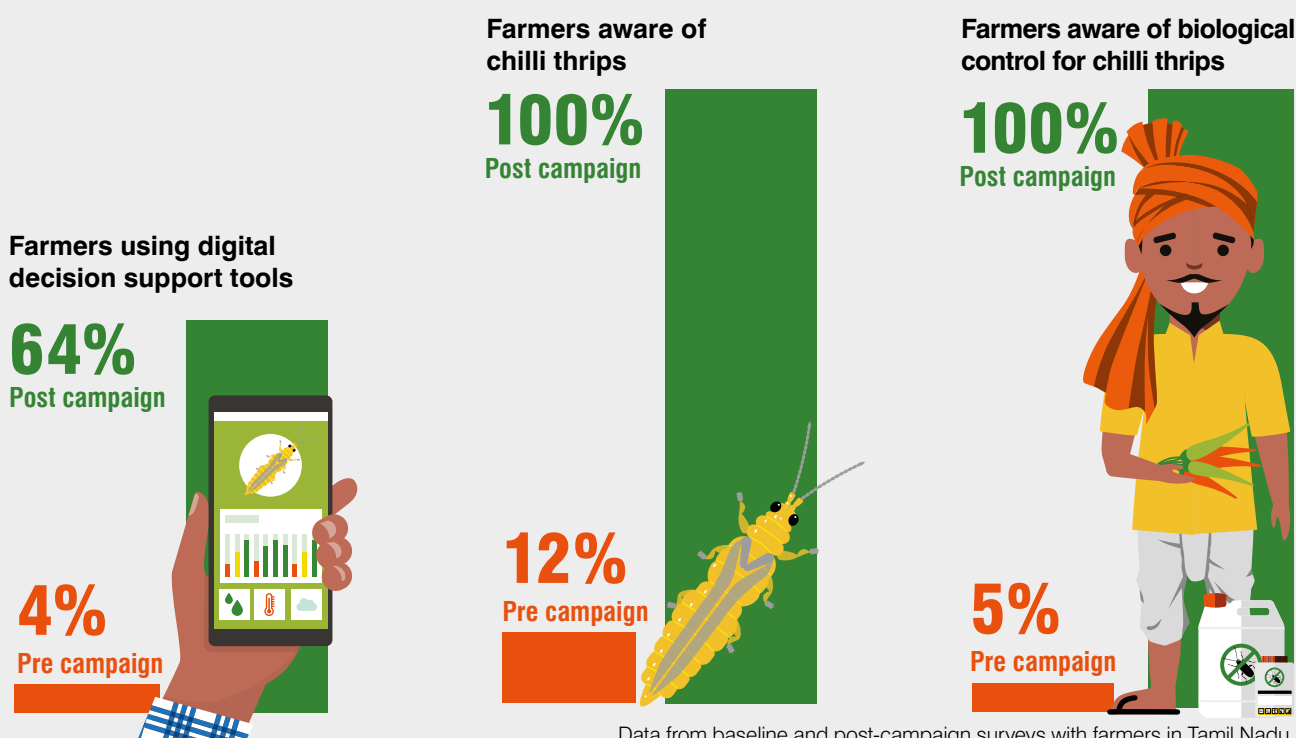
**1.4m**  
digital tool users

**7.8k**  
enrolments in CABI Academy



## Chilli black thrips awareness campaign in India

PlantwisePlus facilitated a three-month-long communications campaign in three states in India, showcasing digital tools for sustainable pest management. Partnering organizations **reached 28k farmers** with information on how to use the digital decision support tools to guide the management of thrips. Campaign evaluation survey results show a significant impact on farmer awareness of the pest and use of lower-risk, **more sustainable control options**.





ToT approach while others attached the activities to conferences and exhibitions. Facilitators found that aligning the digital tool demonstrations with local challenges increased the perceived relevance and therefore the effectiveness of the promotion. More than 80% of participants interviewed after these face-to-face digital tool promotional events said they feel the tools are useful in their workflows and have equipped them with skills and knowledge to improve their advice to farmers.

Webinars, online training, and social media were effective in extending the reach of the promotional activities in five countries, in particular in Bangladesh, where physical travel and gatherings were impossible during the period of political turmoil. Another, more novel, approach that was tested in Kenya and India was the use of social influencers. In Kenya, for example, CABI and partners engaged Catherine Kiboi, a well-known actress from Kenya. Alongside her acting career, she is a keen kitchen gardener with 760,000 followers across Facebook, TikTok, and Instagram. Using a carefully curated content plan, Ms Kiboi shared her journey using the CABI Academy to learn more about biological control, crop pest diagnosis, and pest management, which led to hundreds of other people in Kenya visiting the CABI Academy.

## Smart spraying: Transforming agri-business with digital tools

**Solomon Kariuki**, a 26-year-old spray service provider from Kenya, transformed his business by integrating CABI's Crop Sprayer app into his operations after discovering it through social media. Reflecting on his experience, he shared:

***"I use it for measurements and calibration. The products we have here might be labelled, but some are manufactured elsewhere, so the app comes in handy. When I get to a farm, I now know how much to apply. It has made me not misuse the farmer resources, so crops don't become resistant."***

His expertise led to increased trust among farmers, which expanded his client base and enabled him to train a team of four young men. Together, they sprayed over 600 acres in 2024, significantly boosting their income. Solomon's commitment to technology and continuous learning exemplifies the positive impact of digital tools on modern agricultural practices.



Solomon Kariuki using the Crop Sprayer app during an Ukulima True training session

Across all the digital tools promoted by PlantwisePlus, there was a 92% increase in number of users from the previous year. An analysis based on data from just the 25 PlantwisePlus countries supported by core programme donors suggests that approximately 557,000 farmers were served with the support of these tools in 2024. This overall use figure increases to 844,000 farmers when considering all low- and lower-middle-income countries and up to 1,422,000 when considering digital tool usage globally, including higher-income countries. This shows the strong relevance of the digital decision support tools and e-learning courses in both the most and least developed countries. The main tools used in PlantwisePlus countries were the PlantwisePlus Knowledge Bank (46% of all use), the Crop Sprayer app (21%), and the CABI BioProtection Portal (17%). The CABI Academy and the PlantwisePlus Factsheet Library app made up the remaining 10% and 7% of tool use, respectively.

This major achievement shows that the programme is gaining attention and traction, and that the tools are filling a need that exists in agricultural service provision. Engaging with national partners at the outset to get their endorsement of the use of these tools helps build the confidence of agricultural staff and farmers regarding the tools. In 2025, the group of targeted countries will expand to include Pakistan and Vietnam. In addition, CABI will conduct an assessment of the impact of these digital tools at the farm level.

# Growing the force of frontline plant health workers

## More plant doctors on the ground

The plant clinic approach has remained a central strategy across PlantwisePlus countries, building plant health advisory capabilities in agricultural extension services. In 2024, 871 personnel were trained in the plant doctor modules in 11 countries, while training on related short courses (IPM, biological control, introductions to digital tools and courses, gender-sensitive practices in service delivery, data management, and monitoring and evaluation) was delivered to a total of 1,368 people. CABI's role in these trainings, if anything at all, consists of minimal backstopping and occasional refresher trainings for local trainers.

Despite a slow-down of plant clinic activities during the Covid-19 period (particularly 2020 and 2021), the approach has been revitalized in more recent years. In 2024, CABI updated several partnership agreements with partners to ensure ongoing country-level buy-in through joint planning. A significant milestone was achieved when the Ministry of Agriculture and Livestock Development in Nepal approved a comprehensive document outlining guidelines for the nationwide operation of plant clinics.

Globally, plant clinics, plant health rallies and other face-to-face outreach activities reached an estimated 305,062 farmers in 2024. This result was the collective achievement of 3,394 active plant clinics and a larger number of trained plant doctors across the 25 programme countries. Pakistan had the highest level of clinic activity, with 41,214 farmers served. Other countries that stood out included India (38,543), Sri Lanka (23,982), Bangladesh (17,285), Uganda (12,428), and Nepal (10,200). The precise reach of plant doctors is difficult to measure given the variety of ways that they serve their farmers and document those interactions. The plant clinic reach is still considered to be, for the most part, a reflection of the number of farmer queries addressed at a physical clinic event.

## Mandatory training for agro-input dealers

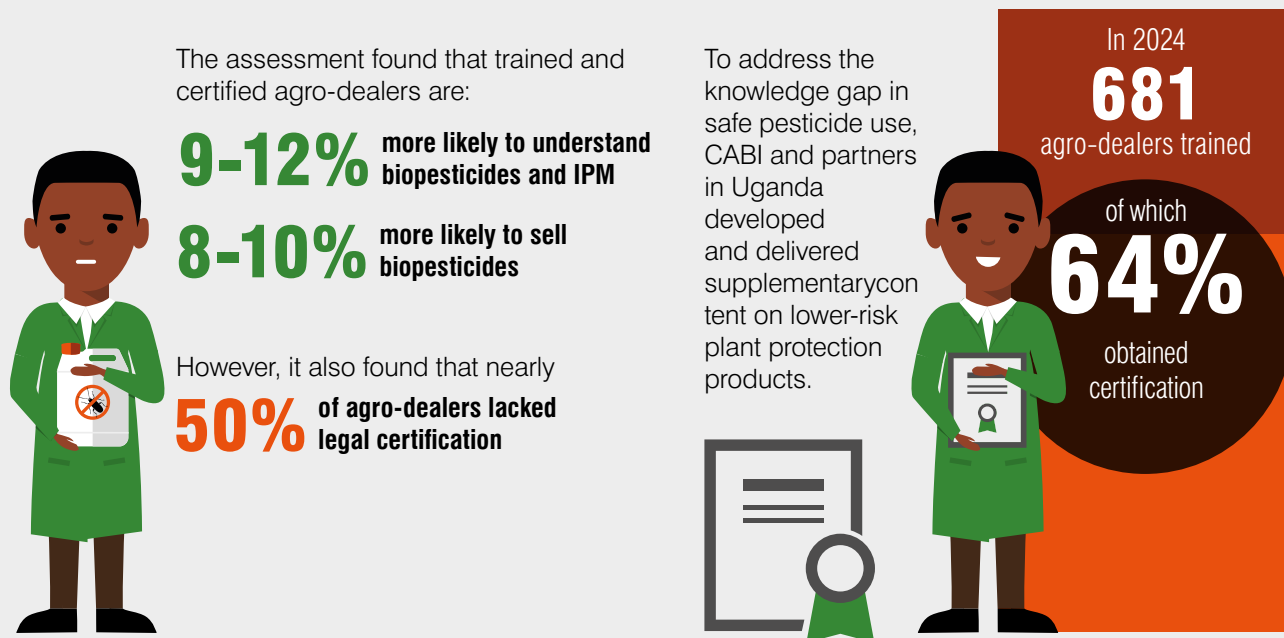
For many smallholder farmers, the most readily available 'advisor' on plant health is an agro-input dealer, who may be selling seeds, fertilizers, plant protection products, and other agricultural inputs. Unfortunately, however, when it comes to expertise on plant health, agro-input dealers are not necessarily equipped with the right knowledge. PlantwisePlus has been working with national regulatory bodies to increase the depth and quality of training that individuals are required to undergo in order to receive a licence to run an input shop. The aim is to ensure that agro-input dealers have the knowledge and access to decision-making tools necessary to provide farmers with accurate information that leads to improved agricultural production through the use of sustainable practices and products.

In 2024, CABI worked with partners in Uganda, Bangladesh, and Sri Lanka to strengthen their training for agro-input dealers. In Uganda, where activities started earliest, signs are now emerging that the upgraded training is having a positive impact on the behaviour of agro-input dealers. The programme intervention had been to integrate a new module on lower-risk plant protection into the existing agro-input dealer training curriculum. The finalized training materials were presented to the Commissioner of the Department of Crop Inspection and Certification. Extensive training sessions were delivered through a ToT approach involving national and district-level staff from the Ministry of Agriculture, Animal Industry and Fisheries to create a national cohort of trainers for the module. In total, 623 candidate agro-input dealers went through the training, 73% of whom passed the assessment and could be licensed. The fact that not all trainees passed shows that the process is rigorous and reinforces the need for thorough learning and preparation. Agro-input dealers who participated in the training described how their behaviour had changed as a result. For instance, it has long been a common practice to purchase pesticides and repackage them; however, some of the trained personnel said they stopped doing this as they have learned it is hazardous. In addition, they were now encouraging farmers to use lower-risk products where possible and providing farmers with information on IPM approaches to pest management. Based on the very positive feedback from this initial roll-out, the Ministry now intends to adapt its entire agro-input dealer course to a similar, more interactive teaching style in 2025.

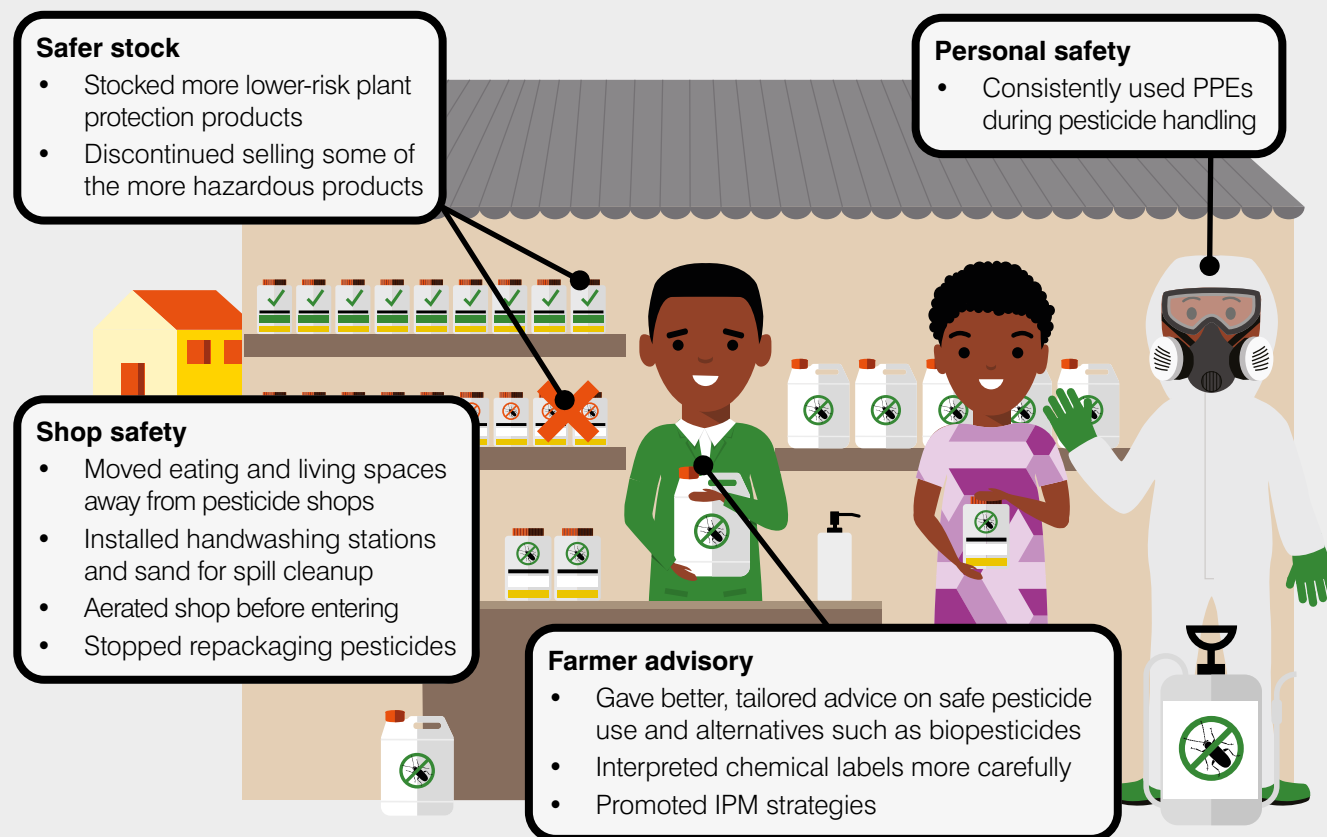
The intervention with agro-input dealers in Bangladesh is particularly significant because there was previously no requirement for agro-input dealers to be trained or assessed as part of the licensing process. New national plant protection regulations now require that all persons seeking an agro-input dealer licence must have a secondary school certificate and must complete the standard training and pass the final evaluation. Despite the political upheaval that struck Bangladesh in 2024, there was still progress on developing training material and a ToT approach was initiated at the end of the year to begin validating the training content and prepare to roll it out. In 2025, new applicants will go through the course and assessment. In addition, Bangladeshi authorities will begin the long process of delivering the training to the tens of thousands of active agro-input dealers in the country.

## Agro-input dealer training supports safer farming in Uganda

In Uganda, CABI and national partners conducted a needs assessment, surveying over 500 agro-dealers, to explore ways to **strengthen agro-dealer training and certification**, with a focus on promoting more environmentally friendly pest control practices.



Feedback gathered from the trained and certified agro-dealers revealed a number of **behavioural changes** that will directly improve their health and safety. Additionally, providing farmers with better quality information and lower-risk products, will significantly reduce the potential harm to farmers, the environment, and consumers.



**In 2024, the programme finalized a training toolkit for a module on lower-risk plant protection products to the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF).**



## New agricultural services involving youth, men, and women

In 2024, the programme continued to spearhead initiatives that empower men, women, and youth in agriculture service provision, while creating sustainable income opportunities for them. Across Kenya, Uganda, and Zambia, 1,151 agri-service providers (900 of whom were under 35 years old and 445 were women) received training in technical and business skills through a ToT and peer mentoring approach that allowed more rapid scaling of the interventions.

### Youth in PlantwisePlus

The PlantwisePlus programme is committed to increasing the engagement and participation of young men and women in agriculture and plant health systems. This is achieved by mainstreaming and facilitating targeted actions throughout the programme's design, implementation, and monitoring phases. CABI has established a target of ensuring that at least 30% of all programme implementers and beneficiaries are young people under the age of 35.

This commitment acknowledges the diverse aspirations, education levels, skill sets, ages, genders, and other social factors influencing young people's involvement. Progress is tracked using age-disaggregated data, and a process of continuous improvement is maintained through rigorous testing of assumptions and intentional learning from both successes and challenges.

Key areas of focus for youth engagement include:

- **Agricultural service providers:** Empowering young men and women to serve as agricultural service providers, thereby enhancing farmer productivity while simultaneously generating income opportunities for themselves.
- **Champions of change:** Developing young individuals as champions within the SBCC component. These champions promote the adoption of sustainable agricultural practices (including nature-based solutions/biological control) among farmers, focusing on pesticide risk reduction, and act as digital champions promoting digital tools within farming communities.
- **Agribusiness development:** Identifying, training, and linking young men and women to agribusiness opportunities within plant health systems to facilitate the establishment and growth of their own agricultural enterprises.

In Kenya and Uganda, CABI and its in-country partners (e.g. the Kenya Plant Health Inspectorate Service and the Uganda Ministry of Agriculture, Animal Industry and Fisheries) provided technical training on IPM, orchard management, fruit tree nursery establishment and certification, and local seed business development. At the heart of this capacity development is the objective of increasing the number of people in rural areas who are available to provide up-to-date information, inputs, and services to smallholder farmers. Many of the trainees have launched agro-input shops serving their communities or farmer associations, providing essential supplies like seeds, fertilizers, and pesticides. District-level engagements provided platforms for youth agricultural entrepreneurs to showcase ventures, fostering collaboration with local governments and other stakeholders.

In Zambia, CABI and partners aimed to combat CBSD by formalizing the cassava seed system while creating income opportunities. A rapid assessment conducted across six agricultural camps in Zambia revealed that farmers were 100% willing to adopt and 99% willing to pay for clean cassava cuttings. This strong demand underscored the potential for a viable cassava seed market. Over 100 farmers were therefore trained in seed production by Arullusa Farms, the Seed Control and Certification Institute, and the Zambia Agriculture Research Institute. These trained farmers were then supplied with certified disease-free planting materials, laying the foundation for a sustainable seed system.

This capacity-building and entrepreneurship support has enhanced the capacity of service providers to deliver critical services to farmers, while diversifying income-generating opportunities in rural areas. A survey of 146 out of 486 previously trained service providers in Kenya and Uganda revealed that 85% were economically active with their new skills. By extrapolation, this suggests that approximately 413 service providers benefited financially during the reporting period. Approximately 57% of them were earning income above the local minimum wage (USD 96/month) specifically from their new service offerings. Moreover, 18% were earning more than USD 238/month, which is an estimate of an East African rural living wage based on the Global Living Wage Coalition's

2023 data. In addition to having a positive impact on the youth, women, and men engaging in new service provision, these ventures are creating a ripple effect that will boost local agricultural productivity and food security in the countries. An independent study was conducted in Kenya on paid agricultural services and included a sample of service providers trained by PlantwisePlus and other initiatives in the country. The study found that these paid-for services increased the income of smallholders by up to 30% and reduced poverty by 16%, even though institutional barriers like market access and credit remain challenges.

## A lead farmer championing for his community

**Mr Mulenga William** became a lead farmer in Nsama District, Zambia, through the CBSD communication campaign. Following the lead farmer training, he expanded his outreach, conducting multiple community sessions to raise awareness about CBSD. The profits he made from selling clean cassava cuttings enabled him to increase his earnings from ZK 3,500 to ZK 18,000 and build an eight-room family house. Next, he plans to invest in a community-benefiting vehicle, further enhancing agricultural development in his region.



Mr Mulenga William (left) with the Senior Agriculture Officer of Nsama district (centre), and Geoffrey Rugaita, CABI (right)

## Increasing the uptake of IPM by farmers

Through partnership building, training, and other forms of capacity building, PlantwisePlus helped local partners directly reach 4.3 million smallholder farmers with plant health advice and other services in 2024 across the 25 countries supported by core donor funding. This outreach was accomplished through a set of tools and methodologies, including plant clinics, farmer trainings, plant health rallies, agribusiness operations, SMS-based pest alerts, digital decision support tools, and mass extension campaigns. Through multiple studies on the sharing of information between farmers, with the most recent and most extensive one conducted during the POC phase, it is assumed that farmers receiving advice through PlantwisePlus-related activities go on to share that information with an average of five other farmers. (This assumption was not made for farmers supported directly or indirectly by digital decision support tools as this has not yet been tested.) It is estimated that PlantwisePlus reached an additional 18.9 million farmers indirectly through farmer-to-farmer sharing. The total programme direct and indirect reach in 2024 is therefore 23.2 million farmers.

Earlier studies conducted under PlantwisePlus show that 90% of plant clinic users fully or partly adopt recommendations given by plant doctors, and that 94% of stakeholders who received information through mass communication campaigns adopted new cultural practices.<sup>14</sup> Using a conservative figure of 90% adoption applied to all PlantwisePlus beneficiaries in countries supported by the programme core donor, approximately 3.4 million farmers have applied new technologies or practices as a result of advice delivered through plant clinics, mass communication campaigns, and other complementary methods. At least 1.3 million smallholder farmers experienced improved yields due to programme interventions and an estimated 1.1 million achieved increased incomes. An estimated 160,441 hectares of land are considered under IPM practices, including biological control or biopesticides, as a result of farmer programme interventions and farmer adoption of advice. Nearly all the hectareage figure (159,841) is based on plant clinic activities, with an additional 600 hectares the result of papaya mealybug biological control in Kenya. This latter figure is a very conservative estimate and will be assessed more rigorously in 2025.

14. Tambo, J.A., Matimelo, M., Ndhlovu, M., Mbugua, F. and Phiri, N.(2021). Gender-differentiated impacts of plant clinics on maize productivity and food security: Evidence from Zambia. <https://www.sciencedirect.com/science/article/pii/S0305750X21001315?via%3Dihub>  
 Tambo, J.A., Uzayisenga, B., Mugambi, I., Onyango, D.O. and Romney, D.(2022). Sustainable management of fall armyworm in smallholder farming: The role of a multi-channel information campaign in Rwanda. <https://onlinelibrary.wiley.com/doi/full/10.1002/fes3.414>

Outreach method	Total farmers reached*	Male			Female			Unknown sex		
		<35	35+	Unknown age	<35	35+	Unknown age	<35	35+	Unknown age
Plant clinics, plant health rallies, farmer field days	305,062	30,097	7,719	180,186	4,596	1,112	43,036	29	35	38,252
Farmer trainings	10,195	140	83	5,296	157	89	3,596	0	0	834
Agri-service providers	31,714	0	0	0	0	0	0	0	0	31,714
PRISE SMS pest alerts	989,534	0	0	470,103	0	0	512,697	0	0	6,734
Mass extension campaigns (e.g. radio)	2,443,223	274,113	318,238	768,231	216,302	276,862	583,477	0	0	6,000
Digital decision support tools	557,357	34,670	53,220	23,762	18,984	38,443	19,217	12,471	22,974	333,616
Subtotal	4,337, 085	339,020	379,260	1,447,578	240,039	316,506	1,162,023	12,500	23,009	417,150
Farmer-to-farmer sharing	18,898,640									18,898,640
<b>Total farmers reached</b>	<b>23,235,725</b>									

\* Reach figures are based on reports from partners in the 25 programme countries supported by core donors (excluding the affiliate project countries Burundi, China, and Namibia).





# Scaling out in Sri Lanka

Sri Lanka became the seventh PlantwisePlus focus country in 2024 due to the strong commitment from country partners to PlantwisePlus, including ownership and readiness to invest in strengthening plant health systems. The implementation of PlantwisePlus in Sri Lanka aligns closely with the nation's comprehensive agricultural development strategy, focusing on sustainable and safe production, food security, and improving smallholder farmers' livelihoods.

In 2024, CABI deepened its collaboration with Sri Lanka's DoA, expanding PlantwisePlus initiatives to strengthen plant health systems, promote digital tools, and reduce pesticide risks. The DoA and CABI signed a five-year partnership agreement, empowering the DoA to independently conduct plant doctor training across provinces.

The DoA has demonstrated strong ownership of the programme by actively participating in training, field activities, and establishing permanent crop clinics across Sri Lanka's 25 districts. Plant clinics have been active since 2012, with a total 1,146 permanent and mobile plant clinics set up, with over 600 currently active (in 2024), recording around 34,500 clinic queries.

Key activities in 2024 included workshops on data management to improve data entry into the PlantwisePlus Online Management System, high-level planning meetings, and the development of localized Pest Management Decision Guides. Although challenges such as district-level staff shortages have hindered data entry, the country's Permanent Crop Clinic Programme successfully integrated the plant clinic approach into provincial agriculture extension systems through training, cluster meetings, and public awareness campaigns.

The DoA expressed an interest in working with the PlantwisePlus programme to identify lower-risk pest management options, such as biopesticides, and to provide training on chemical pesticide use, storage, and regulation. This training is regarded as key to mitigating the negative effects of pesticide use. In 2024, PlantwisePlus initiated an intervention focused on enhancing agro-input dealer knowledge. This involved revising outdated training materials and developing a new curriculum to improve agro-input dealers' familiarity with plant protection and pesticide risk mitigation. As a result, CABI Academy courses – particularly 'Crop pest diagnosis and management' – have been successfully integrated into the agro-input dealer training curriculum.

CABI also conducted a national-level gender assessment study, followed by a two-day validation workshop in Kandy. The study revealed significant gender disparities in knowledge about pesticide risks, access to and experience of advisory services, and land ownership. The findings indicated that, while pesticide application was primarily conducted by men, women took on supportive roles including spraying, mixing, filling, and storing pesticides. However, women had less information about pesticides due to technological barriers and cultural barriers, such as lower rates of land ownership, meaning they could not participate in decision making in farmer organizations. These findings have laid the groundwork for activities in 2025.



# Advancing gender equality in agriculture through action and advocacy

PlantwisePlus facilitated Women's Economic Empowerment Index studies in Bangladesh, Pakistan, Ghana, and Kenya in 2023. The focus in 2024 was to conduct validation workshops that explored the challenges and opportunities for women in agriculture, facilitated knowledge exchange on gender inclusion, and developed actionable strategies for women's empowerment.

In Pakistan, discussions during the workshops resulted in the foundation for a strategic 2024–2025 plan focused on advocacy, capacity building, and community engagement in Khyber Pakhtunkhwa and Punjab provinces. Government officials from these provinces pledged to expand agribusiness opportunities for women and youth through gender mainstreaming workshops and budget allocations for female farmers. Capacity-building efforts will train agricultural extension personnel, integrate gender-focused curricula into agricultural institutions, and support female-led innovation in modern farming. Additionally, community-driven initiatives will train female para-extension workers, establish women-led cooperatives, and enhance access to digital tools and labour-saving technologies. The study also resulted in the publication of 10 case studies showcasing women's success in agriculture, helping to increase recognition of their contributions.

Stemming from this regional action plan in Pakistan, CABI supported partners in launching a gender-communication campaign to highlight the vital role women play in agriculture and the positive impact their participation can have on their families and society. The campaign, which included a series of eight 30-minute radio talk shows, broadcast weekly on Radio Pakistan, aimed to showcase how women's involvement in agriculture can lead to higher yields, better-quality produce, and enhanced access to agricultural extension services. It also identified areas where more support could be provided to enable women to fully benefit from agricultural advice. The radio campaign reached an estimated audience of 25 million listeners and attracted high-level attention, including contributions from senior staff of the State Departments of Agriculture Extension on gender inclusivity, which helped elevate the importance of gender-sensitive practices within the department.





# Supporting countries to achieve their Paris Agreement goals

PlantwisePlus's focus on promoting IPM approaches naturally aligns with the goal of enhancing biodiversity and environmental sustainability. However, there are certain areas where climate change adaptation and resilience activities are more explicit.

In 2024, a key aim was to strengthen climate-focused partnerships in the PlantwisePlus focus countries. To achieve this, CABI consulted with national partners and international development organizations, participated in meetings with the Africa Group of Negotiators Experts Support, and co-organized a regional workshop on 'Understanding the agriculture sector's readiness to implement climate reporting mechanisms under the Paris Agreement' with the ASEAN Negotiators Group on Agriculture. The objectives of these engagements were to jointly identify PlantwisePlus activities that aligned with the priorities outlined in the countries' Nationally Determined Contributions (NDCs) and National Adaptation Plans, ensuring targeted, government-backed support for farming communities facing increasing climate risks and variability.

Pest and disease management through sustainable and climate-smart agriculture (CSA) interventions emerged as a national priority in several PlantwisePlus countries. For example, Pakistan's NDC calls for an increased use of biological controls for managing pest issues and enhancing soil quality. In Bangladesh, Vietnam, and Sri Lanka, PlantwisePlus-led Pest Management Decision Guide expert groups worked to address these priorities by integrating CSA recommendations wherever possible, adapting them to agro-ecological zones or identified 'climate hotspots'.

In Bangladesh, a scoping workshop brought together stakeholders from the public and private sectors to identify agribusiness opportunities for male, female, and youth farmers, while considering current and anticipated climate changes. Similarly, scoping exercises in Zambia and Ghana identified how PlantwisePlus could support NDCs and National Adaptation Plans. Both countries underscored the importance of this initiative for their agricultural development and the necessity for integrated early warning systems that combine meteorological data with advisory information on pests and diseases. In Kenya, CABI contributed to the national climate and development report and created a CSA curriculum for higher education institutions. Additionally, CABI delivered training on CSA as part of the work on pesticide risk reduction and youth entrepreneurship. Similar training was conducted in Zambia in partnership with a separately funded ACIAR project. Preparatory work for establishing Joint Clinics (One Health) in Uganda took place in 2024, aiming to trial a model of more integrated and comprehensive advice to farmers that addresses not only plant and livestock health problems but also relevant soil health and climate-related challenges that can hinder productivity.

Looking ahead to 2025, the programme will continue to mainstream climate change considerations across the three impact pathways in alignment with national climate goals through tangible and practical actions. This includes producing technical policy briefs and knowledge products to inform policy recommendations, promoting CSA advisories through digital tools and early warning systems such as PRISE, and developing climate-focused curricula and courses for relevant stakeholders to be delivered through the plant clinics and the CABI Academy.



A photograph showing three people in a lush green field. On the left, a man with glasses and a CABI vest is looking at a plant. In the center, a woman is smiling and looking at the plant. On the right, another man is smiling and looking at the plant. They are all holding and examining a large leafy plant. The text 'PlantwisePlus affiliate projects' is overlaid in white on the left side of the image.

# PlantwisePlus affiliate projects

## Fall armyworm management in Zambia (ACIAR)

In Zambia, PlantwisePlus is complemented by an ACIAR-funded project on 'Village-based biological control of FAW in rural Zambia', investigating the potential to use a naturally occurring pathogen as an augmentative biological control agent to help farmers manage pest populations. This multi-project action leverages resources and strengths to maximize potential impact through the use of a lower-risk management approach. The project is evaluating the feasibility of using the fungus *Metarhizium rileyi* to develop an effective biopesticide. Innovations were co-designed with farmers and experimental fields were used as biological control learning sites to foster interest in the proposed solutions and, ultimately, greater adoption of lower-risk management options for FAW.

In 2024, CABI, the Zambia Agricultural Research Institute, and the University of Zambia conducted several off-season field trials that showed that the fungus *Metarhizium rileyi* is effective in killing FAW. PlantwisePlus also facilitated outreach activities aiming to increase awareness of augmentative biological control. Approximately 700 farmers were reached through the farmer field days and other events, which led to an increase in dialogue on and demand for augmentative biological control products. A review of the commercialization potential for *Metarhizium rileyi* concluded that there is a market for it to control FAW in Zambia and beyond and recommended a process for product development that will serve to gather information with which to approach commercial companies. That process will be assessed and implemented in 2025. CABI will also lead the establishment of a GTWG in the coming year, supported by the ACIAR-funded project, to help people of all genders access the right information.

## PlantwisePlus – Burundi (Netherlands Embassy in Burundi)

Since 2020, CABI had been leading a project in Burundi to introduce plant doctor training and several aspects of the plant clinic approach. Based on the major successes of that project and the strong interest from national partners, the Netherlands Embassy agreed to fund a follow-up project that would expand the operation to include several facets of the PlantwisePlus programme to further strengthen the country's plant health system. Many more farmers in Burundi need access to timely, evidence-based yet practical and actionable advice. At the same time, there is a lack of awareness and opportunity to resolve issues around farmer access to affordable inputs, in particular plant protection solutions that do not pose harm to farmers, the environment, and consumers. Further support is also needed to reverse the weak capacity of national phytosanitary authorities that have responsibilities for safeguarding the country from pest incursions, for promotion of trade, and for the protection of environmental and human health. Therefore, the new phase of the project will focus

on strengthening farmer advisory, reducing crop protection risks, and enhancing phytosanitary services. 2024 was a year of transition, with a focus on establishing a new funding contract, objectives, and workplan. Nonetheless, with only minimal formal project activities happening in-country, plant clinics continued to serve local communities, with more than 1,200 plant health queries from farmers reported.

## PlantwisePlus – China (Ministry of Agriculture and Rural Affairs, China)

PlantwisePlus activities in China were focused on three programme outputs in 2024: the plant clinic approach, digital tools, and the training and certification of agro-input dealers. Over the years, the geographic focus of programme interventions has shifted between provinces, but Beijing and Sichuan province have been two regions that showed greatest interest and commitment to the innovations introduced. There were 227 plant clinics active in the country in 2024. Reports collected from the Beijing Plant Protection Station and Sichuan Plant Protection Station indicated that more than 35,000 farmers were served by plant clinics throughout the year. Furthermore, more than 51,000 farmers are estimated to have been supported through the digital tools promoted by PlantwisePlus.

Regarding interventions targeting the quality of service provided by agro-input dealers, CABI further supported Chinese partners in developing a standard for input shops and the establishment of five model 'IPM stores'. This standard, formally titled the 'Establishment Specification for IPM Promotion Pesticide Stores', passed the technical review organized by the Administration of Market Regulation of Leshan prefecture in Sichuan province and is due to be formally released by the government by 2025. This is expected to institutionalize the use of clinic data for monitoring agro-shop services, particularly in Sichuan province, enhancing accountability and service quality.

## Establishing plant clinics in Namibia (FAO)

Due to demand from Namibia for the plant clinic model, FAO agreed to fund a short project for CABI to facilitate the necessary planning and training. The project was conducted in 2024 with the aim of setting up 10 community-based plant clinics in selected regions of the country to strengthen plant health advisory services and ultimately lead to improved productivity and livelihoods of farmers through more effective and safer pest management. The plant clinics, once established, were reported to have served approximately 900 farmers by the end of the year.

## Nutrition in City Ecosystems (NICE) project in Kenya (Syngenta Foundation)

The NICE project in Kenya partly aims to promote sustainable agricultural practices and improve crop yields through agroecology practices utilizing biological technologies. Through collaboration with CABI, the project has made significant progress in training farmer hub leads as plant doctors, isolating and mass-producing a potential insect pathogen to develop a biopesticide, and aligning the NICE project's agroecology practices with the Ukulima True campaign. In 2024, the Syngenta Foundation provided further funding to CABI for three areas of work: (i) to conduct more plant doctor training with introductions to digital decision support tools; (ii) to follow up on field trials assessing the effectiveness of the pathogen *Beauveria bassiana* in controlling sweet potato weevil (assessing pest population counts and resulting crop yield); and (iii) to extend an ongoing SBCC on pesticide risk reduction to the focal counties of the NICE project.



A photograph showing three individuals in a field of tall, golden-brown plants. On the left, a man in a patterned shirt holds a green fruit. In the center, a woman in a yellow top and blue wrap examines a plant. On the right, a woman in a light blue top and patterned skirt, wearing a white cap, looks at a smartphone. The word 'Partnerships' is overlaid in large white text on the left side of the image.

# Partnerships

Delivery of PlantwisePlus requires coordinated collaboration with partners across the public, private, and civil sectors, including with in-country, regional, and international organizations. This collaboration can take place through institution-level agreements that encompass PlantwisePlus activities, more specific agreements only related to PlantwisePlus, or organic partnerships that grow through identified synergies. When activities reach a certain threshold of scale, or include any financial exchange, CABI takes steps to establish formal agreements. As at January 2025, PlantwisePlus operates through 290 formalized partnerships, 48% of which are with the government sector and 20% with the private sector. These partnerships ensure that the programme maintains its relevance to target groups and stakeholders, its coherence with other actors in the plant health system, and the sustainability of programme outcomes.

One area where partnerships are critical to the functioning of the programme is in the promotion of digital tools and learning products. In 2024, CABI engaged over 82 organizations to create awareness and promote the tools, including government agencies, academic institutions, international non-governmental organizations, certifiers, corporations responsible for commodity procurement, organizations working for climate resilience and regenerative agriculture, and youth employment agencies. Some of these partnerships were formalized through new agreements, while some of these were extensions of previously existing engagements from Plantwise and the PlantwisePlus POC phase. In all cases, the objective is to embed the digital tools into the organizations' processes and approaches, either through proactive support or by partnering in promotional efforts, and this contributed to more than 550,000 engaged users of the tools in PlantwisePlus countries in 2024, plus another 865,000 elsewhere in the world.

The value of public–private partnerships to support PlantwisePlus objectives is particularly clear in the work of the CABI BioProtection Portal. Twice a year, the Portal's 27 private sector partners are invited to a development consortium meeting, along with eight international organizations and representatives from the four governments that fund the Portal's work as part of PlantwisePlus: Switzerland, the UK, the Netherlands, and the European Commission. Together, these key stakeholders review the Portal's progress and determine its strategic direction, including which countries should be prioritized for data acquisition. In 2024, a record number of associates joined the initiative, including the Association of Agricultural Research Institutions in the Near East and North Africa, Committee Linking Entrepreneurship-Agriculture-Development (COLEAD), the Standards and Trade Development Facility (STDF), Agriculture and Agri-Food Canada, the Instituto Interamericano de Cooperación para la Agricultura, the Association of Natural Biocontrol Producers, the Sustainable Agriculture Network, the Asia-Pacific Association of Agricultural Research Institutions, and the Organic Materials Review Institute. Additionally, one new sponsor, the Minor Use Foundation, came on board, alongside two new partners: T. Stanes (India) and Natural Insect Control (Canada). These partnerships will broaden the Portal's outreach through their global awareness-raising and training activities, supporting the Portal's goal of building awareness and promoting uptake of bioprotection.





# Programmatic challenges encountered and measures taken to address them

## Political change in Bangladesh

In August 2024, Bangladesh's political landscape shifted as student protests for quota reforms erupted into a nationwide movement against corruption, authoritarianism, and economic mismanagement. This eventually led to the resignation and departure of Prime Minister Sheikh Hasina, who had been in the role for over a decade. The transition to the new government led to several major delays in planned PlantwisePlus work due to changing staff or shifting priorities for our partner organizations.

The construction and equipping of a TRF in Rangpur, for example, was initially severely delayed (>3 months), but by the end of the year the facility was built and contracts for specialist equipment were signed. This is a major achievement that will improve access for farmers in the region to a lower-risk alternative to pesticides. In other cases, PlantwisePlus shifted planned work to a consultancy model, such as under the pesticide alternatives output, where CABI commissioned reports that were refined and finalized through consultative processes. Overall, this approach was highly successful, resulting in high-quality, informative deliverables.

Going forward, staff stability remains a key component of the programme's ability to deliver impact. Staff turnover in Bangladesh is already observed to be high, and some elements of the programme require personnel with an understanding of specific issues to provide the close support needed and to ensure the work becomes embedded into the relevant institution. Formalized agreements play an important role, and CABI has signed agreements with 13 of 18 partners in the country. The CABI team in Bangladesh is working continuously to assess risks, identify solutions, and build longer-term partnerships for the programme.

## Engaging with the media on pesticide risk

The media play an important role in shaping public opinion, including on pesticide risk reduction. While PlantwisePlus generally works well with the media, such as during the SBCCs, there were some examples of the media connecting CABI with political initiatives that were perceived to negatively impact farmers, such as a proposal in Kenya (since reversed) that farmers who do not comply with the KS1758 standard should not be permitted to sell vegetables. CABI had in fact reported that it would not be possible for farmers to cover the cost of the certification, which fanned conclusions in the media that farmers would no longer be able to sell their wares. Following this experience, PlantwisePlus took steps in 2024 to build understanding among media groups on promoting pesticide risk reduction, integrated pesticide management, and the role of women farmers.

A highlight of this approach was in Pakistan, where CABI signed Memoranda of Understanding with the Lahore, Multan, Peshawar, and Muzaffarabad press clubs for knowledge sharing and raising awareness on challenges and achievements in the agriculture sector. CABI then hosted a series of workshops, which included visits to the *Trichogramma* rearing facility in Mardan, to orient senior media representatives on pesticide risk reduction, including key concepts and the benefits to society in reducing pesticide risks. Attendees highlighted access to information as a major challenge, including lack of access to credible data on pesticide risk reduction.

As a result of the workshops, the participants endorsed the idea of setting up an Agri-Journalists Forum and proposed that each of the participating media representatives ensure the publication/broadcast at least one story on pesticide risk reduction, IPM, or related topic in consultation with CABI every quarter – that is, 12 stories a quarter. CABI will support this with identification of story ideas and by providing links with experts, as well as sharing scientific resources. The stories produced during the quarter will also be presented in the form of a quarterly 'Safe Farming Newsletter' (online version) for wider circulation.

This approach mirrors similar events in Zambia, which focused on CBSD management and will be used as a model going forward.

## Managing expectations concerning lower-risk alternatives

The biological control of the papaya mealybug has been one of the biggest early successes for the PlantwisePlus programme, with significant reductions in the pest population being recorded in coastal Kenya where it was first released. The control efforts have gained significant press attention, helping to raise the profile of this work in the country. Stories appeared in several news outlets like *The Standard* and *The Star*, receiving over 6 million views. However, not all the press coverage has been positive. An article appeared in Kenyan media highlighting the plight of a farmer in Baringo county (a recent release site for the biological control agent) who was forced to cut down all of his papayas despite the new agent having been released. This was not so much a failure of biological control but a failure in communication to the farming community about how biological control works and the timeframe for changes to be seen.

For a landscape-level biological control programme to be successful, farmers must be actively engaged in an area-wide, integrated approach and educated on how biological control works. This includes understanding its safety, environmental, and health benefits, and the expected timeframe for effective pest control. It is also important for farmers to understand how biological control fits into an overall IPM package. Lessons from this experience can help improve future education campaigns, ensuring better farmer participation and adoption of biological control strategies.

## Tracking use of digital decision support tools

There were still challenges with monitoring digital tool use through Google Analytics due to cookie rejection by users. Because of this, the reported number of unique individuals using the PlantwisePlus Knowledge Bank is considered to be an underestimate. CABI's system for collecting analytics data was upgraded toward the end of 2024 so that user data remains compliant with updated international standards, while enabling CABI to capture all usage data. Starting in 2025, CABI expects to once again have more accurate reporting on digital tool uptake. This is important for improving the accuracy of data on which decisions are made, and which is reported to stakeholders, including partners and donors.





# Communication and visibility

Communications work in 2024 continued to build on the improvements made in 2023, more effectively showcasing the programme's impact on smallholder farmers through strategic outreach and engagement. Significant updates were made to the programme website, and content focused on visually highlighting the programme's core concepts. Content leveraged CABI's reputation as a credible science-based knowledge source, enhancing the programme's messaging and reinforcing CABI's position as a trusted voice in the agricultural development sector.

## Public relations, events, and press

PlantwisePlus was represented at 15 events in 2024. The programme was represented at the Africa Food Systems Forum's 2024 Summit in Rwanda, RUFORUM in Kenya, the International Plant Protection Symposium in Nepal, and ICT4D in Ghana. The CABI BioProtection Portal had a stand at the Annual Biocontrol Industry Meeting in Switzerland, while colleagues from the Pakistan office had a separate stall showcasing how Pakistan's newly approved biopesticide registration guidance will help boost the country's biopesticide market. The programme also participated in the UN Climate Change Conference (COP29) held in Baku, Azerbaijan. Participation at COP29 allowed CABI and the PlantwisePlus programme to engage with key policymakers (e.g. the Central African Republic Ministerial Representatives and Netherlands DGIS for PlantwisePlus Burundi), donors (e.g. the Green Climate Fund, the African Development Bank, and the Bill & Melinda Gates Foundation), and partners (e.g. the Consultative Group on International Agricultural Research and the Tanzania Forest Fund), strengthening and exploring avenues for further collaborations for improving the livelihoods and resilience of smallholder farmers. COP29 provided a platform to showcase how CABI-led programmes like PlantwisePlus support climate change adaptation by putting farmers at the centre of initiatives and supporting nature-based solutions and IPM.

A further notable event for PlantwisePlus in 2024 was the European Commission-led InfoPoint Conference about the programme. The hybrid event was hosted online and in-person in Brussels, Belgium. Dr Daniel Elger, CABI CEO, and Dr Janny Vos, CABI's Partnerships Development Director, who spoke about PlantwisePlus, were joined by two partner speakers from Zambia and Pakistan: Ms Zombe Sikazwe, Senior Seeds Officer, Seed Control and Certification Institute; and Dr Imtiaz Hussain, Member, Plant Sciences Division, Pakistan Agricultural Research Council and CABI Liaison Officer. A total of 176 participants joined the session, with the majority (113) online. Through this event, PlantwisePlus reached new audiences and the event elicited a lively Q&A session. Questions were asked of each of the speakers, covering topics like biological control, climate change-induced plant diseases, and phytosanitary risk, as well as requests to find CABI resources such as our digital tools and infographics.



PlantwisePlus also hosted four webinars in 2024, with expert speakers from organizations partnering with the programme under the pesticide risk reduction pathway. The webinars provided a platform to share expertise from CABI and its partners and contributed to visibility and marketing efforts, serving as effective lead-generation tools. Invitations to register for the four webinars were sent to a total of 9,422 contacts, with an average click-to-open rate of 25%, resulting in 1,818 registrations. This converted to a total of 909 attendees (50% conversion) across all four webinars from 71 countries and organizations spanning education, government, the private sector, non-governmental organizations, the media, and more. These collaborative webinars, which featured speakers from leading organizations such as the African Union, helped to expand the programme's reach and strengthen partnerships.

A set of private, invite-only webinars were also arranged on 'Establishing a national residue monitoring programme in Kenya'. These webinars led into a write-shop and the development of a draft national pesticide residue monitoring framework, which national partners are moving toward piloting in 2025. Likewise, work on developing a national pesticide residue monitoring framework was highlighted as a priority area of work at a national level in Ghana, and follow-up activities are planned for 2025. This engagement has effectively positioned PlantwisePlus as a key facilitator, enhancing its visibility among stakeholders.

The programme received a total of 59 pieces of press media coverage, generating over 538,000 views and reaching a combined audience of more than 34 million. Stories such as the one on the success of the biological control of the papaya mealybug pest in Kenya gained significant press attention, helping to raise the profile of this work in the country. It appeared in several news outlets like *The Standard* and *The Star*, receiving over 6 million views. Other notable stories included AI training for farmers.

Moreover, CABI was awarded the FAO Partnership Award in 2024. CABI's nomination used numerous examples from PlantwisePlus to meet the criteria, which included demonstrating raised visibility of the problem of hunger and malnutrition, communicating complex agricultural and economic issues to the wider public, and promoting successful solutions for improved food security. At the award ceremony, FAO's Director-General praised the partnership for its contribution to sustainable agriculture and improving livelihoods. He reaffirmed FAO's commitment to continued collaboration with CABI and its partners 'for people and the planet'.

Within the programme, the Ukulima True campaign was a silver winner for the Data & Marketing Association's Sustainability Award, following shortlisting against major organizations such as Marriott and Scottish Power.

In addition to the activities listed here, PlantwisePlus is a key component of CABI's corporate communications content. It is prominently featured on [CABI's core website](#), highlighted in the organization's newsletter, and showcased through a series of thought leadership articles. Furthermore, it will be included in the 2024 'CABI in Review' (to be published in summer 2025), with stories covering biological control, pesticide risk reduction, and CBSD.

## Digital communications and materials

In December 2023, the programme website was integrated into the broader CABI website, [cabi.org](#). This positioned it as part of CABI, leveraging the website's better search engine optimization and allowing PlantwisePlus to make use of more advanced functionalities. For example, any blogs published in one area of the site automatically appear on other site areas (e.g. [this blog](#) about the biological control of papaya mealybug in Kenya is pulled through on the 'Kenya' country page and the 'Pesticide risk reduction' page). Search engines like Google give preference to sites with this kind of dynamic functionality, leading to better search rankings, which means the public come across information about the programme more easily when searching the internet. The website also includes a donor resources area with downloadable materials and access to the donor dashboard, which will be released in 2025. A 'Contact us' form was also added to the website, to facilitate better feedback functionality.

In total, CABI published 71 PlantwisePlus blogs in 2024, which led to slightly higher viewership than in 2023. As well as bringing return visits, they also link readers to related tools such as the PlantwisePlus Knowledge Bank or CABI Academy, building general awareness about CABI and its work. This is exemplified with the top three most-read articles in 2024:

- [Common papaya disorders: A comprehensive guide](#)
- [Watch out for these five cabbage pests](#)
- [What is Integrated Crop Management?](#)

Leveraging the reputation of CABI as a trusted knowledge resource, a key output for the communications work in 2024 was a set of infographics that visually explain some of the programme's key concepts: IPM, biological control, plant health systems, and climate-smart pest management. The infographics are available to download from the website and have proven to be popular on social media. Compared to the average performance of other posts, the infographics achieved a 400% increase in engagements (comments, shares, and likes) and a 445% increase in impressions. This substantial increase demonstrates that the infographics amplify the visibility of PlantwisePlus through expanded reach within the global agricultural community. Such high engagement rates effectively position the programme as a thought leader in the agricultural development sector, creating trust and credibility among stakeholders. This in turn attracts more followers and encourages more active participation in our campaigns, creating a cycle of awareness and engagement. Moreover, the high engagement and popularity of infographics on social media reflect the trend toward concise, visually driven content that quickly conveys key insights. This underscores our content strategy of using bite-sized information like dashboards and social media posts to make programme details more accessible to a broader audience.

Through LinkedIn, PlantwisePlus connects with a global network of professionals, industry leaders, and potential partners, enhancing the programme's visibility and credibility. This year, PlantwisePlus transitioned everyday news about the programme – particularly updates on workshops and training – from the blog to LinkedIn. This proved a more effective channel for this kind of update, opening up the blog for more strategic, impact-driven content. In 2024, the PlantwisePlus LinkedIn channel saw a 63% increase in followers, a 38% increase in impressions, and notably much higher engagement rates—a 137% increase on 2023. This expansion demonstrates our growing influence, serves to attract key stakeholders and reinforces our impact within the sector.

The monthly PlantwisePlus newsletters continued in 2024. A review of contact data ensured our communications reached interested and engaged users and helped to improve engagement rates. Over the course of the year, PlantwisePlus sent out 72,694 emails, with an average click-to-open rate of 9%. In addition, the number of subscribers to the CABI BioProtection Portal's monthly News Buzz email rose from 182 subscribers to 1,084 over the year, as a result of better signposting on the website to the sign-up form and through data gathered from a marketing whitepaper advertised through a US company called Greenhouse Management.

Video remains an effective facet of content marketing. In 2024, the PlantwisePlus YouTube channel achieved over 456,000 views and over 200 new subscribers. The most popular videos were short instructional ones for the Crop Sprayer app, which are promoted through paid Google Ads. Organic traffic came mostly to the impact video focused on the biological control of papaya mealybug in Kenya, with 1,400 views. The video uses interviews with farmers, extension officers, and scientists from CABI and KEPHIS to showcase PlantwisePlus's work on biological control of the papaya mealybug, the positive impact on farmers, and the importance of our partnerships.

## Selected PlantwisePlus publications

Every year, CABI staff and partners publish the findings of scientific, social, and economic studies conducted under PlantwisePlus in peer-reviewed journals and in working papers and study briefs in non-peer-reviewed publications. Selected publications from 2024 are as follows:

### Key:

Journal impact factor > 2.0: ↑

Open access: ☀

### Peer-reviewed papers

Adhikari, D., Pandit, V., Bhatta, M., Sharma, D.R. and Baral, S. (2024) Plant clinic in Nepal: an overview. *Acta Agraria Debreceniensis* 1, 5–10. <https://doi.org/10.34101/actaagrar/1/13643> ☀

Akiri, M., Mbugua, F., Njunge, R., Agwanda, C., Gurmessa, N.E., Phiri, N.A., Musebe, R., Kalisa, J.P., Uzayisenga, B., Kansiime, M.K. and Karanja, D. (2024) Intervention options for enhancing smallholder compliance with regulatory and market standards for high-value fruits and vegetables in Rwanda and Zambia. *Sustainability* 16(14), 6243, 21 pp. <https://doi.org/10.3390/su16146243> ☀ ↑

Ayuya, O.I., Makale, F., Gama, P.B.S., Otieno, A.J., Okeny, J., Mugambi, I., Alworah, G.O., Jumason, A.H., Rware, H., Aman, C., Mbaka, Z.S. and Ochilo, W.N. (2024) Strengthening plant health systems in South Sudan: Addressing challenges and enhancing system efficiency and sustainability. *CABI Agriculture and Bioscience* 5, 85, 14 pp. <https://doi.org/10.1186/s43170-024-00292-5> ☀ ↑

Bonilla, J.D., Coombes, A., Romney, D. and Winters, P.C. (2024) Changing the logic in agricultural extension: Evidence from a demand-driven extension programme in Kenya. *Journal of Development Effectiveness* 16(1), 118–141. <https://doi.org/10.1080/19439342.2023.2181848> ☀

Colmenarez, Y.C. and Vasquez, C. (2024) Benefits associated with the implementation of biological control programmes in Latin America. *Biological Control* 69(3), 303–320. <https://doi.org/10.1007/s10526-024-10260-7> ☀ ↑

Durocher-Granger, L., Wu, G.-M., Finch, E.A., Lowry, A., Yeap, Y.T., Bonnin, J.M., Offord, L., Kenis, M. and Dicke, M. (2024) Preliminary results on effects of planting dates and maize growth stages on fall armyworm density and parasitoid occurrence in Zambia. *CABI Agriculture and Bioscience* 5, 52. <https://doi.org/10.1186/s43170-024-00258-7> ☀ ↑

Fallet, P., Bazagwira, D., Ruzzante, L., Ingabire, G., Levivier, S., Bustos-Segura, C., Kajuga, J., Toepfer, S. and Turlings, T.C.J. (2024) Entomopathogenic nematodes as an effective and sustainable alternative to control the fall armyworm in Africa. *PNAS Nexus* 3(4), pgae122, 8 pp. <https://doi.org/10.1093/pnasnexus/pgae122> ☀ ↑

Jomantas, S., Wood, A., Munthali, N., Ochilo, W., Thakur, M., Romney, D. and Kadzamira, M. (2024) Looking at human healthcare to improve agricultural service delivery: The case of online chatgroups. *CABI One Health* 3(1), 10 pp. <https://doi.org/10.1079/cabionehealth.2024.0008> ☀

Kadzamira, M., Chege, F., Suntharalingam, C., Bundi, M., Likoko, L., Magero, D., Romney, D., Kansiime, M. and Mulema, J. (2024) African women and young people as agriculture service providers—business models, benefits, gaps and opportunities. *CABI Agriculture and Bioscience* 5, 24, 14 pp. <https://doi.org/10.1186/s43170-024-00229-y> ☀ ↑

Kansiime, M.K., Makale, F., Chacha, D., Nunda, W., Karanja, D. and Durocher-Granger, L. (2024) Area-wide pest management and prospects for fall armyworm control on smallholder farms in Africa: A review. *Sustainable Environment*, 10(1), 2345464, 15 pp. <https://doi.org/10.1080/27658511.2024.2345464> ☀ ↑

Makale, F., Muvea, A.M., Mugambi, I., Chacha, D., Finch, E.A. and Rwomushana, I. (2024) Current and potential distribution of the invasive apple snail, *Pomacea canaliculata* in Eastern Africa: Evidence from delimiting surveys and modelling studies. *CABI Agriculture and Bioscience* 5, 92, 13 pp. <https://doi.org/10.1186/s43170-024-00301-7> ☀ ↑



- Mulema, J., Phiri, S., Bbebe, N., Chandipo, R., Chijikwa, M., Chimutingiza, H., Kachapulula, P., Kankuma Mwanda, F., Matimelo, M., Mazimba-Sikazwe, E., Mfuno, S., Mkulama, M., Moonga, M., Mphande, W., Mufwaya, M., Mulenga, R., Mweemba, B., Ndalamei Mabote, D., Nkunika, P., Nthenga, I., Tembo, M., Chowa, J., Odunga, S., Opisa, S., Kasoma, C., Charles, L., Makale, F., Rwomushana, I. and Phiri, N.A. (2024) Rapid risk assessment of plant pathogenic bacteria and protists likely to threaten agriculture, biodiversity and forestry in Zambia. *NeoBiota* 91, 145–178. <https://doi.org/10.3897/neobiota.91.113801> ✨ ↑
- Opisa, S., Makale, F., Nyasani, J.O., Muvea, A., Kabole, M., Chacha, D., Agboyi, L.K., Asudi, G.O., Rehman, A., Luke, B. and Rwomushana, I. (2024) Prospects of classical biological control of papaya mealybug in Kenya: Performance of its exotic parasitoid, *Acerophagus papayae*, under laboratory and field conditions. *Crop Protection* 175, 106476, 7 pp. <https://doi.org/10.1016/j.cropro.2023.106476> ✨ ↑
- Othim, S.T.O., Opisa, S., Rwomushana, I. and Luke, B. (2024) Unleashing nature's defenders: farmer-managed natural enemies field reservoirs (NEFRs) enhance management of the invasive papaya mealybug (*Paracoccus marginatus*) in coastal Kenya. *Biological Control* 193, 105528, 10 pp. <https://doi.org/10.1016/j.biologicalcontrol.2024.105528> ✨ ↑
- Tambo, J.A. and Liverpool-Tasie, L.S.O. (2024) Are farm input subsidies a disincentive for integrated pest management adoption? Evidence from Zambia. *Journal of Agricultural Economics* 75(2), 740–763. <http://dx.doi.org/10.1111/1477-9552.12582> ✨ ↑
- Tambo, J.A., Holmes, K., Aliamo, C., Mbugua, F., Alokit, C., Muzira, F., Byamugisha, A. and Mwambu, P. (2024) Agro-input dealers' perspectives on the design of a certification scheme for pesticide risk reduction. *Pest Management Science* 80(12), 6298–6309. <https://doi.org/10.1002/ps.8359> ✨ ↑
- Tambo, J.A., Holmes, K.A., Aliamo, C., Mbugua, F., Alokit, C., Muzira, F., Byamugisha, A. and Mwambu, P. (2024) The role of agro-input dealer certification in promoting sustainable pest control: Insights from Uganda. *International Journal of Agricultural Sustainability* 22 (1), 2299181, 15 pp. <https://doi.org/10.1080/14735903.2023.2299181> ✨ ↑
- Tambo, J.A., Kansime, M.K., Alaganthiran, J.R., Danish, M., Duah, S.A., Faisal, S., Khonje, M.G., Mbugua, F. and Rajendran, G. (2024) Consumer pesticide concerns and the choice of fruit and vegetable markets in five low- and middle-income countries. *Global Food Security* 42, 100801, 10 pp. <https://doi.org/10.1016/j.gfs.2024.100801> ✨ ↑
- Ullah, F., Rehman, A., Rashid, K., Joshi, R.C. and Saeed, M. (2024) First Report of *Tetrastichus howardi* (Olliff) and *Chelonus formosanus* Sonan as parasitoids of fall armyworm, *Spodoptera frugiperda* (J.E. Smith), in Pakistan. *Journal of Biological Control* 38(3), 359–262. DOI: 10.18311/jbc/2024/45293 ✨
- Yaméogo, I.S., Latévi, K., Ouattara, D., Agboyi, L.K., Dabiré, R.A., Zallé, S., Kenis, M., Gnankiné, O. and Nacro, S. (2024) Level of damage and yield losses associated with the fall armyworm (*Spodoptera frugiperda*) on maize (*Zea mays*), millet (*Pennisetum glaucum*) and sorghum (*Sorghum bicolor*) on station in Burkina Faso. *Crop Protection* 182, 106743, 9 pp. <https://doi.org/10.1016/j.cropro.2024.106743> ↑

## Working papers, study briefs, and publications that were not peer reviewed

- Nyamekye, H., Davis, T. and Duah, S. (2024) Changes in women's access to extension services in Ghana: The impact of a behaviour change campaign. *CABI Study Brief 48: Impact*. <https://dx.doi.org/10.1079/CABICOMM-62-8178> ✨
- Opisa, S. and Constantine, K. (2024) Biological control for papaya mealybug: Lessons learned from Kenya. *CABI Study Brief 47: Impact*, 10 pp. <https://dx.doi.org/10.1079/CABICOMM-62-8176> ✨

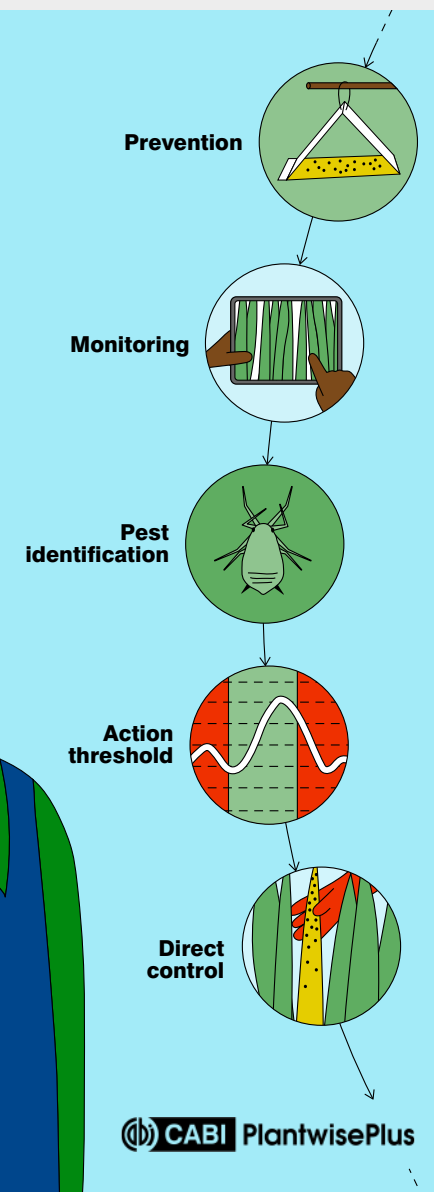
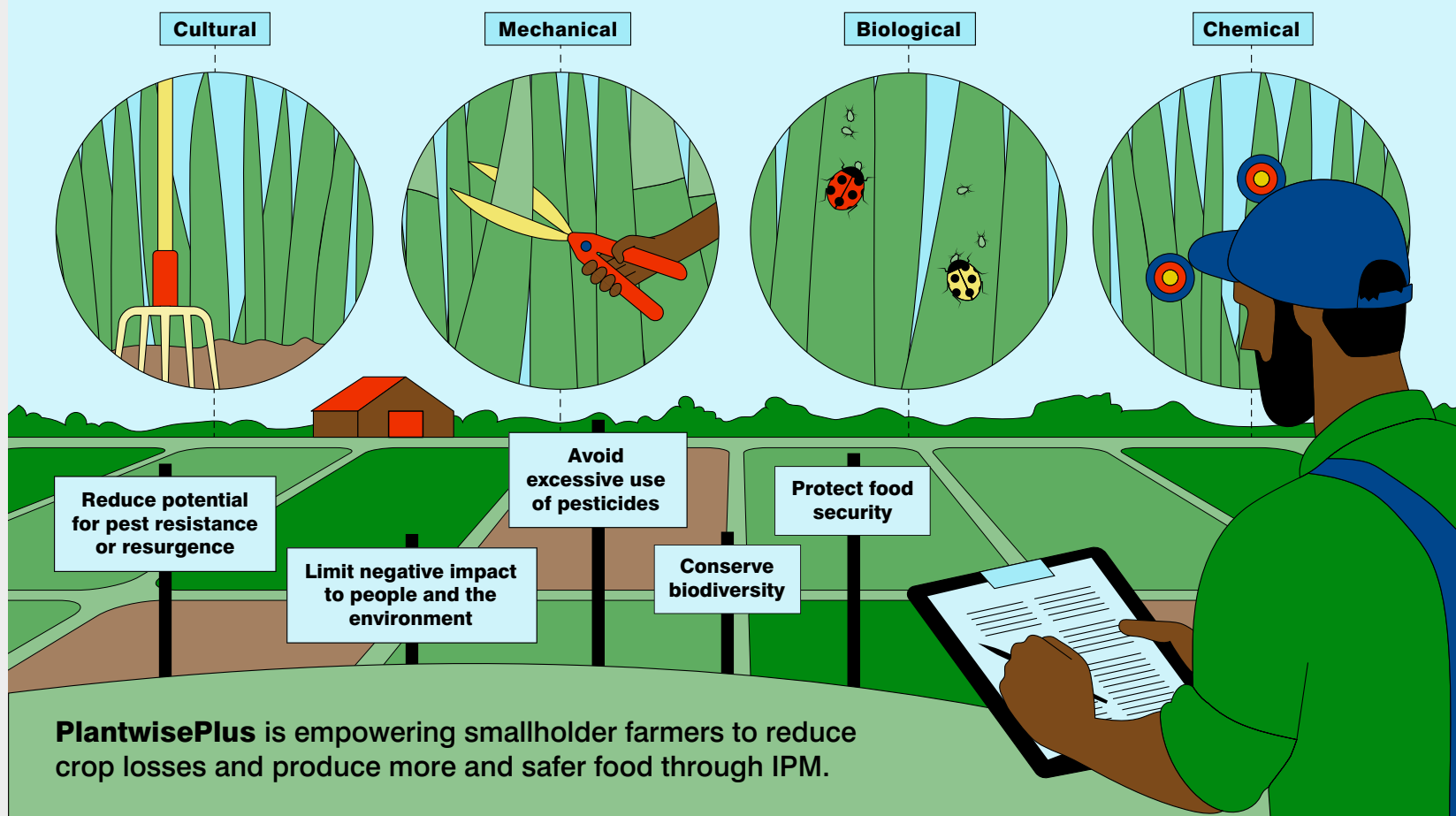


# **Annex I: New PlantwisePlus infographics**

# Integrated Pest Management:

An efficient ecosystem approach to crop production and protection

Integrated Pest Management (IPM) is a **sustainable form of agriculture** that combines different management strategies and practices to minimize economic, health, and environmental risks.





# Biological Control

Biological control, or biocontrol, refers to the use of natural organisms, like beneficial insects, mites, and micro-organisms (such as bacteria, fungi, viruses, and nematodes) to control pests.

 **CABI** PlantwisePlus



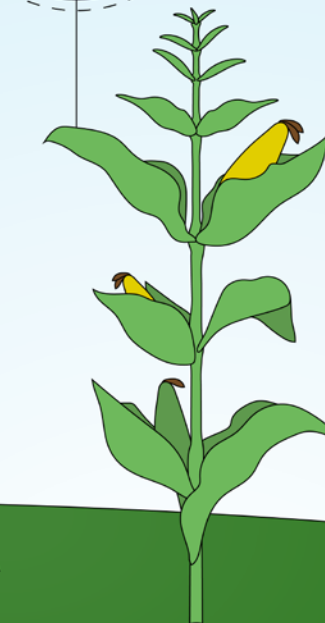
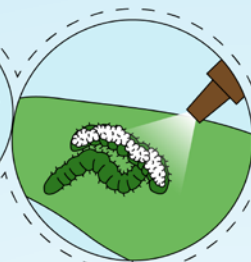
**PlantwisePlus** advocates for lower-risk plant protection practices and products, including biocontrol, and supports farmers to implement these safer solutions to protect their crops and the environment.

**Conservation  
biocontrol**



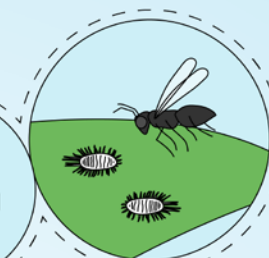
Crop management practices that maintain or increase populations of existing biocontrol agents, for example through providing shelter and more nectar plants.

**Augmentative  
biocontrol**



The ongoing application of beneficial organisms to control pests, often using commercially available species.

**Classical  
biocontrol**

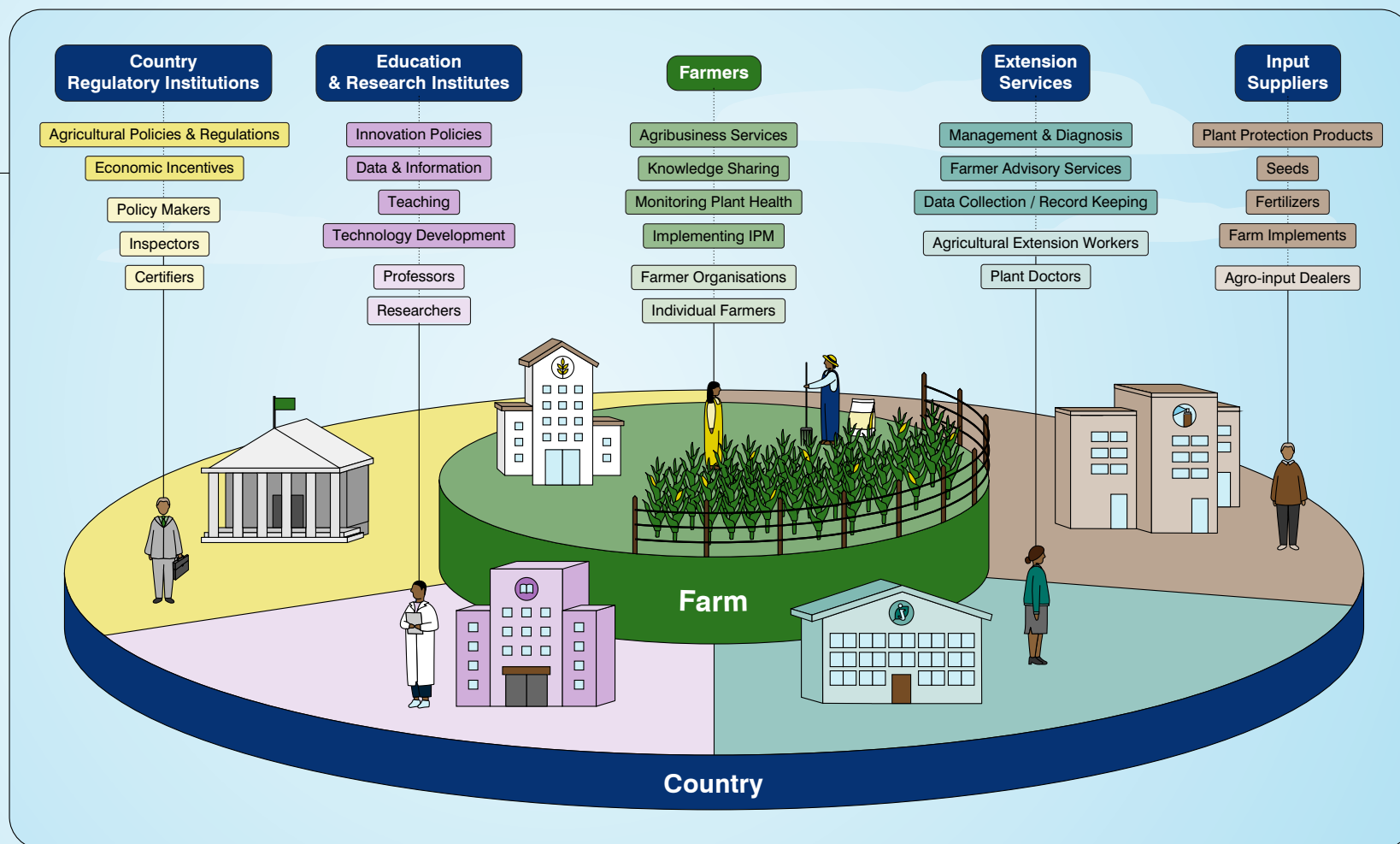


The introduction of a non-native natural enemy to control an invasive pest. Once released, the agent self-replicates, providing permanent control.

# What is a Plant Health System?

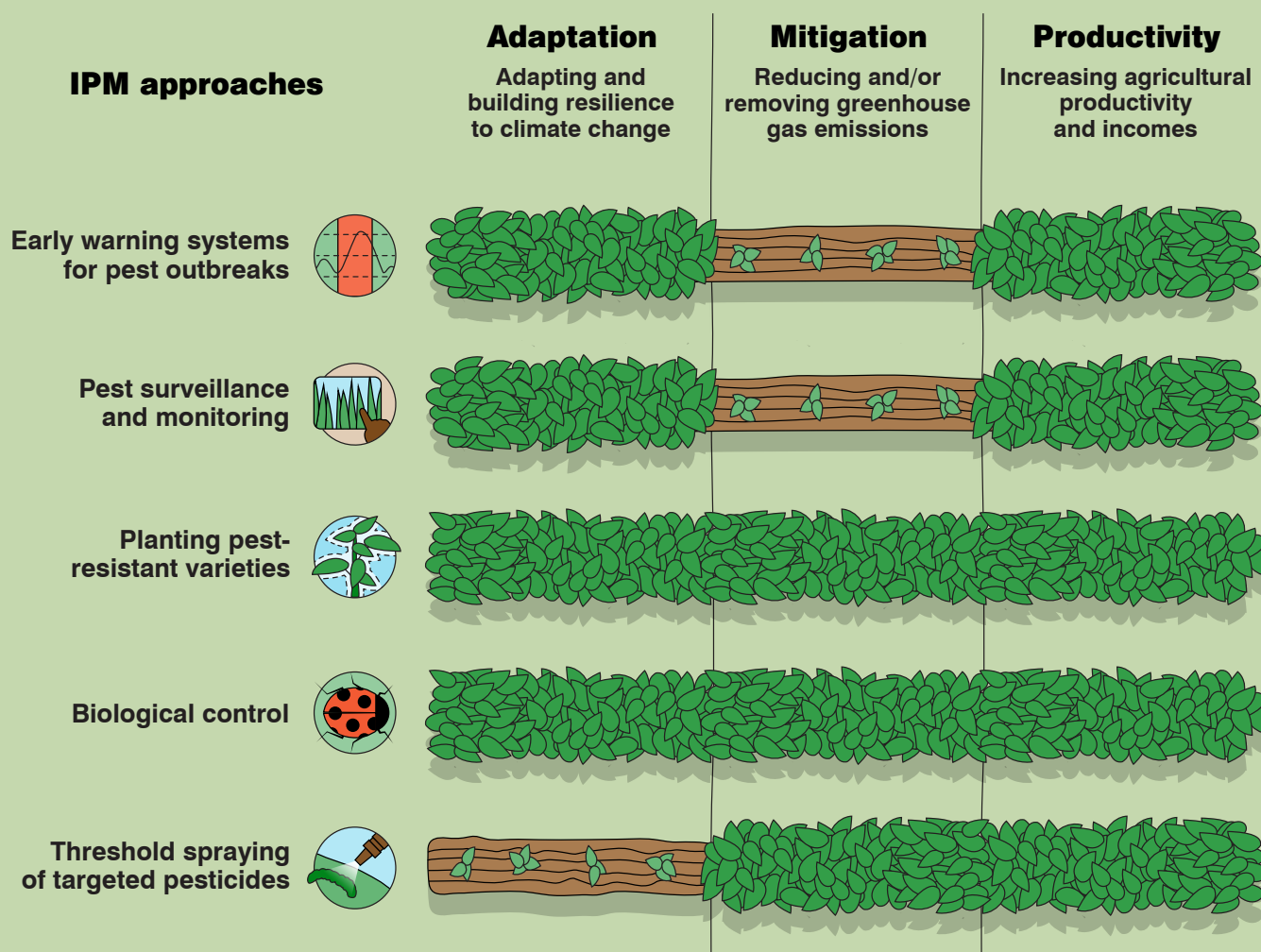
A Plant Health System (PHS) is a network of people, institutions, and resources at both farm and national levels dedicated to promoting, restoring, and maintaining plant health.

A well-functioning PHS improves food quality, quantity, and security and contributes to more resilient, climate-smart, and safer agroecosystems.





Climate-smart pest management addresses the three pillars of climate-smart agriculture (CSA) – **adaptation, mitigation, and productivity** – through a focus on integrated pest management (IPM) strategies.


IPM practices naturally overlap with the pillars of CSA. Practices across both approaches help smallholder farmers build resilience to a changing climate, reducing emissions from chemical-reliant conventional farming practices.



PlantwisePlus contributes to sustainably increasing agricultural productivity and incomes, supporting smallholder farmers in building resilience and adapting to climate change.

  
Clear and direct contribution of IPM to CSA pillars

  
Indirect contributions of IPM to CSA pillars

  
No clear contribution of IPM to CSA pillars



The **PlantwisePlus** vision is to empower women and men smallholder farmers to manage evolving plant health threats, increase their incomes, improve food security and safety, and reduce biodiversity loss by promoting sustainable crop production practices

We gratefully acknowledge the support of our national and international partners, as well as our lead donors, who make the global implementation of PlantwisePlus possible.



## Contact

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