

A woman in a light green short-sleeved shirt is leaning over a table, examining a plant specimen. She is holding a pen and looking at a document. The table is covered with various papers, including a large one with a grid and text, and several smaller brochures or leaflets. A man in a light blue shirt is also leaning over the table, looking at the plant. The background shows other people and a yellow chair, suggesting an outdoor or semi-outdoor event.

CABI and ACIAR Partnership
Annual report to ACIAR
2019

KNOWLEDGE FOR LIFE



**CABI improves
people's lives
worldwide**

by providing
information and
applying scientific
expertise to solve
problems in
agriculture and the
environment

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Supporting ACIAR's strategy – a foreword from CABI's CEO

ACIAR's funding allows CABI's core activities and research and extension programmes to address key issues of importance to both organizations. There is good alignment between ACIAR's strategic objectives and CABI's strategic goals. The summary below highlights how the various CABI activities covered in this report support the delivery of ACIAR's goals.

Improving food security and reducing poverty among smallholder farmers and rural communities

This goal is core to CABI's Mission, and the overall goal of our Medium-Term Strategy (2020 –2022) is focused on delivering "sustainable economic development, improved livelihoods and better nutrition through greater market access for climate-resilient agriculture in healthy ecosystems."

For example, the CABI-led **Plantwise** programme helps smallholder farmers to lose less of what they grow to pests and diseases so that they can feed more people, while CABI's **Action on Invasives** programme specifically tackles the ongoing threat invasive species pose to smallholder farmers.

Managing natural resources and producing food more sustainably, adapting to climate variability and mitigating climate change

CABI is increasingly working to build climate adaptation and mitigation actions into key projects. A CABI Development Fund (CDF) investment has enabled the development of a comprehensive strategy and a position statement on agriculture and climate change. We have also appointed a climate change specialist to lead the implementation of this strategy.

The evolution of Plantwise and Action on Invasives into the **Plantwise+** concept, based on lessons learned from the two programmes, will promote climate-smart approaches to crop production to increase smallholder incomes and supply safe and nutritious food.

Implementation of the Pest Risk Information Service (PRISE), a Plantwise spin-off project funded by the UK Space Agency, in four African countries (Ghana, Kenya, Malawi and Zambia) has also shown good potential for improved preventative pest management of endemic pest threats through the use of predictive models that use long-term climate data as inputs and that are calibrated using real-time weather data.

Enhancing human nutrition and reducing risks to human health

The **Plantwise+** programme will use the power of ICTs to provide advisory services at scale with the intention to predict, prepare for and prevent threats to plant health, agriculture and biodiversity, and to provide climate-smart solutions to farmers which will enable them to deliver increased quality, as well as quantity, of safer and more nutritious food.

Through Plantwise, Action on Invasives and other programmes we have worked to reduce the use of chemical pesticides, and encourage the uptake of biological control measures, reducing the risk of toxic pesticide residues in food.

Improving gender equity and empowerment of women and girls

The global context and the specific priorities of our Member Countries now place much greater emphasis on the pressing need to address aspects of gender equality (Sustainable Development Goal 5). Within our latest Medium-Term Strategy the drive to put smallholder farming onto a stronger business footing is coupled with a recognition that our activities need to do more to recognize and empower the role of women in agriculture, and seeks to engage the younger generations in farming for the future.

We are now identifying and incorporating actions on climate, gender and youth into our activities and plans from the outset on a proactive basis, rather than these being seen as merely beneficial downstream consequences of our project work. To drive CABI's commitment to gender equality, a new Gender Co-ordinator, Bethel Terefe, was recruited in 2019.

Fostering more inclusive agrifood and forestry market chains, engaging the private sector where possible

Using our expertise in value chains and trade, CABI has carried out a large number of projects that have given smallholder farmers better access to commercial value chains. These have included work on a number of agro-forestry crops, such as coffee, cocoa, oil palm and coconuts.

In the Plantwise programme, engagement with the private sector had been trialled in 14 countries (cumulatively) by the end of 2019, with most examples in Asia. Examples include the Syngenta Foundation in India using plant doctor training resources in advisory services; the use of Plantwise Pest Management Decision Guides (PMDGs) and Factsheets for Farmers by Dialog, a phone network provider, for a mobile messaging service in Sri Lanka run through the Govi Mithuru app; and a “Green Control” subsidy programme in the Beijing area that requires agro-input dealers to follow plant doctors’ recommendations to buy integrated pest management (IPM)-compatible products as a criterion for benefiting from subsidies.

Building scientific and policy capability within our partner countries

CABI’s publishing products are important resources for students and researchers in agriculture, the environment and public health, helping them to gain the knowledge they need to become the next generation of agronomists, farmers or environmental scientists. CABI is now evolving the way in which it delivers information so as to provide the practical advice, information and professional development they need as they advance in their careers.

The Plantwise model is built around the train-the-trainer concept, and is augmented by mass extension campaigns to build skills and knowledge in partner countries. We have invested CDF funds to develop the CABI Academy Crop Pest Diagnostics and Management Learning courses to support capacity building activities, using tools and information created under the Plantwise programme.

The courses enable greater access than traditional face-to-face training methods, and they can be used either in a stand-alone way or in conjunction with face-to-face methods to extend the teaching. They are practical courses that support learners to go out into the field and apply their learning. They directly support Plantwise activities. CABI is currently offering free access to the Diagnostics course to all Plantwise plant doctors.

I would like to take this opportunity to thank ACIAR for their continuing support of CABI, and I look forward to working with the ACIAR team to deliver our mutual goals in 2020 and beyond.



Dr Trevor Nicholls, Chief Executive Officer



About CABI

CABI is a unique and innovative not-for-profit international organization governed by 49 Member Countries, of which Australia is one, and operating under a UN-registered international treaty agreement. CABI's work helps to improve crop yields, reduce threats to agriculture from pests and diseases, protect livelihoods, biodiversity and the environment, enables countries to trade commodities, and improve access to agricultural and environmental scientific knowledge.

CABI's governance structure allows all Member Countries to influence its mission and strategic direction through a triennial Review Conference and Regional Consultations covering Africa, Asia and the Americas. Implementation of Review Conference resolutions is governed through an Executive Council, comprising one representative from each country, which meets annually in London. Australia has been a member of CABI and its predecessor organizations since the early 1920s and has played a leading role in CABI's governance since that time. Australia was a key player in leading CABI's transition from a UK Commonwealth Institute to the international organization that it is today, and was a prime mover in drafting the treaty agreement that now guides CABI's governance.

CABI's **strengths** lie in its objective, science-based approach: not only conducting high-quality research, but also translating research into practice through development co-operation projects worldwide, implementing sustainable agricultural approaches and raising the incomes of poor rural farmers. This is reflected in the growing importance of the social and economic sciences in CABI's strategy, and is substantiated through rigorous monitoring and evaluation. CABI plays a unique bridging role in marrying the international development objectives of both high-income and emerging economies, as well as in facilitating the translation of technology research into practical application for farmers.

CABI's Strategic Goals 2017–2019

2019 was the final year of CABI's Medium-Term Strategy for 2017–2019. This focused on contributions to the achievement of the Sustainable Development Goals (SDGs) set out in Figure 1 with gender empowerment and climate change adaptation benefits being seen as cross-cutting outcomes of our work. CABI has been able to deliver the majority of its commitments in the current Medium-Term Strategy, with 91% of the (116) critical milestones either being on track or showing only minor variance.



Figure 1. Aligning CABI's priority actions to the Sustainable Development Goals



In addition, we have delivered:

- a high level of scientific output, with over 140 peer-reviewed papers published
- strong progress on Plantwise's scale-up and sustainability
- strengthened monitoring, evaluation and learning capacity
- funding for Action on Invasives and successful response to fall armyworm (FAW)
- significant new project wins in value chains and trade
- the acquisition and integration of SciDev.Net, the world's leading source of reliable news, views and analysis about science and technology for global development
- CABI's Medium-Term Strategy 2020–2022, summarized in the final section of this report

The CABI ACIAR Partnership Agreement

The ACIAR-CABI Partnership Agreement was developed in 2018 to support the mutual priorities of high-impact, strategic research partnerships, and to provide sustainable solutions to the challenges facing biosecurity. The current ACIAR-CABI Partnership Agreement runs from 2019 to 2023 and establishes a shared vision of ACIAR and CABI working in close co-operation to fulfil their respective missions. The Agreement builds on the existing relationship and joint work to improve agricultural productivity and sustainability and food system resilience in developing countries.

Under this arrangement, ACIAR's contribution to CABI in 2019 was AUD 530,000. The funding is used to cover **CABI Membership** (around AUD 300,000 p.a.), with the balance providing additional support to **CDF** and the **Plantwise** programme.

This report summarises these three components. Separate and more detailed Annual Reports on the CDF and Plantwise are provided to ACIAR.

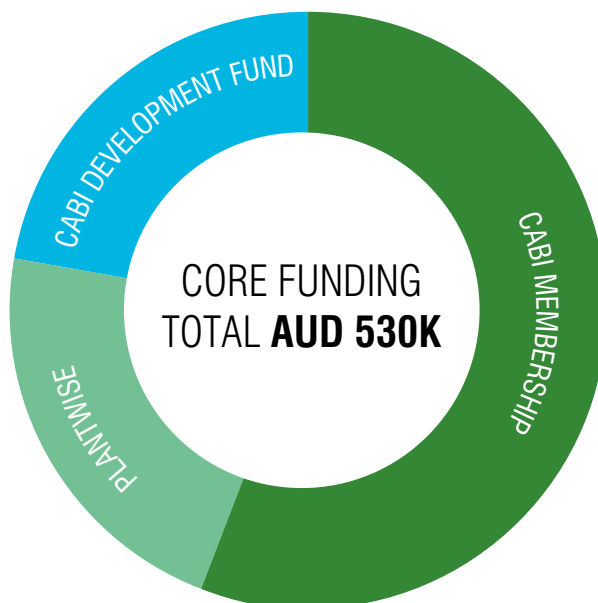


Figure 2: ACIAR's contribution to CABI in 2019

In addition, the following dedicated scientific and development programmes were funded by ACIAR in 2019:

- "Strengthening vegetable value chains in Pakistan for greater community livelihood benefits (2018–2021)", HORT/2016/012, with total life-of-project funding of AUD 2,895,669
- "Plant health – a major challenge to achieving sustainable 'green' agriculture in Myanmar (2019–20)", CROP/2019/103, with funding of AUD 250,000

Brief summaries of each of these programmes are provided here, while additional project reports and factsheets are also provided to ACIAR.



Australia's membership of CABI

Bringing benefits to developing countries and Australia

As a long-term Member Country, Australia plays an important role in influencing CABI's governance, policies and strategic direction, ensuring CABI's activities complement Australia's key strategic objectives.

Through CABI's network, the Australian Government has the opportunity to enhance Australia's international outreach, off-shore intelligence and global links and partnerships. In particular, CABI's membership structure creates a unique network of participating country representatives, usually senior members of national governments, including those of key strategic countries for Australia, such as China, India, Malaysia, Papua New Guinea, the Philippines and Vietnam, as well as some African countries.

CABI membership fees

Core funding from membership fees represents only 4% of CABI's operating costs, with all other costs covered from the financial surplus of the CABI Knowledge Business, which makes CABI unique among international development agencies in that its core overheads are entirely self-funding. Fees are used to fund activities and services that are of direct benefit to its Member Countries. These include the provision of pest and disease identification services, expert consultancy, and access to some of CABI's information products, free of charge to our least developed Member Countries. CABI maintains microbial samples on behalf of its Member Countries, and funds the attendance of Liaison Officers of least developed Member Countries at CABI governance and consultation events. Membership fees also fund monitoring, evaluation and impact studies; project and policy development; proofs of concept; scoping studies and pilot projects; and support to the CDF, to respond to Member Country needs and emergencies not otherwise funded by donors.

Partnerships

Over the years many Australian institutions and agencies have benefited from working closely with CABI and its other Member Countries. For example, CABI's close partnerships with our Member Countries in Africa resulted in the successful implementation of the Australia–Africa Plant Biosecurity Partnership programme, which focused on improving the knowledge and skills of plant biosecurity professionals in 10 African countries. This raised the profile of Australian plant biosecurity expertise across the continent, and established professional links between plant biosecurity professionals in the two regions.

Australia's partnership with other like-minded key players (including CABI and other CABI Member Countries) in CABI-led programme and initiatives, such as Plantwise, the ASEAN Regional Diagnostic Network (ARDN) and the Invasive Species Compendium, aligns closely with Australia's goals to achieve more productive and sustainable agricultural systems, and with ACIAR's six strategic objectives. In the past, CABI identified the biological control agent which helped bring under control the Madagascan Rubber Vine, which was devastating native forests in Australia, and we continue to work in partnership with the Commonwealth Scientific and Industrial Research Organisation (CSIRO), the Department of Agriculture and Fisheries Queensland, the University of Queensland and other government and private agencies on invasive species problems, most recently in providing input to the strategy for managing FAW.

The Invasive Species Compendium, in which ACIAR and Australia benefit from group membership, is available on an open access basis to researchers and practitioners all over the world. The Compendium contains detailed datasheets on over 1,900 invasive species, with referenced text sections, links to related content, images, and distribution maps. The Compendium also contains many basic datasheets on further species, countries, habitats and pathways. 890 invasive species or animal diseases present in Australia are covered by full datasheets.



CABI Development Fund

The CDF is supported by membership fees as well as by additional contributions from several national implementing agencies of CABI Member Countries, including ACIAR and the UK Department for International Development. It is a small but valuable fund which allows CABI to respond rapidly to Member Country needs (eg in response to natural disasters or unforeseen pest problems), develop novel technologies or approaches (Plantwise was originally funded by the CDF) or to provide co-funding where required by major donors. As such, the CDF shows excellent return on investment from the activities it supports. There are also elements of CDF funding that are specifically targeted at cross-cutting issues, such as scientific research and dissemination, and developing and sustaining partnerships: for example, the Association of Independent Research and Development Centres in Agriculture (AIRCA), which includes other ACIAR-funded centres, such as WorldVeg and icipe.

In 2019, the CDF funded some 40 projects or studies, with a total value of £900,000 (around AUD 1.8m) as detailed fully in the separate CDF Annual Report for 2019. This included several invasive species projects which contributed to CABI's **Action on Invasives** programme.

Individual donor funds are not assigned to specific projects. However, some of the work which is of direct relevance to ACIAR's objectives are as follows:



Case study 1: Building scientific and policy capacity in biosecurity

CABI's Pest Risk Analysis (PRA) decision support tool was launched in January 2019 and provides a framework for risk assessors to conduct PRAs which are aligned to the International Standards for Phytosanitary Measures (ISPM), in particular ISPM 2 and ISPM 11. The PRA tool is an additional functionality of the Crop Protection Compendium, which also provides the extensive data used by the tool. CDF funding supported work aimed at improving the efficiency and quality of PRA assessments carried out by National Plant Protection Organizations (NPPOs) in 97 lower-income countries (particularly CABI Member Countries) by providing free access to both the Crop Protection Compendium and the PRA tool, and by encouraging and supporting their use.

In 2019, CABI provided expertise and in-kind support to the Crawford Fund/Australian Plant Biosecurity Science Foundation (APBSF) Regional Master Classes on Biosecurity, held in Salatiga and Kupang, Indonesia. The participants represented diverse public and private sector actors and good progress was made towards achieving the project's objective of creating a new network of biosecurity-aware individuals and organizations within Indonesia.



Case study 2: Development and implementation of agriculture and climate change strategy

Whilst CABI is making a significant contribution to climate resilience, within this context, CDF funding was used strategically in 2019 to position CABI more clearly as a major player in the global arena of climate change adaptation and mitigation – implementing projects and programmes with national stakeholders and partners across multiple countries to support enhanced climate resilience of farming communities and their surrounding landscapes.

A desk-based study provided information, analysis, evidence and options to inform CABI's corporate strategy on agriculture, environment and climate change. The study report stated that 'CABI's future demands that it not only continues doing what it is doing (and doing it well), but to also expand its problem-solving outlook to explicitly address the influence of climate change on plant health, invasive species, soil management, value chains and trade'.

With the help of an external consultant, a workshop was held, which resulted in: i) a greater understanding of the

climate risks of the countries in which programmes are being implemented; ii) recognition that while this is not currently highlighted, CABI is contributing to climate adaptation and mitigation; and iii) identification of new/modified actions that can substantially increase CABI's contribution to climate adaptation and mitigation. Outcomes and recommendations were integrated into the new CABI web page, where 'Climate change and biodiversity' is one of the four major focus areas, as well as the new CABI Medium-Term Strategy 2020–2022, in which climate change is cross-cutting across all the thematic areas.

CABI authors have also published a paper on the concept of climate-smart pest management:

Heeb, L., Jenner, E. and Cock, M.J.W. (2019) "Climate-smart pest management: building resilience of farms and landscapes to changing pest threats", *J Pest Sci* **92**, 951–969. <https://doi.org/10.1007/s10340-019-01083-y>

At the end of 2019, CABI hired a full-time Climate Change Manager, Jonny Casey, to co-ordinate CABI's climate change strategy and activities.



Building on the success of approaches developed for Plantwise, Action on Invasives is a programme led by CABI that addresses the growing problem of invasive species. Invasive species are not a new problem, but climate change, trade and tourism are all exacerbating the situation and the biosecurity of all nations depends on a co-ordinated and effective response at local, national and regional levels.

Invasive species disproportionately affect vulnerable, rural communities and undermine sustainable development. The goal of the Action on Invasives programme is to protect and improve the livelihoods of over 50 million poor rural households impacted by invasive species in Africa and Asia. The purpose is to strengthen system capacity for prevention, eradication, control and management of priority invasives locally, nationally and regionally ("detect, defend and defeat"). The first countries selected were Ghana, Kenya, Pakistan and Zambia, and in 2019 initial steps have been taken to introduce the programme in Bangladesh, Rwanda and Burkina Faso—all countries where Plantwise has already made good progress. The programme has four elements, addressing political, technical and social aspects:

1. Stakeholder engagement

A high-level summit on invasive species was held in Botswana for African Member Countries and partner organizations. It produced recommendations that were subsequently endorsed by the Review Conference, and which are in line with the Action on Invasives strategy. One important element is the need for better estimates of the economic costs of invasives, so a study has commenced to produce an overall estimate for Africa. Action on Invasives is also contributing to the Global Burden of Crop Loss, a CABI-led initiative, funded by the Bill and Melinda Gates Foundation, to develop methods for quantifying crop losses due to invasives and other pests.



As well as highlighting the costs of invasives, Action on Invasives seeks to promote the use of safer pest control methods. Support has been given to finalizing the East African Community guidelines for the registration of biopesticides, and plans are being made to test and support their implementation in Rwanda and Kenya. CABI is assisting the African Union to develop a continental Invasive Species Strategy, and a process for establishing an emergency response fund for invasive pests.

2. Best practice solutions

While the aim of Action on Invasives is to strengthen overall capacity to tackle invasive species, many of the activities are focused on specific priority species, particularly FAW (*Spodoptera frugiperda*), tomato leaf miner (*Tuta absoluta*), and parthenium weed (*Parthenium hysterophorus*). In 2019, some work was also undertaken on mesquite (*Prosopis juliflora*) and papaya mealy bug (*Paracoccus marginatus*), two important invasive species in Africa.

A parasitoid of FAW found to be already present in several countries in Africa, as well as novel biopesticides (virus and pheromones) for FAW, are being investigated as potential cost-effective biocontrols for this pest.

FAW has spread from Africa to Asia and now threatens Australia. On the basis of CABI's work on the pest in Africa, we have been asked by many countries in Asia for assistance in the development of preventative actions and response plans. This work helps to bolster Australia's biosecurity beyond its borders, and we are now working with Australian partners (on a GRDC-funded project led by cesar and including PHA, QDAF, APBSF and CABI) to identify gaps in our knowledge and develop plans for response within the country.

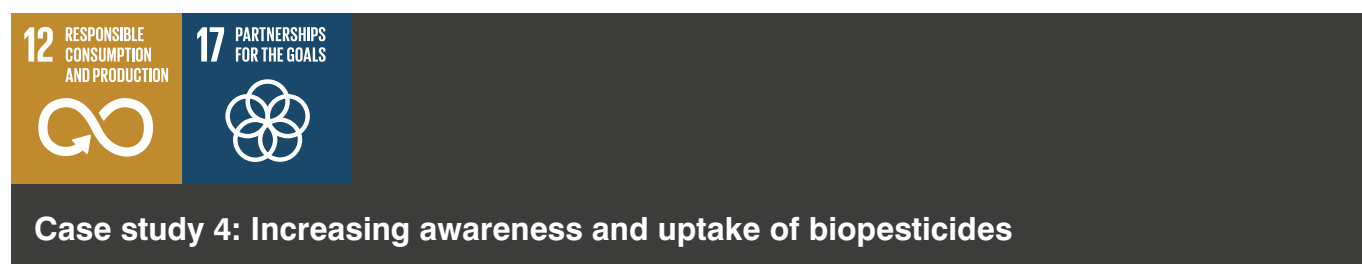
3. Knowledge and data

The Invasive Species Compendium, of which Australia and ACIAR were founder donors, continues to be enhanced and is heavily used worldwide, receiving around 2 million visits in 2019, and latterly over 200,000 a month. Many resources have been added to the Compendium, including those specifically for the FAW, parthenium and tuta portals.

Work has commenced on setting up a FAW Research Collaboration Portal, an online site where scientists can share data and collaborate—particularly on developing and testing control methods.

4. Community action

Several methods for managing invasives are most effective if they are implemented over a wide area. Securing area-wide cooperation when many smallholdings are involved is not straightforward, and studies are in progress to assess what factors can promote such cooperation. Working with international and national communications experts, a document has been produced laying out the elements and issues to be addressed in any communication strategy for a new invasive. Communication campaigns to disseminate advice to farmers on how to manage FAW have been conducted in several countries through different approaches and partners, including radio broadcasts, SMS campaigns and video screenings. In total, over 6 million farmers have received these messages in Zambia, Ghana, Kenya, Pakistan and Bangladesh.



Biocontrol and biopesticide products offer a more environmentally friendly and sustainable method of pest control than chemical alternatives, but smallholder farmers may not be aware of, or have access to, these products. The BioProtection Portal was developed to enhance the uptake of biopesticides by growers and advisers globally, by facilitating the identification, sourcing and application of biopesticide products for particular crop pest problems.

Kenya was selected as a priority country in this regard, based on discussions with biocontrol manufacturers and donors, and CABI secured permission from the regulatory authorities in Kenya to display information on nationally registered products on the portal.

In October 2019, Koppert and Syngenta became the first industry partners of the BioProtection Portal, each agreeing to pay an annual financial contribution based on their annual turnover from biocontrol and biopesticide product sales.

The portal was launched in Kenya in February 2020 as a free-to-use website, accessible on all devices, both online and offline. It will become available in an additional five to 10 countries by the end of the year.



plantw...
Vietnam

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Plantwise

Contributing to food security and poverty reduction worldwide

Plantwise is a global programme, led by CABI, which aims to increase food security and improve rural livelihoods by reducing crop losses. Working in close partnership with relevant actors, Plantwise strengthens national plant health systems from within, enabling countries to provide farmers with the knowledge they need to lose less and feed more. Through Plantwise, CABI is contributing to the achievement of ACIAR’s objectives to improve food security in the developing world, as well as improving “over-the-horizon” plant biosecurity to safeguard Australia’s borders. Plantwise operates in many of the countries that are a focus of the ACIAR strategy, and by helping farmers to lose less of their crop to pests and diseases it has a synergistic impact alongside ACIAR efforts to improve food security through the adoption of new varieties, technology or agronomy.

Continuing growth: In 2019 more than 330 Plantwise trainings were led by partners and/or CABI across all Plantwise countries. The major focus of these were diagnostics, giving good advice and operating e-plant clinics. Women accounted for approximately 28% of the 1,540 people trained, 119 of whom trained as trainers. Local trainers conducted 95% of the trainings. A total of 874 new plant clinics were established in 21 countries in 2019, bringing the cumulative total to over 4,500 since inception of the programme. Of these, about 3,000 were active during the year but the frequency and regularity of operations were variable from country to country and from partner to partner.

National and local partners have taken ownership of the process and are making it an integral part of their agricultural plans, as well as committing over £1m (around AUD2m) of their own funds to support plant clinics and plant doctor training.

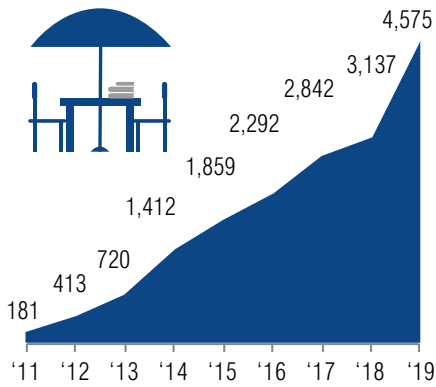
In 2019, via the Plantwise Diagnostic and Advisory Service, five new pests – groundnut ringspot virus (GRSV), tomato chlorotic spot virus (TCSV), FAW, *Pentalonia nigronervosa*, *Thrips parvispinus* and one potential biological control agent (*Microplitis manila*) – were identified in four countries.

Digital devices are being used in 28 of the 30 countries where Plantwise is active, with 650,000 plant clinic records in the Plantwise Online Management System (POMS), plus 80,000 in China’s own systems. This useful resource has been shown to help identify pesticide risks based on recommendations given by extension officers to farmers, and to trigger country regulatory changes to reduce pesticide risk, for example in Pakistan. The Plantwise Knowledge Bank open access content had been accessed by 2.2 million people (cumulative) by the end of 2019, and 22 peer-reviewed papers setting out lessons learned had been published.

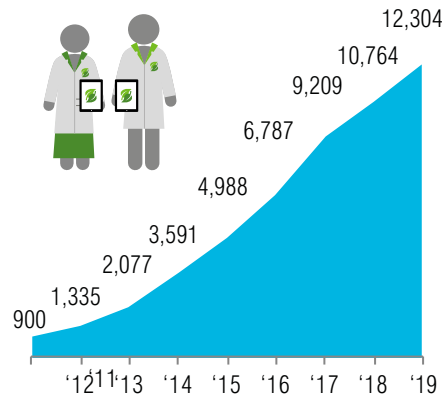


Plantwise continues to scale

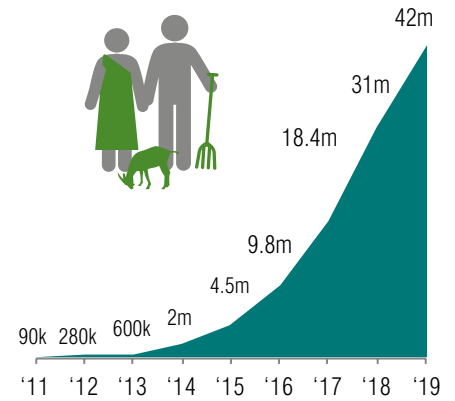
4,500+ plant clinics established



12,000+ plant doctors trained



42 million farmers reached



...and to make a difference

79% 
OF FARMERS REPORT **YIELDS INCREASED**
AFTER USING ADVICE FROM PLANT CLINICS

 **70%**
OF FARMERS REPORT **INCOMES INCREASED**
AFTER USING ADVICE FROM PLANT CLINICS

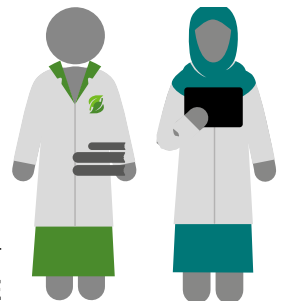
FARMERS REPORTED USE OF
PESTICIDES DECREASED BY

30%



25%

OF PLANTWISE PLANT
DOCTORS ARE **FEMALE**



Gender equity and women's empowerment

In 2019, CABI conducted a gender assessment in five countries (Afghanistan, Bolivia, Ghana, India and Uganda) to understand the measures taken to ensure women's equal participation in, and benefit from, Plantwise, and to understand the challenges faced in this regard. The assessment focused on some of the documented observations that have formed the basis of Plantwise's interventions and endeavours to increase its gender inclusivity.

We found that sociocultural norms restrict women's access to plant clinics, especially when run by a male extension worker, and timing and access could be barriers to attendance, especially for single female heads of household. Seeking agricultural advice is seen as primarily a man's role in many communities, and **communication channels and messages about plant health services are crucial in influencing Plantwise's ability to reach women and men farmers equally. Further, it is necessary to overcome challenges related to literacy, and to increase the affordability of agricultural inputs.**

Various methods to address these barriers have been tested, including:

- establishing women-only plant clinics in communities where the culture is restrictive as regards men mingling with women in public places (in Ghana, Afghanistan and Pakistan)
- training village-based women as lead farmers to support activities aimed at sharing plant health information (in India and Bolivia)
- siting plant clinics and scheduling clinic sessions so as to accommodate the needs of women (in Ghana and Uganda)
- adapting communication methods to deliberately reach women farmers, and training extension agents to be more gender sensitive in their engagement with farmers (in India, Malawi, Uganda)
- initiating collaborations with other stakeholders to support farmers' access to agricultural inputs, including loans (in Ghana, Uganda and Afghanistan)

Next steps

In 2020 a gender assessment will be completed in five Plantwise countries, and this will be followed with in-depth studies in India and Ethiopia to obtain a better understanding of the results of in-country gender adaptations, focusing on using the lessons learned so far to build into CABI's other areas of work. Many of the lessons have been learned from activities tried out under Plantwise in various countries, and hence they point to the need for different approaches to work on gender, with consideration for variations according to country contexts.

Application of these lessons will continue in 2020, with the aim of increasing opportunities for women to access Plantwise products and services. At the same time, since social and gender norms continue to be a challenge for women, CABI will also conduct a study on specific aspects of some of the norms that affect access to and use of plant clinic advice by women, to identify how sustainable positive changes can be realized in order to inform future work under Plantwise or other projects and programmes.

Impact assessments

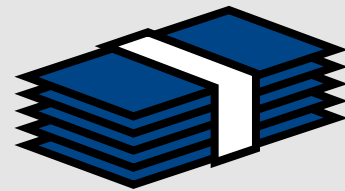
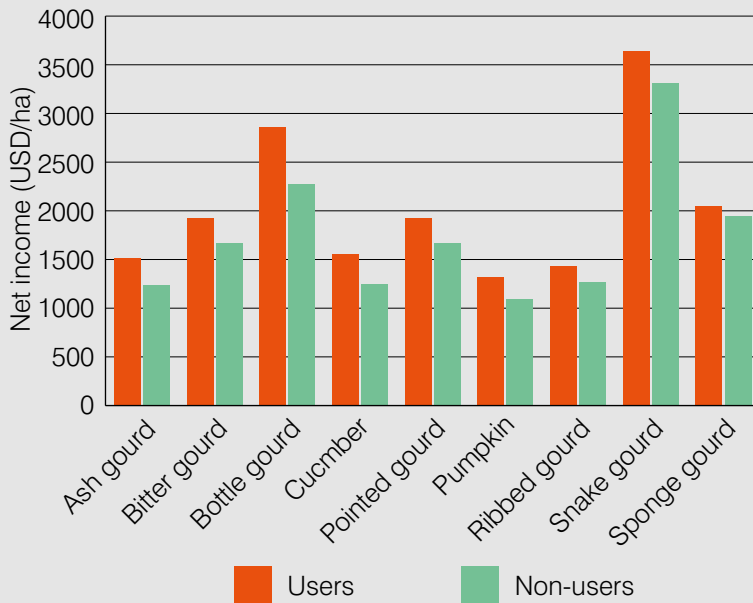
The benefits of Plantwise to overall economic development have now been demonstrated through rigorous assessments, including those in Kenya and Pakistan by the American Institute of Research. Overall, these show that the benefits exceed costs, with the benefit to cost ratio being as high as 3:1 for maize in Kenya, with an internal rate of return exceeding 50%.

Monitoring and evaluation studies conducted by CABI in Rwanda, Malawi, Zambia and Bangladesh (see next page), showed that the value of production of various crops was higher than the cost of adopting Plantwise recommendations, giving higher net benefit for plant clinic users than non-clinic users. According to the findings from studies conducted in six countries (China, Ghana, Kenya, Malawi, Rwanda and Zambia) plant clinic users have higher rates of adoption of crop management technologies than non-clinic users.

A key project carried out in 2019 was a gendered study of the impact of plant clinics in Zambia. Analysis is still ongoing but the preliminary results indicate that men and women farmers both benefit from attending plant clinics, though men benefit more than women. Further analysis will assess whether the gender of the household head, and therefore the decision-making responsibility, affects the results in terms of yield, income and food security indicators. Specific figures in this regard will be published in 2020.

Positive plant clinic impact in Bangladesh

An assessment of plant clinics in Bangladesh on the productivity and profitability of farmers growing cucurbits found that plant clinic users had increased income as well as better knowledge, and further, shared that knowledge with their networks.



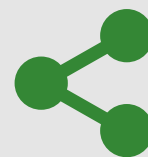
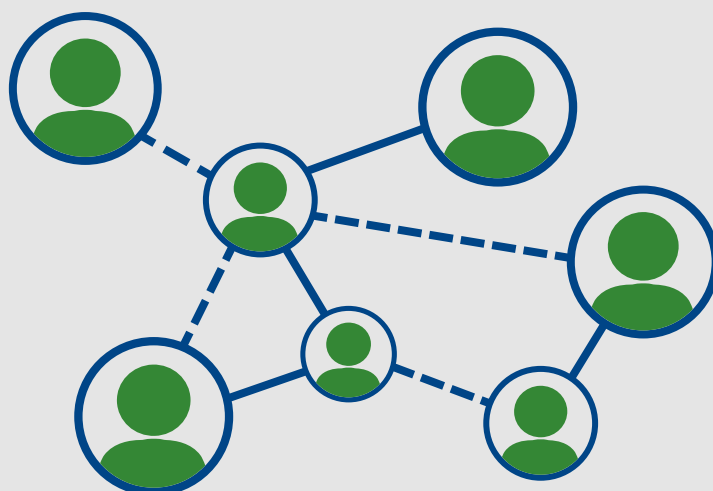
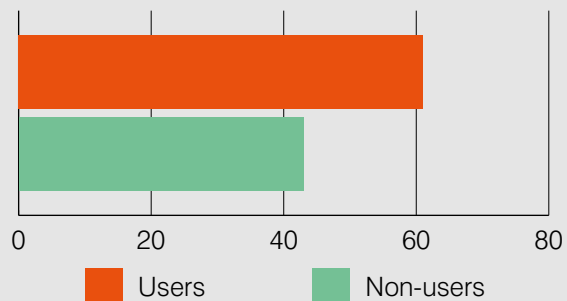
33%

The average income for clinic users was one-third higher than non-clinic users across all crops; amounting to around USD 78.99 each

61%



61% of plant clinic users reported an increase in their problem-solving ability, compared to 43% of non-users.



80%

Around 80% of plant clinic users shared the advice they received with other farmers. With an average of over 4 people informed by each household, a total of 907 persons were informed.



Plantwise+

Evolving Plantwise for climate-smart agriculture and food safety

The impacts of climate change are being felt around the world, and rural communities in developing countries are facing increasingly severe climate impacts like drought, increased soil salinity, and new pest and disease threats. Experience gained through the Plantwise programme has highlighted the urgent need to improve the skills of a wide range of actors who advise farmers on plant health, particularly on diagnostics and safe, effective management practices. In 2020, Plantwise and Action on Invasives will evolve into a single, global programme, with the aim of embedding processes and tools for the sustainable production of safer and more nutritious food as core areas.

This new global programme will build upon the networks and governance mechanisms established by Plantwise, which has used a responsive approach to diagnose and treat any problem in any crop, with a focus on output quantity. **Plantwise+** will use the power of ICTs to provide advisory services at scale, with the **intention being to predict, prepare for and prevent threats to plant health**, agriculture and biodiversity, and to provide climate-smart solutions to farmers which enable them to **deliver increased quality, as well as quantity, of safer and more nutritious food**. In particular, we will use the experience gained through PRISE and other geospatial data projects to leverage the power of technology, especially sensors, drones and satellite imaging, to provide farmers with more granular predictive information on crop health and pest or disease threats.

We envisage that during this new 10-year programme, 20 countries will join us in our ambition to make 50 million women and men farmers more resilient to climate change impacts and more able to access higher-value markets for their produce. As a result, smallholder farmers will have increased incomes and will grow higher-quality, safer and more nutritious food. We will achieve this through the following pathways:

Accelerating uptake of climate-smart practices

- + We will equip agro-advisory services (including agro-input dealers) with gender-equitable information and decision-making tools so they can share knowledge about climate-smart agricultural practices with their farmers.
- + We will enhance the suite of Plantwise digital tools so that the information and learning needed is easily accessible for use in plant health monitoring and management.
- + These digitally-driven solutions will also feed into data-driven quality assurance and market intelligence systems.

Result: Farmers adapt and become resilient to climate change by receiving and applying climate-smart advice from trusted intermediaries.

Increasing the supply of higher-quality, safer and more nutritious food

- + We will make consumers more aware of issues related to hazardous pesticide use in food production, in order to drive demand for higher-quality food.
- + This shift in demand will encourage farmers to apply low-risk practices in order to meet the requirements of new and higher-value markets.
- + To help smallholder farmers produce higher-quality, safer and more nutritious food, we will work with women and young people so they can run small agribusinesses that facilitate access to and use of low-risk products and practices.

Results: Consumers have access to higher-quality, safer and more nutritious food; farmers earn more by responding to market demand for safer produce; and women and youth benefit from value-addition employment opportunities.

Strengthening detection and response to pest outbreaks

- + We will develop processes as part of a systematic approach that allows countries to identify, prioritize and respond to pest threats quickly and effectively. These processes will utilize data on pest risk mapping, pest distribution observations from agro-advisory services, and insights from climate change models.
- + We will also support countries to develop national planning capabilities for responding to crop health threats, such as FAW, before they arrive.

Results: More efficient national pest surveillance and response systems, and reduced losses to crops through improved co-ordination, which improves food and economic security.

Enhancing the availability of safer plant protection products

- + We will work towards improved availability of safer plant protection products so farmers can put them to use.
- + We will work with agro-input dealers to make these products accessible and affordable at the local level.
- + We will also test how small-scale businesses can produce biocontrol and biopesticide products and use them in their communities, assessing how the model and demand for these products can allow for a sustainable financial return.

Result: Women and youth employment opportunities in rural communities; safer plant protection products available, accessible and affordable; and human health and natural resources protected.

As a key Plantwise donor, CABI looks forward to working with ACIAR to further develop this plan.





ACIAR-funded projects

Strengthening vegetable value chains in Pakistan (HORT/2016/012)

Now in its second year, this project works to develop inclusive value chains that empower women and youth by enhancing opportunities for rural enterprise.

In Pakistan, producing vegetables and marketing them is an important component of rural industry, and for those living in poverty it provides opportunities for improving their economic wellbeing and nutritional status. In this project, ACIAR and CABI have partnered to strengthen the value chains of four vegetable crops in Pakistan using a community-based approach to improve the livelihoods of smallholder farmers, particularly women and youth, in Punjab and Sindh. Due to lack of access to inputs and opportunities, these farmers are forced to sell their produce in local markets at low prices. In order to improve their livelihoods, they need to produce and sell more, and having access to improved production technology and better markets will help.

Specifically, the project objectives are to:

- identify opportunities for increasing community engagement and developing rural entrepreneurship
- establish sustainable production and marketing opportunities for small-scale vegetable farmers and traders
- test and develop technical innovations for selected vegetables value chains
- expand improvements in vegetable value chains, and sustain and maximize any community benefits

The project team comprises subject specialists and experts from all areas of the value chains (social science, production, post-harvest handling, value-added product development, marketing and capacity building). At this point in time we have successfully established nine subcontracts with in-country and international partners, who are helping to implement the project, and we have finalized contracts with seven Australian consultants. The project team has been established and all partners have begun participating in project activities. A first step involved all project partners taking part in a 'walk-the-chain' activity (a walk-through experience from start to finish) at project field sites, which allowed them to fully understand how the products flow through the supply chain. A baseline report was then produced and a comprehensive workplan has now been developed setting out how the experts will test and make recommendations to farmers on the techniques and technologies they should implement.

Further details about this project can be found in the CABI ACIAR Factsheet.



Impact story

Women's empowerment and development of leadership skills

The village of Loung Khan Soomro is a typical remote village in Khairpur district in Sindh Province, Pakistan, and women there have a similar status to women in other parts of Sindh Province: they live in poverty and they have limited resources and skills, which means they face daily challenges in providing for their families and generating income.

The “Strengthening vegetable value chains in Pakistan” project worked with the Value-addition team from Sindh Agriculture University to provide training to a selected group of women from the village on developing skills and value-added products.

Azeema, a 46-year-old woman who lives in the village, was selected to take part in the training, and also participated in leadership training. With these new skills, she was able to help other women produce their own value-added products, such as chutneys and pickles, in their own homes.

Gender restrictions mean that women are discouraged from selling and marketing produce in local towns. This newly formed group therefore faced the problem of how to market their products. Azeema came up with an ingenious idea: she identified the most suitable males in her close and extended family and motivated them to visit various local markets to sell her products. Thanks to her perseverance and encouragement, orders were generated from different retailers, and, most recently, these male relatives have approached Ranipur and Khairpur markets, and have succeeded in getting sufficient supply orders to agree a payment order from retailers. Further orders are now expected. The result is that there have been positive changes to the lives of Azeema, her group and their families.



Value addition enterprise in the village of Loung Khan Soomro, Sindh province. ©CABI 2020

Plant health – a major challenge to achieving sustainable “green” agriculture in Myanmar (CROP/2019/103)

Agriculture in Myanmar is experiencing changes. The sector aims to ensure food and nutritional security, enhance rural development and increase the country's foreign exchange through exports. Rice remains the predominant commodity for domestic food security and export income for Myanmar, and the country has the potential to once again become a major, global rice supplier.

However, in Myanmar, rice intensification is increasingly being challenged by devastating pre-harvest crop losses from insect pests, with insecticide misuse being one of the major causes of this problem. Moreover, the problems related to pesticide misuse, including the fragmentation of existing knowledge on pesticides and the illegal cross-border trade in pesticides, are leading to human health and environmental concerns.

Funding by ACIAR has enabled CABI to commence this small research project, as a major step to support “green” agriculture for rice and vegetables in Myanmar. Working in line with the Myanmar–ACIAR collaborative strategy 2017–2027, this project is reviewing pest management practices used by farmers and the use of pesticides on key food crops. The project aims to benchmark farmers' current pest management practices and pesticide use and misuse in food crops, using rice and vegetables as examples, in major production regions. Practical recommendations and actions to address current and potential future problems will also be outlined.





Monitoring, evaluation and learning

Core funding from Member Country fees is allocated to support monitoring, evaluation and learning (MEL). A dedicated MEL team works closely with the broader “virtual” team of social scientists across CABI and contributes to evaluation research that remains focused on the major global programmes but also expands to other areas of work. The team use a range of qualitative and quantitative approaches to test assumptions, learn lessons and assess impact. We carried out 20 impact studies in 2017–2019, of which seven were completed in 2019.

In addition, we carried out a further nine studies that fulfil our study selection criteria, as set out in the MEL strategy. We also published nine papers (journal articles, working papers, study briefs) with an impact focus, and a further 19 papers within the social science field.

Key findings from studies completed/reported in 2019

- **Plantwise – Kenya impact assessment:** This showed that plant doctors’ knowledge increased as a result of training and running clinics; farmers in areas where clinics are run were more likely to monitor crops for pests and use pesticides more effectively, although they were less likely to use safety measures; farmers in areas where clinics are run had significantly higher yields, while costs of production did not change significantly. The benefits to farmers from increased maize production were more than twice the Plantwise investment (including CABI co-ordination costs and country in-kind contributions). The benefit to cost ratio was 2.9:1, and the internal rate of return was 54%.
- **Plantwise – Pakistan impact evaluation:** A 9% increase in net income was seen for farmers of all crops who used plant clinics and who reported their crops having plant health issues, a benefit to cost ratio of 1.19:1 and an internal rate of return of 28% (it is unusual to find a positive benefit to cost ratio or positive internal rate of return for any extension programmes).
- **Plantwise – Bangladesh on-farm impact study:** The study showed that plant clinic users were 90% more likely to use non-chemical pest control practices than non-users; and average income for clinic users was about USD 78.99 (33%) higher than for non-users.
- **Plantwise - Rwanda on-farm impact study:** This showed that participation in plant clinics resulted in significant yield and net income gains of 24% and 30%, respectively. In addition, seeking plant health advice from plant clinics was significantly associated with a 5% reduction in the likelihood of a household falling into poverty.
- **Bio-economic modelling study of FAW control measures:** The model indicates that the co-ordinated control measures taken in Ghana to control FAW reduced the economic loss from an estimated mid-range of USD25m to USD10m, a difference of approximately USD15m over one year.
- **Key findings from Better Cotton Initiative-Pakistan impact study:** The study found that farmers were more likely to use registered and properly labelled pesticides, to reduce the frequency of pesticide application, and to adopt a range of safety measures; women workers perceived that their own and their families’ health had improved as a result of safer pesticide use, and this enabled them to pick larger volumes of cotton and so increase their income; women workers were also aware of the benefits of forming groups for collective action and to obtain greater bargaining power.
- **Impact study on IPM in rice and maize in the Greater Mekong subregion:** This found that during the project there were significant reductions in chemical pesticide use among target rice farmers, as a result of the adoption of alternative IPM practices. The amount spent on pesticides dropped by around 37%, and the number of times crops were sprayed almost halved. The study found that farmers were willing to pay for the biocontrol agent, but not at commercial prices. Commercial markets do not exist for widespread adoption of biocontrol agents in many Greater Mekong subregion areas, therefore, post-project, the number of biocontrol rearing facilities had dropped from 20 to 11 due to a shortage of funds, as they were not commercially viable.
- **Evaluation of mass extension campaigns on FAW in Uganda:** The evaluation found consistent evidence that participation in ICT-based extension campaigns significantly increased farmers’ knowledge and stimulated the adoption of agricultural technologies and practices. The results suggested that among the three ICT channels, radio had greater reach, and greater gains were achieved when video was complemented by radio. This implies that complementary ICT-based extension campaigns (particularly those that allow both verbal and visual communication) offer great potential to improve farmers’ knowledge and trigger behavioural changes in the identification, monitoring and sustainable management of pests.



CABI's Medium-Term Strategy 2020–2022

The drive to put smallholder farming onto a stronger business footing is coupled with a recognition by governments, industry and the international development community that this must happen in a way that is sustainable and climate-resilient, does more to recognize and empower the role of women in agriculture, and seeks to engage the younger generations in farming for the future.

Our Medium-Term Strategy 2020–2022 has been developed to respond to these needs and we now place much greater emphasis on the pressing need to address aspects of SDG 5 (Gender Equality) and SDG 13 (Climate Action). The strategy specifically identifies goals, objectives and activities that will have an impact on gender, youth and climate change. It continues to leverage CABI's core skills and competencies in building and strengthening sustainable, climate-resilient value chains for food, fodder, fuel and fibre, thereby contributing to national economic growth and food security, as well as providing meaningful employment and involvement for women, youth and marginalized groups.

Our key strategic objectives for the period of the Medium-Term Strategy 2020–2022 are as follows:

- **To improve market access for smallholder farmers to sustainable value chains:** We aim to deliver a world where smallholders, family farmers and other value chain actors sustainably produce high-quality agricultural products, access markets and improve their livelihoods as they contribute to meeting the increasing global demand for the safe, nutritious quality food that is required by consumers.
- **To build capacity for the delivery of climate-resilient food and nutrition security:** We aim to deliver a world where climate change adaptation strategies at farm and landscape levels increase the output of safe and nutritious food, as well as improving the climate resilience of individual farmers and the agricultural economies in which they operate, balancing the utilization of ecosystem services and biodiversity with the requirements of conservation for long-term sustainability.
- **To help women and young people gain new opportunities from access to targeted, context-specific agricultural information and technology:** We aim to deliver a world where women, youth and marginalized communities are included in agriculture, thereby ensuring equity, increasing participation in agribusiness and reducing youth unemployment – promoting livelihood improvement, increasing production and reducing poverty.
- **To promote the balanced use and conservation of biodiversity and ecosystems:** We aim to deliver a world where the utilization of biodiversity and ecosystem services to increase agricultural output is balanced with the needs of conservation and the protection of pristine environments.

CABI's strategic goals will be delivered through six thematic areas, as follows:

1. Value Chains and Trade
2. Crop Health
3. Development, Communication and Extension
4. Invasive Species Management
5. Digital Development
6. Science Publishing and Journalism

CABI's Medium-Term Strategy 2020-2022: Theory of change



IMPACT

Sustainable economic development, improved livelihoods and better nutrition through greater market access for climate-resilient agriculture in healthy ecosystems

STRATEGIC GOALS

Improve access for smallholder farmers to sustainable value chains

Build the capacity for climate-resilient food and nutrition security

Help women and young people gain new opportunities in agriculture

Promote balanced use and conservation of biodiversity and ecosystems

DELIVERING IMPACT AT SCALE



KEY PROGRAMMES



CORE STRENGTHS

Bridging the needs of developed and developing country partners

Objective, science-based approach to putting research into use

Knowledge management, communication and dissemination

Deep scientific knowledge of plant pests and diseases

Working in partnership with a broad international network

Delivering value for money to donors and partners



Contact CABI

Africa

Ghana

CABI, CSIR Campus
No. 6 Agostino Neto Road
Airport Residential Area
P. O. Box CT 8630, Cantonments
Accra, Ghana
T: +233 (0)302 797 202
E: westafrica@cabi.org

Kenya

CABI, Canary Bird
673 Limuru Road, Muthaiga
PO Box 633-00621
Nairobi, Kenya
T: +254 (0)20 2271000/20
E: africa@cabi.org

Zambia

CABI, 5834 Mwange Close
Kalundu
PO Box 37589
Lusaka, Zambia
E: southernafrica@cabi.org

Americas

Brazil

CABI, UNESP-Fazenda Experimental
Lageado, FEPAF (Escritorio da CABI)
Rua Dr. Jose Barbosa de Barros 1780
Fazenda Experimental Lageado
CEP:18.610-307
Botucatu, San Paulo, Brazil
T: +5514-38826300
E: y.colmenarez@cabi.org

Trinidad & Tobago

CABI, Gordon Street, Curepe
Trinidad and Tobago
T: +1 868 6457628
E: caribbeanLA@cabi.org

USA

CABI, 745 Atlantic Avenue
8th Floor, Boston,
MA 02111, USA
T: +1 (617) 682-9015
E: cabi-nao@cabi.org

Asia

China

CABI, Beijing Representative Office
Internal Post Box 85
Chinese Academy of Agricultural Sciences
12 Zhongguancun Nandajie
Beijing 100081, China
T: +86 (0)10 82105692
E: china@cabi.org

India

CABI, 2nd Floor, CG Block,
NASC Complex, DP Shastri Marg
Opp. Todapur Village, PUSA
New Delhi – 110012, India
T: +91 (0)11 25841906
E: cabi-india@cabi.org

Malaysia

CABI, PO Box 210,
43400 UPM Serdang
Selangor, Malaysia
T: +60 (0)3 89432921
E: cabisea@cabi.org

Pakistan

CABI, Opposite 1-A,
Data Gunj Baksh Road
Satellite Town, PO Box 8
Rawalpindi-Pakistan
T: +92 (0)51 9290132
E: sasia@cabi.org

Europe

Switzerland

CABI, Rue des Grillons 1
CH-2800 Delémont, Switzerland
T: +41 (0)32 4214870
E: europe-CH@cabi.org

UK

CABI, Nosworthy Way
Wallingford, Oxfordshire, OX10 8DE, UK
T: +44 (0)1491 832111
E: corporate@cabi.org

CABI, Bakeham Lane
Egham, Surrey, TW20 9TY, UK
T: +44 (0)1491 829080
E: microbiologicalservices@cabi.org
E: cabieurope-uk@cabi.org