IFAD
Investing in rural people

Scaling up biological control of the diamondback moth on crucifers in East Africa to other African regions

GRANT RESULTS SHEET

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The **goal** was to **increase the income** of rural smallholder vegetable producers through the **improved safety and quality of vegetables**

Goals and objectives

The goal of the project was to increase the income of rural smallholder vegetable producers through the improved safety and quality of vegetables in the supply chain for domestic markets.

Based on the successful experience of the International Centre of Insect Physiology and Ecology (ICIPE) in promoting biological control of the diamondback moth (DBM) in crucifer-based production systems with smallholder farmers in East and Central Africa, the project aimed to scale up these integrated pest management (IPM) technologies to four new countries (Malawi, Mozambique, Rwanda and Zambia).

The objectives of the project were to:

- promote biocontrol-based IPM of crucifer pests in Southern and Central Africa (Malawi, Mozambique, Rwanda and Zambia);
- assess the impact of *Cotesia vestalis* in East Africa through a pilot study in Kenya.

Beneficiaries

The main beneficiaries were smallholder vegetable farmers, mainly women and young farmers, and rural as well as urban consumers in Mozambique, Malawi and Zambia.

Other beneficiaries in all project countries were researchers from national agricultural research and extension systems (NARES), who were trained in establishing biocontrol rearing, release and monitoring projects.

The project also targeted policymakers in the ministries of agriculture, as well as the general public, with the aim of increasing understanding of the importance of biological control in food safety.

Facts at a glance

Grant implementing agency

International Centre of Insect Physiology and Ecology (ICIPE)

Theme

Natural resources; improved agricultural technologies and effective production services; and technical and vocational training

Benefiting countries

Kenya, Malawi, Mozambique, Rwanda and Zambia

Total programme cost

US$1,449,975

IFAD contribution: US$1,405,153

Cofinancing (other donors): US$449,975

Effectiveness and duration

August 2012 to September 2016

Linkages to IFAD investment projects

Mozambique: PRONEA-PSP (National Programme of Extension [PRONEA] Support Programme)

Main results

With the mass release of DBM parasitoids, through new introductions (*Diadegma semiclausum*) or through boosting the population of naturally present species (*Cotesia vestalis*), there was a need to ensure that farmers reduced or stopped the application of broad-spectrum insecticides that affect not only crucifer pests (DBM or aphids) but also beneficial parasitoids. Hence the project trained extension agents in the use of IPM, and the extension agents subsequently trained farmers, mainly through farmer field schools (FFSs) or through the extension system approach used in the country.

Whenever pesticides were needed, only specific environmentally friendly and biological control-friendly ones were recommended within the IPM programme. For instance, Mozambique has shown a lot of progress in IPM activities by cooperating with the Eduardo Mondlane University in testing and recommending a series of safe pesticides and biopesticides.

To make these pesticides available to farmers, meetings and discussions with the private sector were conducted to ensure their availablity in the proper package size and at prices that were adapted to the socioeconomic needs of smallholder farmers, something which was not part of the project activities.

The national project team also worked closely with the Food and Agriculture Organization of the United Nations programme on obsolete pesticides in Mozambique; this programme partners with the government and the private sector to promote the safe use and disposal of pesticides. Mozambique has also initiated the testing of new IPM innovations, including the use of AgroNet, which is being promoted as a solution to DBM infestation of cabbage.

Recently, a proposal was developed in collaboration with the United States Agency for International Development to increase farmers' access to this technology. The lessons learned from Mozambique were shared with the other countries in regional meetings.

Lessons learned

Complexity of production constraints: smallholder farmers are faced with a complex of abiotic and biotic constraints. Therefore, integrated crop management is important for the success of IPM, and the incorporation of agronomic practices into IPM is critical. The role of habitat management in the control of agricultural pests is also important. The adoption of vegetable systems and pest complex-based IPM packages is important when dealing with pest complexes. Raising farmers' awareness of the available IPM technologies is also an important component in making IPM a success.

Misuse of pesticides: it was evident that both vegetable growers and extension officers supporting them had limited knowledge of the health hazards that can be caused by misuse of pesticides and the availability of IPM technologies and tools. Hence there is a need to increase awareness among all stakeholders in the vegetable value chain of the negative impacts of pesticide misuse and of the availability of IPM technologies. Further training on appropriate use of pesticides needs to be scaled up to smallholders.

Farmers' perception: farmers' perception of IPM options as expensive and slow acting influences its adoption. Farmers' business schools should be used to publicize the advantages of IPM strategies. Promotion of biocontrol agents that are cost-effective can encourage the adoption of IPM options. Raising farmers' awareness of how IPM works is also important. Strategies for developing and nurturing partnerships with farmers from the inception to the conclusion of a project are needed. Strengthening the flow of information from pilot sites to other regions is also important.

Collaboration between private sector, extension and research (and policymakers): scalability of IPM technologies can be achieved only through effective collaboration between researchers (to enable constant upgrading of the technology), the private/public sector (to increase the availability of IPM tools) and extension agencies both governmental and non-governmental (to ensure extensive outreach).

Time required to effectively establish and run FFSs: FFSs and farmer-to-farmer communications have always been found to be effective in disseminating improved agricultural technologies. However, establishing effective FFSs and sustaining activities in FFSs requires concerted efforts over a period of time. The effectiveness of FFSs can be ensured only if they are established in accessible and needy locations, with appropriate linkages to extension agencies and research for development agencies, and led by lead farmers in the region.

Need to build capacity among NARES partners: during the project implementation, it was observed that NARES partners varied significantly in their ability to implement activities. In this regard, beyond the scope of this project's activities, emphasis should be given to building capacity among NARES partners and institutions for the effective implementation of project activities. The need for such capacity-building efforts must also be highlighted to policymakers in the target countries.

Mr Alberto Nhampasse is a member of the association Massacre de Mbuzine, in the municipal district of Kamavota, an important green belt area of Maputo City in Mozambique. He was facing several problems in the production of cabbage and kale, specifically in controlling DBM infestation. The pesticides he used were not working because the pest had developed resistance; he was obliged to spray the same crop more than five times in a given season. The pesticides used were highly toxic, his own health and that of consumers at risk. Moreover, the hazardous pesticides negatively affected the population of natural enemies. In 2012, Mr Alberto was one of the beneficiaries of the pilot project on scaling up biological control of DBM.

Vegetable growers and extension officers had limited knowledge of the health hazards that can be caused by **misuse of pesticides** and of the **availability of IPM technologies**

In the farmers' association of which Mr Alberto is a member, a series of sensitization meetings were conducted to raise awareness of best practices for IPM in brassica production systems.

At the same time, several releases of a natural enemy, *Cotesia vestalis*, were made to boost the population; *Cotesia vestalis* occurs naturally in very small numbers in the area because of the negative effects of the broad-spectrum pesticides applied over the years. Mr Alberto recognizes that the sensitization meetings at the association and the artificial releases helped to maintain the population of the natural enemy, enabling it to do its work of regulating the population of DBM. In his own field, two releases were made, and he also received a package including an alternative biocontrol-compatible pesticide, *Bacillus thuringiensis* (*Bt*). Mr Alberto acted as an example to other farmers in the association; immediately after the releases, he mobilized members in the surrounding crop fields to stop using broad-spectrum pesticides and encouraged the use of *Bt*. Appreciating the positive results following the releases of *Cotesia vestalis* and the use of *Bt*, he and his friends adopted the use of alternative pesticides to manage DBM and conserve its natural enemies. The number of applications has been reduced and the farmers' brassica products (e.g. cabbage and kale) have the market quality desired by consumers.

Way forward

The adoption of vegetable systems and the pest complex approach in the development, implementation and dissemination of IPM packages is important, since farmers are faced with a diversity of key pest complexes in various vegetables, such as aphids (on cabbage), thrips and Iris yellow spot virus (on onion), *Tuta absoluta* (on tomato and other solanaceous vegetables) and whiteflies (on French beans and tomato). Robust extension systems and public–private partnerships are required for the successful dissemination and adoption of IPM options by farmers; participatory technology transfer at farm level is required, for example the use of FFSs, mother-and-baby trials and farmers' business schools facilitated by public or private pest extension workers. The use of incentives to encourage the adoption of IPM, for example linking to markets for farm inputs and products, is important for the dissemination of IPM options. Food and environmental safety are the key drivers of IPM, and consumer education on food safety is required. Scaling up of knowledge management products beyond pilot sites is also critical.

Knowledge generated

To share the lessons learned with a wider audience and achieve greater visibility for the project, as well as for use in advocacy and influencing policymakers, two videos (one for Mozambique and one for Zambia) were developed. Key results of the project activities were also presented at scientific conferences and in meetings with varied audiences.

To support efforts to scale up, four posters (two for Mozambique; one for Zambia, translated into Bemba, Nyanja and Tonga; and one for Malawi, translated into Chichewa), five brochures (two for Mozambique; one for Zambia, translated into Bemba; and two for Malawi) and three mass media clips were produced as knowledge management products.

A training of trainers manual and IPM training manuals for extension workers and lead farmers were developed in Mozambique and Malawi, respectively. The knowledge management products in local languages facilitated the adoption of IPM technologies for crucifers by diverse groups of farmers in Malawi, Zambia and Mozambique.

All the knowledge management products are available at www.icipe.org.

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