Farmers in Africa should switch to biopesticides

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The fungus Beauveria bassiana can protect cabbage against the diamondback moth

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Biopesticides are better and safer than chemical pesticides — policymakers must do more to promote them, says insect ecologist *Manuele Tamò.*

Agriculture is, and will remain for years to come, the main driver of economic development in Africa. Vegetables such as cowpea in West Africa and the common bean in East Africa are an important source of cash and nutrition.

Vegetable and horticultural crops will soon become more important due to increasing urbanisation. But they are plagued by insect pests and diseases that can reduce yields by up to 80 per cent.

Farmers often resort to using chemical pesticide sprays to mitigate the problem. But pesticides are usually applied without taking basic safety precautions such as protecting oneself against the spray mist, or using the correct dosage and intervals between applications.

The problem is compounded by aggressive selling strategies, where retailers target barely literate growers to market toxic pesticides of dubious quality that are sometimes inappropriate — for example destined for use on cotton, not vegetables.

As a result pesticides can pose risks to the health of consumers, the environment, and producers. They include acute and chronic side effects including the development of skin and neurological disorders. And indiscriminate use of broad-spectrum insecticides can wipe out pests' natural enemies.

Most growers ignore the natural ways in which pests and disease can be managed. Yet biopesticides — derived from plants as well as microorganisms such as viruses and fungi — have virtually no adverse impact on environmental and human health.

Biopesticide benefits

If prepared and used correctly, biopesticides can be as effective as conventional pesticides. But their killing action is a few days slower, and for farmers accustomed to seeing dead insects an

hour after a chemical pesticide has been applied, this can be a critical concern that needs careful explanation.

Training programmes in using biopesticides often provide plots where farmers can compare chemical against biopesticide treatment — an essential tool for education about the effectiveness of biopesticides.

At the end of the cropping season biopesticides protect crops well, providing the same yield as chemical treatments. This has been shown by on-farm trials using the fungus *Beauveria bassiana* against the diamondback moth *Plutella xylostella,* a serious cabbage pest.

And the issue of 'slow kill' has now lost some significance because some of the most important agricultural pests have developed resistance to chemical pesticides.

Insects have developed detoxification mechanisms as a result of farmers' overreliance on the same chemical substance. This is particularly well-documented for the diamondback moth; it is now resistant to almost all commercial insecticides.

By contrast, resistance is not a problem with bio-pesticides and there are no signs of it so far. There are two good reasons for this.

First, if living organisms are deployed as biopesticides against pests, the insect-specific fungus or virus can co-evolve to counterattack if the target organism begins to develop resistance.

Second, the plant extracts used in biopesticides contain several different active substances, which are much more difficult for insects to develop resistance to than the one or two active molecules present in most chemical pesticides.

The development of insect resistance to chemical pesticides has been extensively reported, so that even farmers with low literacy are becoming aware that it is better to use a slow killing biopesticide than a chemical insecticide.

Local production

Bio-pesticides can be produced locally with cheap materials and simple equipment, and can generate additional household income by engaging women groups or unemployed youth.

Recent examples of the production of a baculovirus to attack the cotton bollworm in India clearly demonstrate the feasibility of this approach.

Community-based production of this virus was initially funded by a grant from the UK's Department for International Development. But it has continued beyond the end of the project, prompting nongovernmental organisations (NGOs), the private sector and even the government to set up production units.

In another example from Benin in West Africa, the international NGO SENS is encouraging community-owned enterprises to help farmers co-invest in producing biopesticides.

One of these start-up enterprises, Phileol-HVC is already marketing a mixture of neem oil and essential oils branded BioPhyto. Designed for spraying horticultural crops, it costs a fraction of the price of synthetic pesticide, yet still provides the desired pest control and environmental benefits.

Scaling up

So why aren't more farmers using bio-pesticides in Africa?

In West Africa, the main reason is the lack of 'off the shelf' availability. Some farmers may know the advantages of using botanical extracts, such as the absence of hazardous side-effects, but are reluctant to invest extra time and labour to produce them by themselves during the peak cropping season.

This is particularly true for male farmers. So engaging women groups or unemployed youth in producing biopesticides, as well as making them affordable and of good quality, helps promote their use.

Research institutions and NGOs need to develop appropriate training materials to support the use, production, and quality control of biopesticides. Because there is no lab accreditation for quality control of biopesticides in Africa, it is currently done by producers in Africa — and they need appropriate training materials.

Similarly, vendors, consumers and policymakers need to be made aware of the higher quality and safety of products treated with bio-pesticides.