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sharing knowledge, improving rural livelihoods

Rural Radio Resource Pack

08/02

INTEGRATED PEST MANAGEMENT



CTA is funded by the
European Union

The Technical Centre for Agricultural and Rural Cooperation (CTA) was established in 1983 under the Lomé Convention between the ACP (African, Caribbean and Pacific) Group of States and the European Union Member States. Since 2000, it has operated within the framework of the ACP-EC Cotonou Agreement.

CTA's tasks are to develop and provide services that improve access to information for agricultural and rural development, and to strengthen the capacity of ACP countries to produce, acquire, exchange and utilise information in this area.

Rural radio

Radio remains, despite all the interest in the new ICTs, one of the most important communication tools in ACP rural communities. CTA began supporting rural radio back in 1991. Every year since then we've produced a set of Rural Radio Resource Packs (RRRPs).

Each pack is on a specific topic – anything from crop storage and cassava to small ruminants and soil fertility. The choice of topics depends on what ACP partners suggest. The number of topics covered has now reached 51. Inside each pack are materials for a radio programme on that topic – interviews on cassette or CD, a transcription and a suggested introduction for each interview, technical information on the topic, advice for how the pack can be used and a questionnaire for users to provide feedback to CTA.

You can find most of the RRRP material on CTA's Rural Radio website
<http://ruralradio.cta.int/>.

CTA
Postbus 380
6700 AJ Wageningen
The Netherlands

Website: www.cta.int

This CD can be played in an audio CD player, and also contains pdf files of the written documents and the feedback questionnaire.



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CTA Technical Centre for Agricultural and Rural Co-operation
Postal Address: Postbus 380, 6700 A J Wageningen,
The Netherlands
Telephone (31) (0) 317 467100 Fax (31) (0) 317 460067
<http://www.cta.int>

Produced for CTA by
WREN*media*, Fressingfield, Eye, Suffolk, IP21 5SA
Telephone (44) (0) 1379 586787 Fax (44) (0) (1379 586755)
<http://www.wrenmedia.co.uk>

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Integrated Pest Management

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Integrated Pest Management

TECHNICAL INFORMATION

Introduction

When natural ecosystems are left undisturbed they generally exist in a healthy balance. For example, the numbers of pest and predator insect species balance one another, so plants can grow without facing a high pest challenge. Some traditional agricultural systems maintain that balance, through planting of diverse crops and indigenous crop management practices that give little opportunity for pest numbers to build up. But efforts to increase food production to support a growing population have promoted different farming methods that have brought with them increased losses to pests and diseases. As a result, use of chemical pesticides to minimise those losses has become widespread.

In the 1980s it became apparent that overuse of chemical pesticides was having some damaging side effects. For example, pest species developed resistance to the chemicals, demanding stronger or more frequent applications. People applying the pesticides were also experiencing health problems, for example from inhalation of pesticide fumes or contamination on their skin. There were also instances of consumers being poisoned, when pesticide guidelines were not correctly followed. Beyond this, chemical pesticides were also causing damage to ecosystems, killing plants, animals, insects and fish and polluting groundwater.

Given these problems, which were particularly acute for poorer farmers who lacked specialist knowledge or proper equipment, it was clear that a different approach to farming and pest control was needed. In the late 1990s this developed into a comprehensive methodology called Integrated Pest Management. This encouraged a broad range of methods to counter pest problems: biological control (for example using biological pesticides or pest predators); use of pest-resistant crop varieties; cultural control (such as weeding, tilling, crop spacing); and selective use of chemicals.

The IPM methodology has been developed and spread through Farmer Field Schools. This new method of agricultural extension has emphasised giving farmers the skills to learn for themselves. Farmers are taught how to make an analysis of their agro-ecosystems and to observe pest-predator relationships. As a group they experiment with solutions to problems, based on their better understanding of the ecological processes taking place in their fields.

Integrated Pest Management is not a fixed set of rules that farmers can apply to pest problems. Solutions will vary according to each situation, and finding the right solution depends on a farmer's skill in recognising the problem, understanding its causes and devising an appropriate remedy. Developing the skills and knowledge to use IPM effectively depends on training.

This resource pack

This resource pack provides an overview of some of the main strategies used in Integrated Pest Management. These include cultural control methods, use of botanical pesticides and natural pest enemies, and appropriate usage of chemical

pesticide. The majority of Africa's small-scale farmers are women, and a final interview looks at the need for training in IPM for women's groups.

Preparing to plant

It may be surprising, but one of the most important ways to prevent pest problems is to take care of the soil. Pests and diseases generally target plants which are already vulnerable. If a plant is growing vigorously it stands a good chance of producing a crop even in the presence of pest insects. Looking after the soil involves keeping it fed with organic matter, such as compost or livestock manure. This also helps to improve the soil structure, enabling it to hold more water and encouraging the growth of plant roots.

Burning of crop residues and weed plants is widely practised, but can have negative consequences. For example, helpful insects which feed on pest species may be killed, and the organic material on the surface of the soil may be destroyed. Grazing livestock on crop residues, and then ploughing in the remaining residues and manure will help to build a healthy, fertile soil. Turning the soil also exposes the eggs and larvae of pest species to the heat of the sun, and to predators such as birds.

Choice of crop and variety can help to reduce pest problems. In general, it is much better to farm 'with nature' than against it. This means choosing a crop that is naturally suited to the soil type and environmental conditions of the farm, rather than trying to adapt the farm to suit the chosen crop. Some varieties of crop have been developed that have resistance to certain pests. Farmers should consider planting these if pests are a major cause of lost harvest. 'Early maturing' varieties of crop reach maturity and are ready for harvesting sooner than normal varieties. If pests only become a problem later in the growing season, choosing an early maturing variety may be a good idea.

It may also be possible for farmers to minimise pest attack through good timing. For example, if pests are scarce during the dry season, a crop grown at this time using irrigation may remain pest free. With other species of pest it may be better to only cultivate the crop during the rainy months.

Cultural control

There are many standard farming practices that help to reduce pest problems. Weeds can harbour pests and diseases, as well as competing with crops for water and nutrients. Regular weeding helps to reduce pest populations, as well as promoting good crop health and the plants' ability to resist attack. Correct spacing is also important, to ensure plants do not compete with each other. The interview ***Double benefits from cultural control*** covers some of these aspects.

Intercropping, to create a diversity of plants rather than a monoculture, imitates natural ecosystems and helps to control pest numbers. Some plants, such as strong smelling garlic, onions or parsley, can help to repel pests, protecting the other crops around them. Another strategy is to plant marigolds amongst the crop. Marigolds can help to reduce pest attacks in several different ways. For example, their roots exude a substance which repels nematodes. Above ground, they have a scent which repels some insects, including aphids. Other insects, such as thrips, may be attracted to the bright coloured flowers, which can pull them away from food crops. If pest insects have collected on the flowers, they can easily be sprayed with a pesticide.

Crop rotation helps to prevent pest populations building over a number of years. By changing what is planted on a piece of land each year, farmers often deprive pest insects of their food source, reducing their numbers. Rotation also helps to prevent diseases being carried from one crop to the next, and helps to prevent

soils becoming exhausted of certain nutrients.

Using manure or fertiliser boosts crop health, giving greater resistance to pest attack. However, applying too much fertiliser can cause problems. For example, applying too much nitrogenous fertiliser to brassicas, such as cabbage, can make them very soft and juicy and attractive to aphids. See ***Controlling aphids on brassicas***.

Encouraging natural enemies

Learning to recognise pest species and non-pest species is an important part of Integrated Pest Management. A field may have more than a hundred species of insect living in it, but only a few of these may be a problem for crops. Some insects actually feed on pest species, which is one reason why broad-based insecticides are discouraged by IPM. These types of pesticide target all insects, including the helpful pest predators, leading to worse pest problems in future seasons.

One of the best known pest predators is the ladybird beetle. These colourful insects feed on aphids, which are a damaging pest for many crops. Farmers can attract ladybird beetles to their fields by planting white and yellow flowering plants, such as fennel and mustard. Hover flies are also attracted by these plants, and their larvae are another predator that feeds on aphids. See ***Controlling aphids on brassicas***.

Some bird species are also useful pest eaters. Planting trees along field margins can encourage birds, and if farmers choose their trees carefully they can also boost soil fertility, provide fodder for livestock and other useful resources.

Occasionally, pest predator species are deliberately introduced in order to combat a pest problem. For example, the cassava green mite is a damaging pest which was introduced to Africa from South America in the 1970s. A natural enemy of this green mite is another type of mite, brown in colour. These brown mites have been deliberately released in Ugandan cassava fields, and are now spreading naturally, helping to control the green mite pest. Farmers may be able to offer some protection to their own crop by deliberately capturing brown mites from fields where they are found, and releasing them in their own field. See ***Fighting mite with mite***.

Safe and cost effective use of chemicals

Poorly managed use of chemical pesticides is one of the driving forces behind the development of Integrated Pest Management. One of the most common problems has been with over-dosing, with farmers failing to mix the correct amounts of pesticide and water. This can cause damage to the crop and the environment, and increases the risk to human health, both for farmers and consumers. It is also a waste of money.

Safe and appropriate use of pesticides requires the farmer to have a good understanding of the pest problem. For example, what kind of insect pest is present, what level of damage is it doing, and how is that damage likely to worsen if left untreated?

Thresholds – knowing when to act includes an explanation of the thresholds that farmers need to know, in order to decide whether or not to use a pesticide. The decision will depend on the number of pest insects found in the crop and the level of damage they are doing. Once a certain number or level has been reached, spraying a pesticide may be warranted to protect the crop. This is called the 'action threshold'. However, once levels of damage reach a certain point, it will no longer be cost effective for a farmer to spend more money on spraying the crop. This is known as the 'economic injury level'.

Choice of pesticide and application technique are other important aspects of correct pesticide use. Where possible, farmers should use pesticides that are very specific to the type of pest present, thereby protecting the pest predators. How to apply the pesticide will depend on the crop and the behaviour of the pest, for example whether it tends to be on the stem of the plant, or the leaf. Maintaining spray equipment in good working order, especially the spray pattern of the nozzle, and use of protective clothing are other features of good pesticide usage. Safe washing of equipment and safe disposal of excess pesticide are also important. The interviews in this pack do not, however, provide comprehensive information on using chemical pesticides.

Botanical pesticides

A natural pesticide from tephrosia, *The magic of marigolds* and *Garlic – a natural insect repellent* all describe the use of botanical pesticides. These are normally made by crushing the leaves or fruit of certain plants and soaking them in water. This can then be applied to the crops using either a sprayer or, if unavailable, a broom. Botanical pesticides are not generally as powerful as chemicals, but they have the advantage that they are normally made from plants available on or near the farm, so they are cheap or free to make. They are generally much less harmful to pest predators than chemical pesticides.

A natural pesticide from tephrosia gives a fairly detailed description of a pesticide made from crushed tephrosia leaves, which is used to control aphids and caterpillars. The pesticide also contains hot chilli and soap, and advice is given about the quantities needed and the amount of water required. *Garlic – a natural insect repellent* mentions use of pesticides that contain paw paw, tobacco and aloe leaf extracts. But it is important to emphasise that effective use of botanical pesticides depends on farmers having a good knowledge of the pest problem. Different 'recipes' may work better in different places, so experimentation will be necessary to get the best results. This may best be done in the context of a farmer field school, where farmers can learn from the control efforts of others, as well as their own.

Using this Rural Radio Resource Pack

What is IPM?

This introductory interview explains that IPM is using a combination of strategies to achieve control of a pest. It outlines many of the common strategies, without exploring any of them in detail. You could use it at the start of a programme or series on pest management, and then explore with a studio guest the benefits of using more than one strategy to deal with a pest. You could invite listeners to phone in with examples of how they use a combination of methods to control a pest, rather than just using a chemical spray.

Controlling aphids on brassicas

This interview will be of most interest to vegetable growers. It explains why aphids are a problem, and gives some useful ideas for how to control them, including preparation of land, companion planting and using predatory species like ladybird beetles. This interview could be used on its own, or could be supplemented with farmers' comments on their success or failure in using these and other methods to control aphids. *Thresholds – knowing when to act* also looks at aphid control, emphasising that a farmer should act quickly when aphids are found, as they can breed extremely quickly.

Double benefits from cultural control

Cultural control of pests covers many different farming practices, including tillage,

weeding and crop rotation. This interview gives a brief overview of a range of cultural controls, without going into detail. However, it could be useful to prompt a discussion about some related issues. Shortage of labour can make it difficult for farming families to carry out adequate land preparation or weeding. Are there any labour-saving technologies that could help them, or benefits from working as a group? Limited land can discourage people from rotating their crops. Could an agricultural officer give advice on a practical crop rotation for smallholders?

The magic of marigolds

This short interview introduces the use of marigolds, planted among vegetables, as a means of pest control. The pests mentioned are nematodes, thrips and leaf miner. The interview needs to be supplemented by more detailed information. For example, how can farmers recognise these pests and the damage they do? Which crops do they affect? The advantages of companion planting with marigolds could also be explained in more detail; for example, marigold roots exude a substance which repels nematodes. The last part of the interview mentioned a natural pesticide made from hot pepper. ***A natural pesticide from tephrosia*** offers more information about botanical pesticides.

Garlic – a natural insect repellent

This interview comes from a demonstration nutritional garden in Zimbabwe where pests are clearly a problem. A range of methods are being used to try to control them, including companion planting with garlic and use of biological pesticides made from paw paw, tobacco, and aloe leaf extracts. So how effective are these methods? Can they really save a crop from pests? Why not invite listeners to share their experiences of using methods like these? Do they have a recipe for a natural pesticide which really works?

Fighting mite with mite

Focusing on control of the cassava green mite using another species of mite, this interview will be of primary interest to cassava growers – although it's an interesting story that others will enjoy as well. The key question that you should address, to complement the interview, is whether cassava green mite is a pest problem for your listeners, and if so, whether the predator mite has been released. If the predator mite has not been released, then it could be worth asking for a comment from a government pest control expert on whether this could happen in the future. Having evidence of the pest from your listeners could help to indicate the seriousness of the problem.

Chemical pesticides – good and bad practice

Correct and appropriate use of chemical pesticides is a big topic, and could easily be the subject for an entire radio pack. This interview offers a summary of some key issues, but to tackle the subject in proper detail you will need to get more information from a local source, such as an extension officer. You could then discuss some of the pesticides that are available locally, and which ones are suitable for which pests or crops. Are there products available that are pest specific, rather than broad-based? These are more environmentally friendly as they should not affect the beneficial insects. Wearing protective clothing is often ignored, either because it is not available, or it's uncomfortable to use in hot conditions. Are there any solutions to this? For example, a group of farmers could share equipment.

Thresholds – knowing when to act

This interview gives a good explanation of the 'action' and 'economic injury' level thresholds. These are obviously valuable concepts for farmers to be aware of. However, using thresholds in practice requires a lot of knowledge, including insect

identification and scouting techniques. You could therefore follow this interview with some discussion of what training may be available to farmers in your country. Do any organisations run farmer field schools? Should this kind of subject be taught in schools? Perhaps a representative of a farmer training institution could discuss the courses they run.

A natural pesticide from tephrosia

This interview gives a clear description of how to make a natural pesticide from tephrosia leaves, chilli and soap. The big question your listeners will have is how effective it is. As with other interviews on natural pesticides, it would be good to get your listeners to share their experiences of using them. Do they really kill pests? Can they save a crop?

IPM training for women

To complement this interview on IPM training for women, you could investigate local training facilities or opportunities for women farmers in your area. In the past, government extension activities have often targeted men. Is that still true? Do you know any women's groups which have accessed training? If so, why not invite a representative onto your show, to explain how they have accessed that training, what they have learned and what benefits it has had? Is it important for young women to go into practical sciences like agriculture? It could be a good subject for a discussion programme or phone-in.

Other aspects of IPM not covered in this pack

Soil fertility

Poor soils tend to produce poor plants that are vulnerable to pest attack, so maintaining good soil fertility is an important aspect of pest management.

Farmer field schools

The IPM methodology has been largely developed and taught through farmer field schools. This method of extension was developed first among rice farmers in Asia, but in recent years has spread to Africa, and has included tree crop and livestock farmers.

Larger pests

The interviews in this pack are focused on insect pests, but crops can also be attacked by larger pests, including birds, snails, mice and rats. There is a range of chemical and non-chemical strategies for dealing with these pests.

Crop rotation

Crop rotation is mentioned in the pack, but not explained in detail. It is, however, an important strategy in pest management, as it helps to prevent the build up of pest populations over several years.

Other botanical pesticides

The pack describes the use of botanical pesticides made from tephrosia, chilli and aloe, but many other plants can be used, including seeds and leaves from the neem tree, and nicotine from tobacco leaves or cigarettes.

Mineral and animal based insecticides

Laterite, the common red soil of the arid tropics, can be crushed and added to stored grain and beans. It deters insects from laying their eggs among the stored grains, and can kill insects by scratching their waxy outer coating. A fine layer of ash is a useful deterrent, protecting leaves from chewing insects. Fermented cow

urine is a powerful insecticide which can be used in a sprayer.

Pests of stored crops

As with the example of laterite above, there are many strategies to protect crops from pests after they have been harvested.

Further information

Useful websites, online articles and fact sheets available:

Online Information Service for Non-Chemical Pest Management in the Tropics (OISAT)

The OISAT website provides easy to read information on how to produce key crops using affordable, non-chemical crop and pest management practices. The information is arranged by crop and by pest/disease for easy reference.

<http://www.oisat.org/controlmap.htm>

This briefing paper on IPM from the Pesticide Action Network gives an overview of why IPM should be promoted in developing countries, and how policy can support it.

<http://www.pan-uk.org/internat/ipmindc/pm2.pdf>

This website includes a Dossier on Ecological Pest Management with many articles on IPM relevant to Africa, Asia and South America.

<http://www.leisa.info>

The wikipedia online encyclopaedia has an article which explains the history of IPM and a useful summary of its main elements.

http://en.wikipedia.org/wiki/Integrated_Pest_Management

Books

If you belong to CTA's network of broadcasters, you can receive, free of charge, books from our catalogue. For more information, send us a request at radio@cta.int

Principles of integrated pest management: Growing healthy crops This illustrated booklet is the first in a series of four practical guides to Integrated Pest Management. It offers advice to extension agents working with local farmers on pest control without the use of unsustainable and damaging chemical pesticides. The other three booklets in the series focus specifically on pest control in vegetables, cereals, pulses, roots, tubers and plantains.

37pp, ISBN 9988 0 1085 0, 10 credit points. CTA no. 1180

Integrated pest management practices for the production of cereals and pulses

64pp, ISBN 9988 0 1086 9, 10 credit points. CTA no. 1178

Integrated pest management practices for the production of vegetables

56pp, ISBN 9988 0 1088 5, 10 credit points. CTA no. 1177

Integrated pest management practices for the production of roots and tubers and plantains 54pp, ISBN 9988 0 1087 7, 10 credit points. CTA no. 1179

A guide to IPM in brassicas production in Eastern and Southern Africa.

Cabbage, kale, cauliflower and other brassicas grown in Eastern and Southern Africa are prone to increasingly resistant pests and diseases. For smallholder farmers who rely on these crops as essential sources of food and cash income,

this well-illustrated guide offers advice on using reliable and affordable methods of integrated pest management.

120pp, ISBN 92 9064 148 7, 5 credit points. CTA no. 1169

A guide to IPM in French beans production, with emphasis on Kenya

French beans are a major export crop in many African countries. This pocket manual summarises common pests and diseases of the crop and recommends IPM methods that can be used to combat them and meet the increasingly stringent regulations imposed by importers, such as the EU, on pesticide residue levels in vegetables.

96pp, ISBN 92 9064 142 8, 5 credit points. CTA no. 1093

A guide to IPM in tomato production in Eastern and Southern Africa This guide follows a Tomato Planning Workshop in Harare, Zimbabwe, October 1995, which aimed to identify key pests and diseases affecting tomato production in the region. It promotes environmentally safe and affordable integrated pest management techniques as a means by which smallholder and medium-scale commercial farmers can increase yields and meet increasingly rigid export standards. 152pp, ISBN 92 9064 149 5, 5 credit points. CTA no. 1168

Pesticides: compounds, use and hazards A practical guide in the Agrodok series

108pp, ISBN 90 77073 41 8, 5 credit points. CTA no. 1216

Non-CTA titles:

Controlling crop pests and diseases: by Rosalyn Rappaport, published by ITDG publishing. ISBN: 106pp, ISBN 1 85339 600 1. Available from <http://developmentbookshop.com/>

Useful contacts

African Farmers' Organic Research and Training

PO Box. CY301, Causeway, Harare, Zimbabwe.

Fax +263 472 6911, . Email afforest@icon.co.zw

Centre for Information on Low External Input and Sustainable Agriculture

PO Box 2067, 3800 CB Amersfoort, The Netherlands

Email: ileia@ileia.nl

Tel: +31 (0)33 4673870 Fax: +31 (0)33 4632410

Pesticide Action Network Africa

BP 15938 Dakar- Fann, Dakar, Senegal

Email: panafrica@pan-afrique.org

Integrated Pest Management

What is IPM?

Cue:

When you hear of pest control, what is your first thought? Perhaps you think of someone using a sprayer, or sprinkling a chemical solution onto plants using a broom. But there are many ways to protect crops from pests, and farmers can achieve very good control if they learn how to combine different strategies. This approach is commonly known as Integrated Pest Management, or IPM for short.

So what is the difference between management of pests and simply killing them, for example by using a pesticide? John Nderitu is Dean of Nairobi University's Faculty of Agriculture. Recently, he spoke to Winnie Onyimbo about some of the different methods that together, make up an integrated approach to pest management. Methods that may all the difference to winning the battle against very tricky pests...

IN: "Well we have pests like bean fly..."

OUT: "...only managing the pest itself."

DUR'N: 4'51"

BACK ANNOUNCEMENT: Professor John Nderitu of the University of Nairobi. The interview comes from a resource pack produced by CTA.

Transcript

Nderitu Well we have pests like bean fly, where we combine cultural control in combination with pesticide and also using varieties that are less attacked. All those now I am saying there are about three of those combinations, and they can be effective rather than using one in isolation.

Onyimbo *Let's go into the details of the different approaches like cultural and genetic. What exactly are you talking about?*

Nderitu Well, cultural is where you use some agronomic practices that are normally done by farmers, like ridging, planting time, plant density, even intercropping, or like companion cropping; those methods that farmers have used themselves, they may have not been intentional, but we have currently tested them and found them to be effective. Even the use of aspects like the use of ash on controlling the bruchids on beans in storage, or the use of soil on maize funnels for control of the maize stalk borer. Those are some of the cultural practices that farmers have used to control the pests. Or use of even cow dung to control the beetles on maize, the black beetles on maize in western Kenya.

Onyimbo *And the others what about the genetic one, the chemical one?*

Nderitu We have of course the varietal control where certain varieties are affected differently by a particular pest, and some may be tolerant, some might be resistant and some may be susceptible. So we go for tolerant and resistant varieties which can be able to reduce the population and therefore the damage on the crop. Of course there are also the chemicals, where in IPM we would also advocate the use of chemicals. Chemicals that are environmentally safe, chemicals that are selective to the pest they attack so that they do not attack other organisms in the environment. Chemicals that are safe to humans beside other aspects and chemicals that will be able to be selective on natural enemies that we have in the field and also chemicals that have minimum residue levels.

Onyimbo *How is IPM environment friendly?*

Nderitu The concept of IPM came in mainly with a reduction of use of insecticides.

And the insecticides are the most pollutant in the environment. So IPM is a reduction of use of pesticides for controlling pests and therefore it is implied that it is directly an environmental strategy. Of course we have also biological control where you are using natural enemies. It means if it is a pest, an insect pest, you use other insects which are predators or parasites on those pests or you use the insect pathogens, diseases of those insects and multiply them to ensure that we can control the pest by use of diseases. Besides that, we have both the physical and mechanical control, in form of issues like use of greenhouses. It is a method that can be able to reduce insects from outside the greenhouse and we ensure that whatever is inside can be directly controlled and you prevent further infestation from outside. That is one reason why greenhouses are part and parcel of IPM in horticultural production.

Onyimbo

How different is IPM from other ways of managing pests?

Nderitu

IPM is a combination of methods, methods that are compatible, methods that are integrated. Other methods are individual: you may use them individually, but in IPM we try to use as much combination or methods that are effective as much as possible. Because IPM quite often is recognising that pests will still be there after you control them. Your only importance is reducing them to an economic level, that you are able to produce a crop in the presence of the minimum infestation in the crop. Other methods like chemical control may be targeted to extermination or removal totally of the pest. But this IPM is recognising that it is very... You may not completely eradicate a pest from a crop, it is only managing the pest itself. *End of track*

Integrated Pest Management

Controlling aphids on brassicas

Cue:

The brassicas are one of the most important families of plants in agriculture, including crops such as cabbage, cauliflower and kale. Brassicas are also vulnerable to pest attack, particularly by aphid insects. There are over 4000 different types of aphid, and more than 200 of them cause trouble to farmers and gardeners, not only by feeding on crops, but also by infecting plants with diseases and viruses. Colonies of aphids can often be found on the underside of plant leaves, or on the growing tips. The young insects grow quickly, and if their food supply begins to dry up they develop wings and fly off to infest other plants.

Shepherd Musiyandaka and Isabel Chirere are experts in aphid control. They work for the African Farmer's Organic Research and Training, a non government organisation based in Bulawayo, Zimbabwe. Sylvia Khumalo visited them at their offices and began by asking Mr Musiyandaka how big a problem these tiny insects are.

IN: "They are quite a serious problem ...

OUT: ...ladybirds but they are actually pests."

DUR'N: 4'48"

BACK ANNOUNCEMENT: Shepherd Musiyandaka and Isabel Chirere with some advice for vegetable growers on how to manage aphid pests in their cabbages, and other brassicas. The interview comes from a resource pack produced by CTA.

Transcript

Musiyandaka They are quite a serious problem. I am not going to go into details about the economic damage that they might inflict on any brassica crop but they actually damage the crop by sucking the plant sap and spreading other diseases like viruses and excreting a liquid, a sticky liquid that covers the plant and usually that can also attract other pests to come and attack the crop and usually that results in the plants or the brassicas becoming deformed and stunted and you may actually produce an unmarketable crop.

Khumalo *Talking about aphids being a problem, pests as they are, we want to talk about the control of aphids now.*

Chirere I am talking generally about the control of aphids. The first thing that one must do is to plant the crop in a well prepared fertile seed bed to promote vigorous growth. And it is also wise not to apply too much nitrogenous fertiliser as this will make the plant very soft, juicy and attractive to aphids. The third point would be to avoid planting near an aphid infested crop or on land from which an infested crop has been recently removed. Rainfall and overhead irrigation tend to discourage aphids. Growing strong smelling plants such as garlic, onion or parsley near the crop will reduce infestations of aphids and spraying, soaping with a soapy solution helps to wash off aphids and it disturbs their breathing.

Khumalo *Using biological control, from your experience how best would a farmer go about controlling an aphid using another pest?*

Musiyandaka Aphids are actually controlled by a number of what we call farmers' friends or natural enemies. These have a tendency to keep the pest at acceptable levels if measures are taken to conserve and encourage them. However it is sometimes difficult for natural enemies to attack aphids since some of the species of ants, which are attracted to the aphids by the sweet sticky juice that the aphids produce, have got a tendency of fighting the farmers' friends that we want to control the aphids. But for the farmers' friends that are usually found in the garden we have ladybird beetles and hover-fly

larvae or caterpillars.

Khumalo *How do you identify these?*

Musiyandaka Ladybird beetles they usually take the form of tortoises. They have almost like a shell like that one of a tortoise.

Khumalo *A hard shell?*

Musiyandaka Almost, it looks like a shell which is dome-shaped and they have many colours. You usually find them being black and red or red and white or completely black.

Khumalo *How do you attract them to your field to ensure that at any one time you are controlling aphids?*

Musiyandaka Most of the natural enemies that would control any pests, they prefer or they need what I call a balanced diet. They get their protein from eating the pest which is the aphid but they also require some carbohydrates for energy and the carbohydrates they get them from flowers, the nectar. So these farmers' friends or ladybird beetles prefer yellow or white flowering plants. Plants that easily come to mind are things like fennel.

Chirere *Mustard.*

Musiyandaka Mustard yes, mustard you are right.

Khumalo *So if you grow these crops you are sure that you would have them around?*

Musiyandaka Yes, what we would encourage would be to intercrop your brassicas with these flowering plants like mustard, fennel or sunnhemp. At times I have seen farmers planting borders of sunnhemp within their plots. Including crops like marigold as well which produce very bright colours.

Khumalo *So are the beetles, are they not harmful to the plant?*

Musiyandaka They are completely harmless to our crops. Although farmers have to learn to observe them. There are some species which might look like the ladybirds but they are actually pests. *End of track*

Integrated Pest Management

Double benefits from cultural control

Cue:

Turning the soil before planting and removing weeds from the field are both examples of good farming practice. But practices like these are also a part of pest control. Turning or cultivating help to aerate – add air spaces to - the soil and to reduce competition for water and nutrients. Getting rid of weed plants, which are often a home to pests and diseases, helps to keep a crop pest-free and healthy.

These farm tasks like tillage and weeding, also known as cultural practices, are an important part of IPM,, Integrated Pest Management. Dinala Zalinga, a Crop Protection Officer in Malawi's Ministry of Agriculture explained more about this to Excello Zidana, who began by asking him about the importance of tillage for pest control.

IN: "Yes tillage is an important tool ...
OUT: ... the growth of most of the crops."
DUR'N: 4'11"

BACK ANNOUNCEMENT: Dinala Zalinga, explaining why cultural methods of pest control have some advantages over use of chemicals. The interview comes from a resource pack produced by CTA.

Transcript

Zalinga Yes, tillage is an important tool in managing pests in the field because with tillage, you tend to till the soil and in the process you tend to expose the eggs even the larvae, even the adults that burrow in the soil and you tend to expose those things to the heat, that is the heat generated from the sun and even to other predators like the birds and even the wasps. In so doing you tend to reduce the pest populations.

Zidana *Now how about weeding?*

Zalinga Weeding is another pillar of cultural control, only that farmers, they do not realise, but the weeding is one of the most important aspects that should be applied if you are to get good yields. In weeding, we intend to remove plants that harbour enemies like pests and disease and once a crop is growing under weed free condition, they grow with the robustness and the vigour and those crops tend to resist pest attack, even disease attack. And a crop that has grown with minimal pest or disease attack is the one that will give you enough yield at the end of the day.

Zidana *Extension workers in Africa are busy persuading farmers or encouraging farmers to be practising crop rotation. How does crop rotation help in managing pests in the field as one of the integrated pest control measures?*

Zalinga Of course we know land is limiting but we should not be carried away by the situation because crop rotation has proved to be more effective in controlling pests. In rotating the crops you tend to destroy the pest-crop relationship which makes the population of pests to reduce with time. Say if a plant is to be replanted at the very same area after four years during the period that you are planting other crops different from the crop that we used to plant, you tend to starve the pests and at the same time even some crops that are planted, some of them they can have a repelling effect to the pest, to say the pest can decide to run away because of maybe the type of crop that you have just introduced instead of the plant that they used to feast on.

Zidana *Is it in order to say that variety selection is also another aspect of doing cultural control in the field?*

- Zalinga** Yes it is really important because with the variety selection there are even other varieties that are resistant to certain pests. In this context we are talking of other specific characters within the variety that will deter that pest to come closer. Say for varieties of cotton, there are the varieties that are more hairy. They tend to be more resistant to say jacid. And with the time to maturity, for example in the other varieties, say maize, there are the varieties that mature very early and before maybe a certain particular pest may come in or a certain particular disease may come in, you find that the crop was already produced.
- Zidana** *Moving around the villages and seeing fields of farmers one may discover that many farmers are doing intercropping. How does intercropping help in pest management in the field?*
- Zalinga** My friend, intercropping is really another good area that farmers should be involved in. Because in intercropping we tend to bring in different crops and we know different pests like different crops species, and in between them you will find there is a different crop that is repelling those pests, and in the process they tend to run away from your good crop and you tend to get good yields.
- Zidana** *So how important are they over the other methods, we are talking of cultural control here?*
- Zalinga** Cultural is very important because with cultural you tackle so many issues. And with cultural you even tend to increase yield per unit area because if you weed, you know for sure that your crop is growing under very good management and your yield will be high. If you do the tilling, you tend to loosen the soil and you find the crop grows under very good conducive environment. While with the pest control or chemical control, you only apply, you only kill the living organism but you do not kill the weeds, you do not loosen the soil. And some of the chemicals that we use, they tend to make the soil inert, thereby making the micro-organisms that are very useful for fixing of nitrogen to be inert. But with cultural, you tend to facilitate robustness in the growth of most of the crops. *End of track*

Integrated Pest Management

The magic of marigolds

Cue:

With their bright yellow and orange flowers, marigolds are a gardener's favourite, planted in pots and flower beds around the world. But can you imagine marigolds in vegetable beds, sitting alongside tomatoes and eggplants? Why would a vegetable grower choose to use valuable land for a plant that can't be eaten?

The answer is that marigolds have some very special qualities for the vegetable grower, as Lazarus Laiser found out when he visited the World Vegetable Centre in Arusha, Tanzania. There he met research assistant Omary Ijumaa, who explained several different methods the Centre uses to control pests in its vegetable plots, including the amazing marigolds.

IN: "One thing is to look on the timing ...

OUT: ...go ahead with finding a proper solution."

DUR'N: 3'19"

BACK ANNOUNCEMENT: Omary Ijumaa of the World Vegetable Centre in Arusha, Tanzania, with some good advice for farmers. The interview comes from a resource pack produced by CTA.

Transcript

Ijumaa One thing is to look on the timing of growing your crops. The different pests they occur in different times during the year. For instance during maybe rainy season, we can have some kind of pests which are more prevalent and during the dry season we can have some pests which are more troublesome to the crop. So by changing and knowing which crops are affected most at which time you can avoid that. But also we have some measures which we take to reduce incidence of diseases. For instance we are growing this marigold which has the impact on controlling nematodes and also thrips and also leaf miner.

Laiser *Can it be found here in this garden?*

Ijumaa Yes, here it is. We have a lot which we put for each experiment. It is a known flower which people here grow as an ornament in their gardens.

Laiser *Yes we usually see, we even put in our houses, just around the house, around the garden to make it nice because, you know it grows quickly and you can just find that it has very nice flowers, red and yellow and pink. So these are the plants which are used to control pests?*

Ijumaa Sure this is the plant which we use. So apart from that use as ornamental, you can also use it in your gardens to protect your crops.

Laiser *Is it only some kind of crops or generally does it chase away all these pests?*

Ijumaa As I say before that this is mainly for nematodes and thrips and also leaf miner. So whichever crop is affected with that pest, this one can reduce the incidence. Because for instance, thrips, they will be attracted with this yellow colour. So instead of going to your crop they come to this flower. So they reduce the incidence which can occur in your crops.

Laiser *So when it is attracted what happens, it dies or...?*

Ijumaa No, what you do with that, when they are attracted here so it is just like a collection. So we collect all the pests on the one area. So when you come with your chemical now, you can spray once in this flower. So you can capture a lot of the pests there, yes. Also we have a natural pesticide which is very available by the farmers, not much expensive, like hot pepper also we can use as a pesticide.

Laiser *How do you use that, do you plant or how do you use that?*

Ijumaa No, we harvest the fruits which is ripened and then you can pound them or crush them and then soak over the night and then you can spray that mixture in your farm, so you can prevent some of the pests. Also we can use resistant materials which we have and which is our mandate to give farmers the materials which is resistant to certain diseases and pests. So by doing that, you can rid out of these pests and diseases.

Laiser *Which advice do you have to the farmers, focusing on prevention of pests?*

Ijumaa First of all, finding the problem is the first step of solving the problem. So most of the farmers sometimes they do not know what is their problem. So when you know exactly that this is the disease or this is the pest so that you can go ahead with finding a proper solution. *End of track*

Integrated Pest Management

Garlic – a natural insect repellent

Cue:

Using chemical pesticides to kill insect pests has both advantages and disadvantages. The main advantage is that they work quickly, enabling farmers to save a crop if it becomes infested with a pest. One disadvantage is that many chemicals are broad-based, meaning that they kill all insects, not just the pest species. This unfortunately means that beneficial insects, like ladybirds for example, are also killed. Another disadvantage is that chemical pesticides can be expensive, and can damage the health of both crops and people if used incorrectly.

In Bulawayo, Zimbabwe, the Lead Trust is working with orphanages to establish nutritional gardens. Those working in the gardens are being trained to use a wide variety of methods to control pests. Busani Bafana visited the Trust's demonstration garden and spoke to extension specialist Canisius Mpala. He was curious to know more about the pest control methods. Does the Trust teach modern methods, and is there still a culture in Zimbabwe of protecting plants without using chemicals?

IN: "The culture still exists. The problem has ...

OUT ... the numbers of the whitefly."

DUR'N: 4'24"

BACK ANNOUNCEMENT: Canisius Mpala, an agriculture extension specialist working for the Lead Trust in Bulawayo, Zimbabwe. He was speaking to Busani Bafana, and the interview comes from a resource pack produced by CTA.

Transcript

Mpala The culture still exists. The problem has been that people have been more used to using the quick fix methods, which are the chemicals, whereby if you spray, after two days the problem is gone. Right now people are discovering, due to the costs of the chemicals that they can still maintain a clean environment and save their crop using biological means. The culture is there but it has been over-shadowed by quick fix methods.

Bafana *Is there a need then for agro-chemicals if we can use the biological control of pests?*

Mpala The need could be there on a small scale, whereby there is a time lag between the increase in the population of the beneficial versus the pest. The pest increases faster than the beneficial. It will take some time for the level of the beneficial insect to come and control the pest. During that phase, that is when people could come and use mild chemical remedies. My organisation Lead Trust is implementing a nutritional garden programme in the orphanages in Bulawayo. We are using other plants to control insects, like interplanting garlic with tomatoes. Since garlic has a pungent smell it repels red spider mites. Or using paw paw leaves or tobacco leaves to spray for aphid pests.

Bafana *What are the tangible benefits therefore, in terms of crop quality, human health, and the environment in using good insects to manage pests?*

Mpala The tangible benefits are: the quality of the crop improves, because you will be having crops that are not disfigured by harmful pests; the human health is also enhanced because chances of food poisoning or chemical poisoning are reduced; you increase biodiversity, because there will be an increase in the animals or insects that are in the system that you are having.

SFX *Moving outside.*

- Bafana** *Right now we are actually outside Mr Mpala's demo garden. I can see you are holding a leaf of the chomolia plant. There are actually some aphids there. Please explain how biologically you control those aphids?*
- Mpala** We can control these aphids by using some plants that we have in the yard. We have some aloe in the yard. We can take that, crush it in water, spray it on the leaves. This will destroy the aphids. Or we can use the garlic which we have, interplant it with the plants, and the smell will repel the aphids.
- Bafana** *One of the leaves that you are actually holding is white in colour. What has caused that?*
- Mpala** This is a chemical burn. We were trying to do a quick fix on one of the rows of chomolia plants. We used some chemicals and the mixing up was not done properly, and what we have now done is to burn most of the plants in the garden in that row of plants.
- Bafana** *In front of me I can see that you have intercropped some chomolia plants and some garlic. What are the benefits there?*
- Mpala** The benefits are we are trying to save water. Whatever space we can get between the chomolia we can get garlic growing there. But the major thing is we want to use that garlic as a repellent, that will repel any harmful pest that will attack the chomolia or the tomatoes nearby.
- Bafana** *And the tomatoes have actually been infected with whitefly, so how then do you control them biologically?*
- Mpala** The whitefly we could use some ladybirds. Unfortunately if you are going to use a chemical spray the ladybirds will be destroyed and therefore you are removing the predator of the whitefly, and this will lead to an increase in the growth or an increase in the numbers of the whitefly. *End of track*

Integrated Pest Management

Fighting mite with mite

Cue:

Cassava is a vital food crop for more than 200 million people in Africa. Its starchy roots provide food security in areas of low rainfall, and its leaves are also a nutritious vegetable. But cassava crops across the continent are threatened by a tiny, but deadly enemy - the cassava green mite. This insect pest came to Africa from South America in the early 1970s, and was first detected near Kampala in Uganda. Over the next 20 years it spread across Africa's cassava growing belt, causing huge losses in yield of up to 80 per cent in some areas.

Attacking the pest by using chemical sprays is difficult, not least because the mites live on the underside of cassava leaves. But in Uganda, and other countries, cassava farmers are increasingly using a different approach to pest control, as Wambi Michael discovered when he met with Stella Adumo, Senior Technician at Uganda's National Agricultural Research Organisation laboratories in Kawanda. Wambi began by asking Stella to describe the damage caused by the mite.

IN: "It is a very serious pest in almost ...
OUT: ... and the yield improves drastically..
DUR'N: 4'44"

BACK ANNOUNCEMENT: Stella Adumo, Senior Technician at the NARO laboratories in Kawanda, Uganda. The interview comes from a resource pack produced by CTA.

Transcript

Adumo

It is a very serious pest in almost all cassava growing areas. It is a dry weather pest, and it attacks almost every variety of cassava. And it is a pest which attacks the tip of the plant. When it attacks the tip of the cassava plant it causes chlorosis of that plant, that is, the plant loses colour and becomes yellowish. In severe cases you will find that there will be drying of the leaves and defoliation. The effect of this pest goes down even to the root system. The tubers get drastically reduced, and in cases where tubers have already been manufactured, you realise even rotting of the tubers.

Michael

So how can the pest be identified?

Adumo

This pest is found under the leaves of the cassava plant, and in most cases it is at the growing shoot. When you turn the leaf upside down, you find that they are under the leaves of the cassava plant, and they are very tiny in size and greenish in colour.

Michael

So what biological control methods have been adopted in Uganda to control the cassava green mite?

Adumo

Biological control is using natural enemies to control pests and weeds, and for this case, it uses a predatory mite that is called *Typhlodromalus aripo*. It is a mite that feeds on the cassava green mite. It sucks out all the fluid and renders the pest dead.

Michael

How can the beneficial insects be identified?

- Adumo** The beneficial insect, as I said, is also a mite, but it is a predatory mite. The pest is greenish in colour. The natural enemy is brownish in colour and slightly bigger than the pest, and a farmer can only identify it when he checks at the tip of a cassava plant. These natural enemies live at the tip of a cassava plant, and when the farmer opens the tip of a cassava plant they will be very shifty, running up and down, they are very fast, because they have a good searching ability.
- Michael** *How can farmers encourage beneficial insects to control this problem?*
- Adumo** These natural enemies have already been released in the field and they are multiplying out in the field. Now a farmer has to have proper management practices in the field in order to promote the development of this natural enemy. They should avoid unnecessary burning, because in most cases the unnecessary burning destroys the natural enemies that are already out in the field. Now if a farmer has that problem of green mite, try the next field, check the tip of the plant, check for that brown mite. If they find it there, break the tip, move to the affected area where there is a lot of pest and just place that tip on top of the affected plant. The natural enemy will automatically crawl from this tip to the plant which is affected and will work on the cassava pest which is there, and destroy it.
- Michael** *So the beneficial insect; isn't it in any way dangerous to the environment?*
- Adumo** Uganda is not the first place where we have released this natural enemy. It has been tried in other countries, and the fact is that it does not affect any other insect, any other plant except its host, and that is the green mite. It is host specific, it cannot attack any other but it only attacks the cassava green mite.
- Michael** *So this beneficial insect, what impact has it had on the cassava production in the country?*
- Adumo** In many areas they had realised low yields of cassava. But when the natural enemy reached in some of those areas the yields of cassava were raised, and also the planting material was improved. Another thing we realised is, this insect is cost effective. When you release it in the field it multiplies on its own, so the farmer does not have the bother of again going back and releasing in the same place. So a farmer just benefits as the insect multiplies and destroys the pest.
- Michael** *So there is no cost related to spraying the cassava?*
- Adumo** There is not cost at all, because this is a natural, a living thing. When it multiplies it moves under – remember one thing. Cassava has a very heavy canopy, so when you think about spraying it is even difficult to spray under the leaves where the insect is. Now with this natural enemy, it goes searching all over the area, under the leaves and it attacks the pest which is damaging the crop, and you find automatically that the crop improves and the yield improves drastically. *End of track*

Integrated Pest Management

Chemical pesticides - good and bad practice

Cue:

Chemical pesticides can be a valuable tool in crop production. However, to use them properly, the farmer must have a good understanding both of the pests and of the chemicals themselves. For example, farmers need to identify the pest species in order to know which type of chemical will be effective in controlling it. They also need to know whether it is economically worthwhile to use a chemical, how the chemical should be applied, in what concentration, and how long the chemical will remain active after spraying. Without this knowledge, usage of pesticides is likely to be ineffective, and potentially harmful to the environment and to human health.

In North West Cameroon, the government's Phytobase service is working to improve pesticide usage by farmers, and to promote IPM, Integrated Pest Management. Michael Mboh, Chief of Service for Phytobase in the province spoke to Martha Chindong about some of the good and bad practices in chemical use, and about the place of chemicals within IPM.

IN: "First of all it is a holistic approach ...

OUT: ... Thank you."

DUR'N: 5'29"

BACK ANNOUNCEMENT: Mr Michael Mboh, on some of the problems that can occur when chemical pesticides are improperly used. The interview comes from a resource pack produced by CTA.

Transcript

Mboh First of all it is a holistic approach. That is we use every available method that we can have and chemicals or pesticides only come in as a last resort when all the other systems have been exhausted.

Chindong *If I get you well it means that the chemical control is part of the integrated pest management system?*

Mboh Of course.

Chindong *Which type of chemicals are safe and hygienic for the farmers to use in this system?*

Mboh They are usually proposed or recommended based on their persistence. Persistence is the period that this chemical will remain active on the crops and when consumed can be lethal to the consumers. Chemicals are divided into food crops and cash crops because cash crops they spend more time on the field, food crop and vegetables they take a shorter time. So some vegetables take seven days to harvest so they use those pesticides that take seven days for their activeness to disappear. I would not advise a farmer to treat tomatoes that they harvest after every seven days using a pesticide that has three month persistence.

Chindong *What are the quantities of the pesticides used?*

Mboh They have the chemical labels which tells us the quantity and for what quantity of water and on what surface.

Chindong *It means that before using it the farmer should study the instruction inside a chemical very well?*

Mboh *We know most farmers they make not understand or they may read the labels and not understand but all those things are on the label but the government has done a lot, putting in place village phytosanitary brigades. These people are able, like the nurses and the doctors in health centres, to*

tell the farmer the quantity and quantity of water to be used and in what type of spray because the spraying method depends on the formulation of the chemical because in formulation we are looking at about liquid, powder, granules and all the like, there are quite a good number of them.

Chindong *Some farmers use brooms in spraying these chemicals. Is it advisable?*

Mboh Well I want to say that it is not advisable because I think they do that when they are desperate, they do not have the equipment. Using brooms, how do they measure the chemicals? Because most of our spray equipment is 15 litres to this amount of chemical. How do they mix the chemicals? So they use a broom it is a wrong usage and we do not advise farmers to do that.

Chindong *What are the consequences of wrong pesticide usage on the pest, the environment and the farmer himself?*

Mboh Well the first thing is that the farmer tends to be the first victim. That is when you use chemical poorly by not being well protected in terms of body protective equipment, we risk chemical poisoning. Then when you do not respect the dosage you still risk chemical poisoning because the concentration of what would have been applied is not what you are doing. So in the case of intoxication the antidote cannot work. And then the second one, we know we are living in a world where we are talking about biodiversity. That is we do not live exclusively alone, we are living with other creatures that we sustain them and they sustain us. So when we have wrong usage of pesticide we destroy the fauna and the flora. And then there is environmental pollution, when we do not use chemicals rightly. Like you will find a farmer after using the sprayers or spraying they go and wash their sprayers in running streams. They kill fishes and all the others in the food chain are destroyed. Then sometimes farmers get pesticide, especially oily solutions and they burn it. You can imagine it is an atmospheric pollution. You will find residues of pesticides in the air in form of fumes and then people have to breathe them and you know breathing and inhaling pesticides, they can lead to intestinal cancer or breathing organ cancer and all the like, and then most farmers get blind when they do not protect themselves very well.

Chindong *Is it due to wrong usage of pesticides that some insects develop resistance?*

Mboh Of course. This one is a little bit complicated but I hope it is easy to understand. A wrong usage of pesticide by under dosage can lead to resistance in the target pests. So they develop a gene that that particular insecticide will no more kill them and then subsequent generations will never be affected by that pesticide.

Chindong *Thank you for making yourself available to us.*

Mboh Thank you. *End of track*

Integrated Pest Management

Thresholds – knowing when to act

Cue:

For farmers, chemical pesticides are a valuable weapon in the fight against damaging insects. But chemicals can be expensive, and if used incorrectly they can not only damage the environment but lead to problems of resistance in the insects they are intended to control. Effective use of chemicals depends on farmers knowing at what point they should be used. For example, there may be insects in the field, but are they pest species, and are there enough of them to justify using a chemical spray?

The point at which spraying becomes a good idea is known as a threshold. To find out more about these thresholds, and why they are so important, Adu Domfeh visited the Kwame Nkrumah University of Science and Technology in Kumasi, Ghana, and spoke to Senior Lecturer Dr Jakpasu Afun. Dr Afun began by explaining that not all insects should be seen as enemies.

IN: "All the insects we see are not pests...
OUT: ...will also be able to apply this threshold."
DUR'N: 5'21"

BACK ANNOUNCEMENT: Dr Jakpasu Afun, explaining to Adu Domfeh why farmers need accurate information on exactly when to take action against pest species, the point known as the action threshold. The interview comes from a resource pack produced by CTA.

Transcript

Afun All the insects we see are not pests. A whole lot of them are beneficial to the farmer and it is not every quantity or amount of pests that warrant a control.

Domfeh *So specifically, how does the farmer know there is a problem or likely problem of pest infestation or damage?*

Afun The farmers themselves, not until they are trained, they find it difficult to determine which is the pest and which is not a pest. So we take them through a whole season of planting, right from land preparation through to harvest, pointing out to them which of them are the pests, what numbers they should expect before taking action, what quantity of damage those things should do before they should take any action. This is where we are coming to this word of "threshold". And we have two forms of threshold: one we call the "action threshold". That is where you see some given amount of damage before you go in to do your control. And another which we call the "economic injury level". That is the level beyond which, if there should be damage beyond that level then there is no justification because even if you try to do some remedial action you might not break even. It will lead to a loss to the farmer, loss of income. So you realise we are dealing with two thresholds, the action threshold is below the economic injury level. So the pest that the farmer is concerned about is the quantity of pest or damage between these two levels. If the farmer can take care of the pest within these two threshold levels then the farmer is in good business.

Domfeh *And in these instances what basic scouting methods can the farmers adopt or use when they want to take action against destructive pests?*

Afun We teach them to do site counting. So they go in, they look out for the pest on the crop. Then they count, because they see and count and then they look at some distance. Ok, if I see for example one or two pests within maybe two steps then I need to control. Or they can do what we call "sweeping", and then they look at the number of pests within what you have collected and you look at the number and compare with the scale. And what we do, what we call a scale ranges from zero to nine. Zero means where you do not have any pest problem at all, where nine means there is almost total damage. So on that scale, we call a point three on the scale. That point of three on that scale of nine is what we are calling the action threshold now. So if your damage is below that score of three on the scale of nine then you do not have any trouble, but if it is at the three or beyond then you need to take some action.

Domfeh *Are there some examples of the action they could take to control these pests?*

Afun If, for example, we look at the crop like cowpea which takes a lot of insecticide, almost all farmers will apply all sorts of chemicals onto their cowpea crop. We have four main pests that attack the crop right from seedling to maturity and even in store. So we teach them for example if you go into your field and you see what we call aphids or what we call plant lice, if you see them scattered in your crop - because these insects can be very prolific they can produce between five and fifteen children, let me call them children, in a day. So if you go and you see a cluster of say three or four scattered among your crop then you need to take action immediately because if you did not by the time you go back the next day that has increased into a very large colony. Then there is another one called "maruka". That one is very devastating because it will destroy the flower, it will destroy the pod. So we teach them to open these flowers to the centre of it. If they see the pest or the seed is damaged then that flower is considered as damaged. So if they count, they take twenty and maybe out of that twenty, five of them show damage symptoms then quickly you need to spray that very day. You do not wait until the next day. So these are some of the specific things we teach them to do.

Domfeh *How then do we get the threshold right?*

Afun It is all education. The problem is even now we have the threshold for a few pests on a few crops. So the first thing is that we researchers will have to double up. We need support to be able to determine these thresholds which we can then communicate to the farmers. Then they will also be able to apply this threshold. *End of track*

Integrated Pest Management

A natural pesticide from tephrosia

Cue:

When insect pests strike a crop, farmers like to act quickly, to prevent the whole crop being lost. Spraying a chemical pesticide is frequently their first thought, a way of hitting the problem hard and easing their fears of a lost harvest. But chemicals do have disadvantages. They are expensive, and farmers may have to travel some distance to buy them. They can also store up problems for future seasons, by killing the beneficial insects and soil organisms that help to maintain a healthy and productive field. There is also the danger to human health, if chemicals are used incorrectly, or without proper equipment.

An alternative approach is for farmers to make their own environmentally friendly pesticides, using locally available plants and resources. For example, it is possible to kill aphids and caterpillars using a pesticide made from the leaves of a shrub which is found throughout Africa. Godfrey Kiyoge, training manager at the Katende Harambee Training Centre in Kampala, explained more to Pius Sawa.

IN: "If we want to say kill aphids ...
OUT: ... they are environmentally friendly."
DUR'N: 4'34"

BACK ANNOUNCEMENT: Godfrey Kiyoge, explaining the benefits of a natural pesticide made using leaves of the tephrosia plant. The interview comes from a resource pack produced by CTA.

Transcript

Kigoye If we want to say kill aphids, we want to kill caterpillars that always attack our cabbages and other crops, you can only go and get tephrosia. Tephrosia is a kind of a shrub which grows there in the field. So you just get the leaves, you crush them, you measure the amount that you have got. If we have got, say, one jug of crushed tephrosia, you put in five jugs of water. That is enough, do not further dilute. Then you get five hundred grams of hot chilli, you crush it, you boil it to the boiling point, then remove it from the fire. You get a piece of soap, thirty grams of soap, equivalent to a matchbox. This time we do not use blue soap which is acidic, we just use yellow soap, laundry soap, and then you dissolve it in the solution, you leave it to cool, then you spray on crops.

Sawa *And can you say this tephrosia is available everywhere in Africa where any rural farmer can access it?*

Kigoye I can say in Africa here, tephrosia is everywhere and is a shrub which grows in the bush there.

Sawa *And how long does it take to prepare this chemical?*

Kigoye To prepare this it takes only 30 to 50 minutes but because we lack preservatives it takes two days and then it expires.

Sawa *Which means a farmer in a rural place can manufacture a pesticide in the morning and he uses it within two days?*

Kigoye Within two days, yes, he can or she can use it. We are trying, we are doing research to see how we can preserve the pesticide for a longer period of time. We have come up with a solution, we can use bottlebrush in Luganda they call it *nyamba laztonya* If you add in that bottlebrush it can last something like five days or more, but we are still doing more research on this so that we can get a pesticide that can last maybe two weeks.

Sawa *And what amount of pesticide should one spray on a crop?*

- Kigoye** Amount, I can say it depends on the size of the crop. If it's a cabbage you just need something like a 100 mls. Sometimes also we can use local ways because some farmers could not afford to buy spray pumps or what. So you can get a broom and than you dip it in the solution and then you sprinkle on the plant. When you are doing that, you make sure that, you know some of these insects hide inside the leaves. They are not on top, they know that they are thieves. So when you are spraying, you just apply at the behind side of the leaf so that you can kill the aphids and other caterpillars. These animals or insects they are categorised in three. We have the chewing pests, we have the sucking pests and then we have the stinging pests. So when you are applying this kind of solution you have to understand what type of pests are attacking the crops. If it's a stinging pest, they always attack or they always hide inside the leaves and they always stick on the leaves so what you do you just smear or you just sprinkle. You put the leaves upside down and then you sprinkle the solution.
- Sawa** *How many times should you keep on applying to the crop?*
- Kigoye** It depends on, if it is a rainy season you need to repeat at least every three, four days but if it is in the drought season you just spray once in a week.
- Sawa** *How has this pesticide helped a person who cannot, maybe who does not know it, how can it help someone?*
- Kigoye** It can help someone, if you do not have enough money to purchase say these toxic chemicals, the ambushes, the dimethoates, every farmer can afford, they are cheap. Secondly they improve on soil fertility. Some of these, the residues you get out of this when you put it somewhere they decompose and form fertiliser. It is not like the other toxic chemicals where you put them. Yes, they can serve the purpose for that particular period but in the long run they kill the natural, all the soil-living organisms. So they are very cheap and then they are environmentally friendly. *End of track*

Integrated Pest Management

IPM training for women

Cue:

In sub-Saharan Africa, 80 per cent of food crops are grown by women. But while women have a huge responsibility for food production, they typically have low levels of training in farming methods. As a result, the harvests from their plots are much lower than they should be.

There are many reasons why women have tended to receive little training. Extension activities may have focussed on cash crops; women have been restricted from attending because they are looking after babies or small children. But that situation does seem to be changing. For example, by belonging to a group, women are gaining new opportunities for training.

Dr Florence Olubayo is a senior lecturer at the University of Nairobi, and a specialist in crop protection. She spoke to Eric Kadenge about her work with women's groups to give training in pest management.

IN: "Well I would say in terms ...
OUT: ... we need to continue training."
DUR'N: 4'59"

BACK ANNOUNCEMENT: Dr Florence Olubayo, giving some reasons why training for Africa's women farmers in pest management techniques is so important. The interview comes from a resource pack produced by CTA.

Transcript

Olubayo

Well I would say in terms of now practical IPM it would actually be profitable or it would be advisable if we had training, field training for women groups. Because a lot of women groups are involved in farming activities and knowledge is important and I would like just to cite an example where, through our funded research we have done pest management through farmer field schools and we find that most of the groups that we meet out there are actually women and they are very willing to learn. So an increase in these kind of field trainings, funding for researchers or even university lecturers to go out there and do field training for women groups in safe pest management, which is really what IPM is about, would be very important for our agriculture. I personally have done that on several crops in terms of training, where we go out there with our actual insects and the pest management options. Even while you train you actually get knowledge from the farmers, how are they coping and you can be able to incorporate this in the research programmes, to be able to validate the kind of methods they are using and then include in IPM packages.

Kadenge

Perhaps you could point out maybe one women's group somewhere that has been very successful in this and what kind of PM you have been working with them on?

Olubayo

Now the group that we worked with in Deya and in Jambini, a majority were women and these are groups that grow seed potatoes. Now our programme was mainly on how can they grow safe seed potatoes, because potatoes have a lot of virus problems and these viruses are passed by insects. So we actually went practically to show them what the symptoms look like, what the insect that is passing the virus looks like and how they can manage. Simple methods just like pulling out those that look like they are too affected by the virus therefore it would not be good seed, and that is really a component of IPM, a safe one. And then we were advocating how they can sample the aphid now that they know the insect and how they can tag the plants that are looking healthy enough so that they can

continue with the cleaner seed and then eat the potatoes that are coming from the virused plants. And the reception was very good. Why I am saying I can consider this mainly knowledge that went majority to women, because three quarters of these groups were women and they were really excited to be able to know the small insects they see are actually passing a disease which makes them produce less seed and therefore produce less potatoes. So it can be done and I think that it is a very good way of actually taking IPM to the farmers.

Kadenge *Now eating the potatoes that are infected does not cause any harm to their bodies?*

Olubayo No it does not because it just means the virus is in the latent form in the potato, it has no problem. The only thing is if you plant it then that plant will express the symptoms and you will get less yield.

Kadenge *Anything else that you would probably like to share as we wind up this interview?*

Olubayo I would just like to say, as a women scientist, I have seen an increase in women getting interested in science in terms of agriculture. And we need to encourage - if we have to increase food production and therefore meet the millennium development goal number one which is food security - we actually need to encourage women to get into these practical sciences, so that when they go out there to the field the encouragement is there, not only for the women who are growing to see that our daughters are actually interested in what we are doing, they want to help us, but also in encouraging young girls to get into the science of agriculture so that we can sustain food production. Because you find that the children in high school tend to think agriculture is a dirty business and yet for any country, if you cannot feed yourself then therefore, even the economy you are talking about will not work. Because first and foremost we have to feed ourselves and IPM is the way forward for managing pests and diseases because you cannot eradicate. We have to think of ways how we can safely reduce the damage caused by diseases and pests because we have to safeguard the environment. And with changing of climate we are likely to get more challenges, so we need to be on our toes and we need capacity. So we need to continue training. *End of track*