

Pesticide Discussion Forum Summary Digest

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Pesticide Management Initiatives in Africa

Coffee insect pests are one of the major factors which affect coffee production and quality. Globally, coffee insect pests are estimated to cause losses of about 13%. However, in Africa, yield losses can be much higher, particularly where Arabica and Robusta coffees are grown for a long time. In Tanzania, the major insect pests are white coffee stem borer (*Monochamus leuconatus*), coffee berry borer (*Hypothenemus hampei*), Antestia bugs (*Antestiopsis spp*), leaf miner (*Leucoptera spp*), green scale (*Coccus spp*) and mealy bugs (*Planococcus kenyae*). Minor important pests, including yellow-headed borer (*Dirphya nigricornis*), thrips (*Diarthrothrips coffeae*) and berry moth (*Prophants smaragdina*), are reported to vary in crop losses caused. For decades, industrial chemicals have been used to control the prevailing coffee insect pests. However, uses of industrial chemicals have been reported to have negative implications for the environment, animals, and human health. In recent years, worldwide efforts have been focused on researching sustainable control measures for coffee insect pests. For over ten years, Tanzania Coffee Research Institute (TaCRI) has been developing ecologically and environmentally sustainable coffee insect-pests control measures which include the use of biopesticides, traps, parasites, attractants, and biological agents. These technologies are progressively adopted by coffee farmers in the country.

This document is a summary of the University of Cape Town’s Division of Environmental Health’s Pesticide Community of Practice held on the 9 June 2022 titled: “Pesticide Management Initiatives in Africa”. This digest presents the issues and points raised, and the information shared by participants in response to three questions prepared by the presenter, Godfrey Wilgod (HRNS). A total of 62 participants joined the live discussion and 1 individual blogged his responses. From the members who attended, 73% were from Africa, 3% were from Latin America and the Caribbean with 16% coming from Europe, 2% Eastern Mediterranean, 2% South-East Asia and 5% Western Pacific. Sector distribution amongst participants were as follows; 47% were from the government sector followed by 16% from non-governmental organisations, academia with 13 %, industry 13% and lastly 11% from intergovernmental Organisations.

About the Presenter



Godfrey Wilgod works with Hanns R Numan Stiftung (HRNS), a non-profit organization (NGO) operating in Tanzania (southern highlands -Mbeya). He is involved in the designing, preparation, and training of small-scale coffee farmers on the safe use and handling of agrochemicals in Tanzania (Mbeya region). He has been involved in agriculture extension for many years especially working with small scale farmers on creating awareness on the use of integrated pest management (IPM), health and environmental hazard of pesticides, biopesticides and safe use of agrochemicals. Godfrey holds a degree of Agriculture and Rural Innovation.

DISCLAIMER: The information below represents the opinions of members participating from different countries expressed during the discussion and shall not necessarily be taken to reflect the official opinion of the DEH, UCT, FAO, or Kemi.

PRESENTED BELOW ARE THE THREE QUESTIONS AND RESULTING DISCUSSION INPUTS FROM PARTICIPANTS:

Question 1: Explain how IPM is applied to agricultural practices in your country or the country you work in.

REGION	
AFRICA	
Ethiopia	<ul style="list-style-type: none"> ➤ Smallholder farmers use cultural IPM (e.g., crop rotation and intercropping). ➤ In closed agriculture, mostly in floriculture, some biocontrol agents are used as an IPM technique. ➤ IPM is implemented in only a few areas and scattered throughout the country. Most of the implementation is based on the project named, “Dirven”. However, farmers have indigenous knowledge. ➤ Government and pesticide companies echo the use of pesticides (synthetic) and as a result, farmers use them. Therefore, useful to know is how Tanzania made the transition to IPM.
Eswatini	<ul style="list-style-type: none"> ➤ Though biopesticides are used as alternatives to conventional pesticides, at times they are more expensive.
Guyana	<ul style="list-style-type: none"> ➤ IPM is used in the sugar cane industry as no chemical insecticides are applied. Sugar cane borers are major pests that are controlled biologically with a wasp. ➤ The cost of biopesticides can be lowered by reducing import tax and the cost of registration. To encourage the use of biopesticides, an incentive should be given. ➤ Reducing the costs of IPM can be done by rearing natural predators and releasing them into fields. This will involve an initial cost; however, it can gradually be repaid when natural predators are reared and released.

Kenya	<ul style="list-style-type: none"> ➤ Biopesticides are available in the country. Over 70 biopesticide products are registered but adoption remains low. IPM practices are common, especially among farmers who grow vegetables and fruits for export. Usually, it entails the use of methods like cultural methods, plant extracts, pesticides etc.
Madagascar	<ul style="list-style-type: none"> ➤ IPM is used by: <ul style="list-style-type: none"> • Farmers preparing pesticide plants available on site. • Some farmers use <i>Bacillus thuringiensis</i> (Bt) as a microbial pesticide in market gardening and for the control of Colorado potato beetles. • In 2019, to counter the spread of the fall armyworm some farmers used pheromone traps.
Rwanda	<ul style="list-style-type: none"> ➤ IPM practices are done through training extension workers. ➤ Biopesticides are not common since they are expensive. Farmers mainly use conventional chemicals.
South Africa	<ul style="list-style-type: none"> ➤ IPM strategies are practiced locally in South Africa and include: <ul style="list-style-type: none"> • Sterile Insect Technique (SIT) • Mating disruption • Biological control • Monitoring. ➤ The use of IPM varies in South Africa, from very limited to full implementation. Unfortunately, very few farmers fully adopted it, for example, in vegetable crops, only one brassica grower is known to have fully switched to biologicals and doesn't use synthetic pesticides. ➤ Genetically modified crops are still used like maize. ➤ IPM in South Africa involves biological activities like mass rearing, releasing & monitoring and is integrated with pesticide use and biopesticides. ➤ The experience in South Africa is that IPM focuses on the use of commercial pesticides and limited use of microbial or biochemical pesticides. ➤ Awareness and non-export crops are an issue. Little pressure is put on chemical companies or farmers to switch to alternatives. ➤ An advantage is that pests do not develop resistance to biopesticides. ➤ Costs can be reduced by encouraging greater adoption. ➤ If more farmers and consumers were aware of the acute and chronic health effects associated with synthetic pesticides, more support for less toxic alternatives would exist.
Senegal	<ul style="list-style-type: none"> ➤ The use of IPM is oriented towards alternatives to pesticides. Therefore, routes that use biopesticides such as neem, BT etc are promoted. However, the use of IPM applies only to small farms unlike agribusiness, which according to many studies, allegedly do not use IPM. ➤ Currently, awareness campaigns on the advantages of IPM are carried out by the agroecological transition committee, which uses exchange frameworks (e.g., focus groups and seminars) with farmers' organizations for the application of IPM.
Sierra Leone	<ul style="list-style-type: none"> ➤ Farmers do not believe in pesticide control and therefore, they do not focus on it.
Tanzania	<ul style="list-style-type: none"> ➤ IPM is slightly implemented: <ul style="list-style-type: none"> • In the country, there is a big biolarvicidal plant that produces microbial biopesticides for mosquito control. However, the plant is struggling to get buyers of the product because it goes concurrently with other synthetic pesticides. ➤ People's attitude towards conventional pesticides favours their preferred use. In agriculture, there are undocumented practices associated with the use of ash, rabbit urine and other local products that repel pesticide properties. However, this only happens when conventional pesticides fail. ➤ Biopesticides are incorporated in IPM, yet other local techniques are still used. Adoption is low due to the high price, particularly for small-scale farmers. ➤ It is beneficial that the government provides subsidies that will attract farmers to use biopesticides. ➤ A policy brief for policymakers should be used as an initiative for raising awareness.
Uganda	<ul style="list-style-type: none"> ➤ Typically, IPM is used by combining the use of plant resistance, due to attention to soil health and cultural methods. The use of biopesticides is low while the use of chemical pesticides is common. ➤ Most smallholder farmers use the different pest/disease management methods (e.g., host plant resistance, cultural, mechanical/physical etc) in isolation and they are not intentionally integrated as IPM. ➤ The use of biopesticides is largely limited to commercial farms, and under-protected environments for example, floriculture greenhouse farms.
Zambia	<ul style="list-style-type: none"> ➤ Most farmers who export to the EU, alternate the use of biopesticides with the approved chemicals used in the EU. ➤ Traps are used. ➤ IPM has not been taken up as much as the conventional pesticide management as the manufacturers have vigorous programs to advertise the pesticides. More efforts are needed for biopesticide use.
Zimbabwe	<ul style="list-style-type: none"> ➤ Agriculture is one of the pillars of the Zimbabwean economy and pest control has relied mostly on the use of chemicals. ➤ Recent advances in IPM allowed other avenues for pest control.

	<ul style="list-style-type: none"> ➤ IPM is applied in selected areas in Zimbabwe where some insects are used to control agricultural pests. However, the most common method of pest control is the use of biopesticides. In most cases, chemicals are rotated with biopesticides. ➤ Biopesticides such as <i>Beauveria bassiana</i> is used to control sap-sucking pests (e.g., mealybug) and aphids in cotton. It is used with beneficial pests. ➤ The use of biopesticides is expensive in the country. ➤ Biopesticides have been incorporated into IPM however, the uptake is still low due to low awareness and resistance to change as well as the availability of cheap conventional pesticides. ➤ The disadvantage is the rate at which biopesticides kill targeted pests and therefore there is slow uptake.
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Iran	<ul style="list-style-type: none"> ➤ Biological pest control started more than 60 years ago and was mostly used for the wheat bug. ➤ Eurygaster integrities employing tiny wasps from the Scelionidae family have been very successful. ➤ Different small Coccinellidae and other beetle families to control pests on citrus trees and it was a growing science in Iran in the University of Tehran with connections to big, related scientists Paul DeBach, etc. It was going good and successful however, an invasion of pesticide corporations took over: <ul style="list-style-type: none"> ▪ https://books.google.com/books/about/Biological_Control_of_Insect_Pests_and_W.html?id=rBLxAAAAMAAJ ▪ https://link.springer.com/book/10.1007/978-1-4757-9162-4 ➤ The neem tree, <i>Azadirachta indica</i> from the Persian Gulf has been introduced approximately 25 years ago together with many other natural products that are plant-based. ➤ Due to health problems by using conventional pesticides, one of the most important advantages of using biocontrol agents are less or no harm to human and wildlife.

Question 2: How does IPM differ from other methods of pest control? Name the type of method it differs from.

Reduces fogging

- IPM differs from spraying with knapsacks where the use of systemic pesticides causes fogging.

Uses different or all types of control methods

- IPM uses all control methods available to bring pest populations under the “economic injury level”.
- IPM is a multitasking approach that involves human methods and environmental ones.
- IPM is a strategy in which different methods (e.g., host plant resistance, cultural, biological, mechanical, chemical.) are strategically combined to form a package (IPM package) to manage a given pest(s). It emphasizes the minimal use of synthetic chemicals, and continuous field scouting and relies on the economic injury level for which method should be applied.
- IPM integrates many different pest management methods instead of only using one type of traditional methods.
- IPM makes it possible to switch to different methods.
- IPM is an integrated use control technique, where different control measures are effectively carried out.
- IPM programs combine management approaches for greater effectiveness. For example, when using chemical controls in IPM, the pesticide will be used in bait stations

rather than spraying; or spot-spray a few weeds instead of an entire area.

Causes less environmental and human harm

- IPM is safer for farmers and the environment as it minimises the use of chemicals. The minimum residual effect it has on crops makes it less toxic to consume.
- IPM is a useful approach to ensure that workers, the community, and the environment is not at risk.
- IPM is a healthier and environmentally friendlier approach compared to methods like chemical methods.

Specific to a location

- IPM strategy is a specific approach that considers the characteristics of the country.

Preventative

- IPM is preventative rather than a treatment.
- In sugar cultivation, flooding of fields takes place for 3 days to kill cane stalk borers (castnia) rather than treating them with insecticides.

Non-conventional methods are used

- IPM promotes non-conventional methods of controlling pests and diseases such as biological control and cultural practices.

Question 3: What is your perception/view on using biopesticides? Have you experienced challenges in obtaining biopesticides in your country? How can these challenges be addressed? List your country in your response.

REGION	
AFRICA	
Guyana	<ul style="list-style-type: none"> ➤ Biopesticides are a good way forward, however, the challenge is having them registered as the current regulations and requirements are for conventional pesticides and very stringent. Therefore, it may not be applicable to biopesticides. To address this, legislation can be amended to have separate requirements that encourage the registration and importation of biopesticides.

Ethiopia	<ul style="list-style-type: none"> ➤ Challenges concerning implementation are: <ul style="list-style-type: none"> ▪ Farmers look for quick fixes and therefore use conventional pesticides. ▪ IPM is knowledge intensive. ▪ Although IPM farmer field schools are the best and most dynamic extension model to promote IPM, some experts say it is an expensive approach. ➤ One of the challenges experienced is the connection of the use of biopesticides because there is no approved guideline for the registration of biopesticides.
Eswatini	<ul style="list-style-type: none"> ➤ Monitoring biopesticides in the country is limited making it difficult to judge the usage thereof. Registration of biopesticides can address the challenges.
Kenya	<ul style="list-style-type: none"> ➤ One challenge with alternatives to pest management is that there are no certification schemes that can motivate farmers to switch. The prices for products in the market are the same. ➤ Registration of biopesticides is encouraged by the government to companies and as a result, several activities are being registered. ➤ Biopesticides in IPM require timely monitoring.
Lesotho	<ul style="list-style-type: none"> ➤ There is no registration of pesticides at all in the country, however, a pesticides bill is being drafted and awaiting cabinet approval.
Malawi	<ul style="list-style-type: none"> ➤ Registration of biopesticides has been reduced by 10% because of the cost of registering other products. However, the goal is to register more than 20% of biopesticides on all plant protection products by 2040.
Rwanda	<ul style="list-style-type: none"> ➤ Biopesticides have the potential to reduce toxic exposures. However, as it is expensive, farmers do not easily adopt it. Therefore, to address these challenges, policymakers would get involved and motivate farmers to adopt them by applying subsidy schemes.
South Africa	<ul style="list-style-type: none"> ➤ Farmers are not aware of IPM and therefore turn to synthetic pesticides for pest control. ➤ There are some positive views on IPM and good experiences with using it in the country. ➤ One of the challenges in South Africa is to register biopesticides timeously for farmers awareness. ➤ For countries like South Africa, where there are no guidelines, the FAO/WHO and OECD guidelines on the registration of biopesticides are useful.
Tanzania	<ul style="list-style-type: none"> ➤ Though the registration of biopesticides takes place, the authority in charge attempts to first track and reduce the number of obstacles that take place during registration. The challenge is faced with regulation and monitoring of registration as an authority there are not enough efforts to capacitate us on biopesticides. ➤ The uptake of biopesticides is slow due to the lack of legislation on biopesticides and the stipulation on the requirements required during registration. Only guidelines from SADC and EAC are used. ➤ The use of biopesticides is as good as they alternate between the use of conventional chemicals. However, more effort is needed for research on how to minimize the negative impacts thereof. ➤ In Tanzania, few biopesticides have been registered due to the lack of information and poor market.
Uganda	<ul style="list-style-type: none"> ➤ The challenges associated with the use of biopesticides are the availability and efficacy thereof. ➤ Though many biopesticides have low toxicity, they are not readily available in the market.
Zambia	<ul style="list-style-type: none"> ➤ Availability is a challenge as all biopesticides are imported and in some cases, special storage facilities are needed. ➤ Biopesticides are slow to act after being applied. Therefore, farmers prefer fast-acting chemical pesticides. Additionally, the cost of biopesticides is a challenge. ➤ The effectiveness of biopesticides on some pests is a challenge in the country. ➤ Using biopesticides on a large scale is a challenge. ➤ Farmers are loyal because pesticides are very effective, and they can see the action on the pest almost immediately. On the other hand, IPM takes some time and is quite a process. It's not a matter of adding 10mils to 16 litres and you are done. IPM requires more efforts. ➤ Biopesticides are not so easy to find in agricultural shops.
Zimbabwe	<ul style="list-style-type: none"> ➤ Even without pesticide advertisements, farmers are loyal to conventional pesticides compared to alternatives in IPM. ➤ As conventional pesticides can be a once-off kind application, it is more appealing to farmers. ➤ Conventional pesticides are less labour intensive than trying all the control methods required by IPM. Biopesticides are slow-acting and their availability is limited in Zimbabwe. ➤ Many farmers apply pesticides 6-10 times a season and it is not a once-off process. However, there is an assumption that pesticides are more effective, but this assumption does not factor in resistance or health effects or soil damage, etc.
MIDDLE EAST	
Iran	<ul style="list-style-type: none"> ➤ Biopesticides are getting more available recently, biopesticides can cover a very wide concept and is now getting solutions to substitute dangerous "conventional pesticides".
Extra resources shared	<ul style="list-style-type: none"> ➤ FAO hosted a webinar on the use of predatory birds for quelea control to move away from the use of fenthion, recording thereof: http://www.pic.int/Implementation/CapacityDevelopment/Workshops/OnlineAfricanWorkshopMay27_2022/tabid/9192/language/en-US/Default.aspx ➤ Here is a relevant link to FAO's efforts toward understanding the challenges and opportunities of biopesticides' registration. https://www.youtube.com/watch?v=UUtAZpDKNg

PRESENTED BELOW ARE QUESTIONS FROM PARTICIPANTS AND AN ANSWER FROM THE PRESENTER'S PRESENTATION:

Question (Q) & Answer (A):

(Q): Is it possible to use biopesticides alone without using other forms of pest control?

(A): Yes, biopesticides can be used alone however, they come with limitations like having to use large quantities to control pests. When you are controlling pests, you must observe good agricultural practices like maintaining the general health of the crop.

(Q): Tell us what's your experience been in relation to farmers' willingness to use biochemical pesticides rather than synthetic pesticides

(A): Most farmers that I have worked with are not aware of all the biopesticides, despite their availability and viable nature. In the beginning, some farmers were hesitant. However, after setting many demos and trials with farmers, an improvement has been seen. Farmers are starting to switch to using biopesticides as they are cheap and accessible.

(Q): Does biopesticide work well in large-scale farming?

(A): The big challenge for biopesticides is getting large quantities. However, if large-scale farmers can get large quantities of it, it is possible. 75 acres of a coffee farm in Moshi Tanzania is purely organic and only biopesticides are used to control pests. If IPM is observed and biopesticides are used correctly, over the years, fewer biopesticides will be needed..

(Q): Why are biopesticides more expensive than chemical pesticides?

(A): It can be expensive because of the products needed for the mixture. Therefore, in large quantities, it can be expensive because a lot of materials can be needed. Additionally, it can be more expensive than chemical pesticides because of their accessibility.

(Q): Why would it be good for people to accept the IPM methods and move away from their traditional methods?

(A): One of the advantages of using IPM is that you can detect the pest in its early stages, and it can be applied to any stage. It is cheaper to use IPM once the concept has been mastered and it is environmentally friendly.

(Q): Is IPM practical for annual crops? IPM seems to work better for perennial crops.

(A): IPM can be used for perennial crops if it is used correctly. IPM and biopesticides go hand in hand and can be used for perennial crops.

Resources and Further Reading

1. Biopesticides: The Science of Organic Alternatives to Chemicals by Peter Keen: <https://stir-tea-coffee.com/features/biopesticides-the-science-of-organic-alternatives-to-chemicals/>
2. Innovative strategies for control of insect pest in coffee: <https://www.ajol.info/index.php/huria/article/download/152638/142227/0>

If you are not a member, we invite you to join UCT's Pesticide Discussion Forum:
<https://forms.gle/NzYH5REfUruL3jdm6>

The Division of Environmental Health (DEH) Pesticide Discussion Forum is a bi-monthly online seminar for pesticide regulators and resource persons, as well as students in the postgraduate Diploma in Pesticide Risk Management (DPRM). Our aim is to provide support for managing pesticide risks and implementing risk reduction strategies.

DEH is based in the School of Public Health and Family Medicine at the University of Cape Town (UCT). environmentalhealth@uct.ac.za

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