Opening remarks

Paving the way for lower risk crop protection: Regulatory pathways for the registration of biopesticides

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24 October 2024

Presentation outline

1. About CABI
2. Overview of PlantwisePlus
3. Pesticide risk reduction
4. Registration of biopesticides

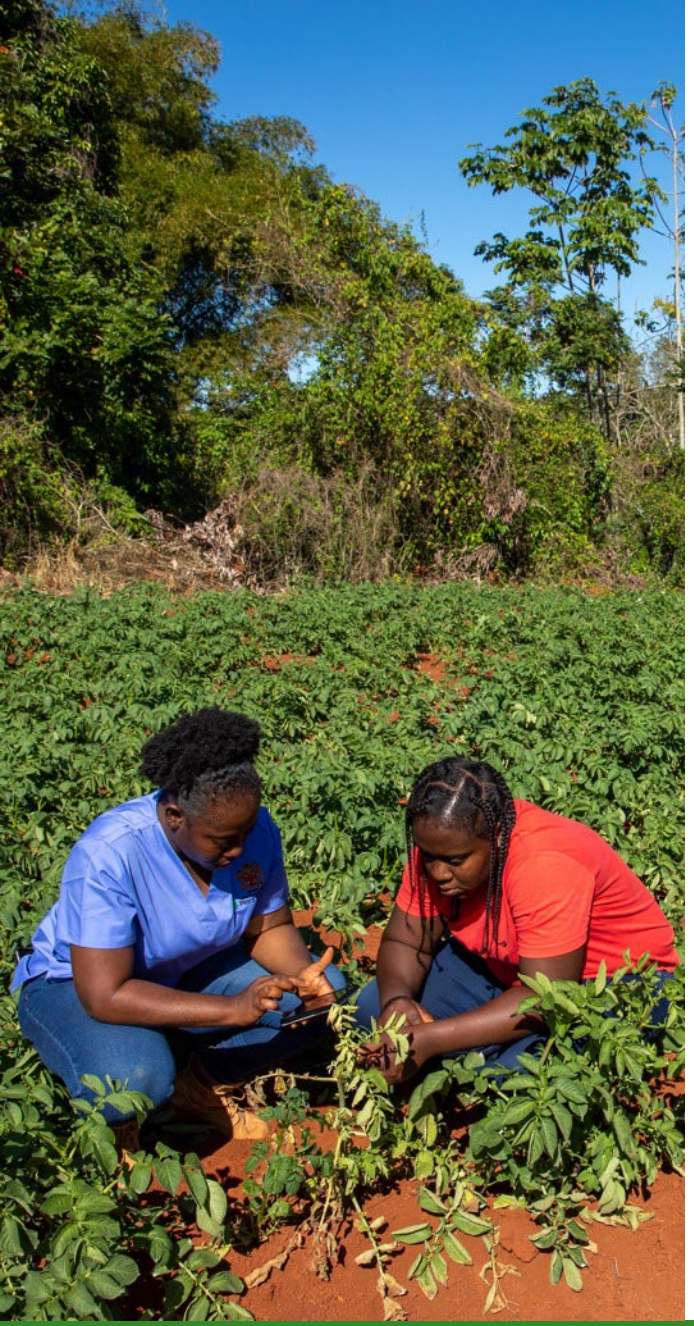
1. About CABI

CABI is an international not-for-profit organization that improves people's lives by providing information and applying scientific expertise to solve problems in agriculture and the environment

2. Overview of PlantwisePlus - 2024/30

Programme goal

75 million smallholder farmers in **27** low- and middle-income countries producing **more food** using **safer** and **sustainable** crop production practices, thereby improving **food security** and **rural livelihoods**.



Impact pathways

Pest preparedness

Coordinating and strengthening systems for detection and response to pest outbreaks

Pesticide risk reduction

Increasing awareness of, access to, and use of affordable integrated pest management solutions

Farmer advisory

Enhancing knowledge and uptake of integrated pest management practices through responsive digital advisory tools

PW+ Pesticide risk reduction

1. Identify risks and opportunities for risk reduction

2. Classical biological control

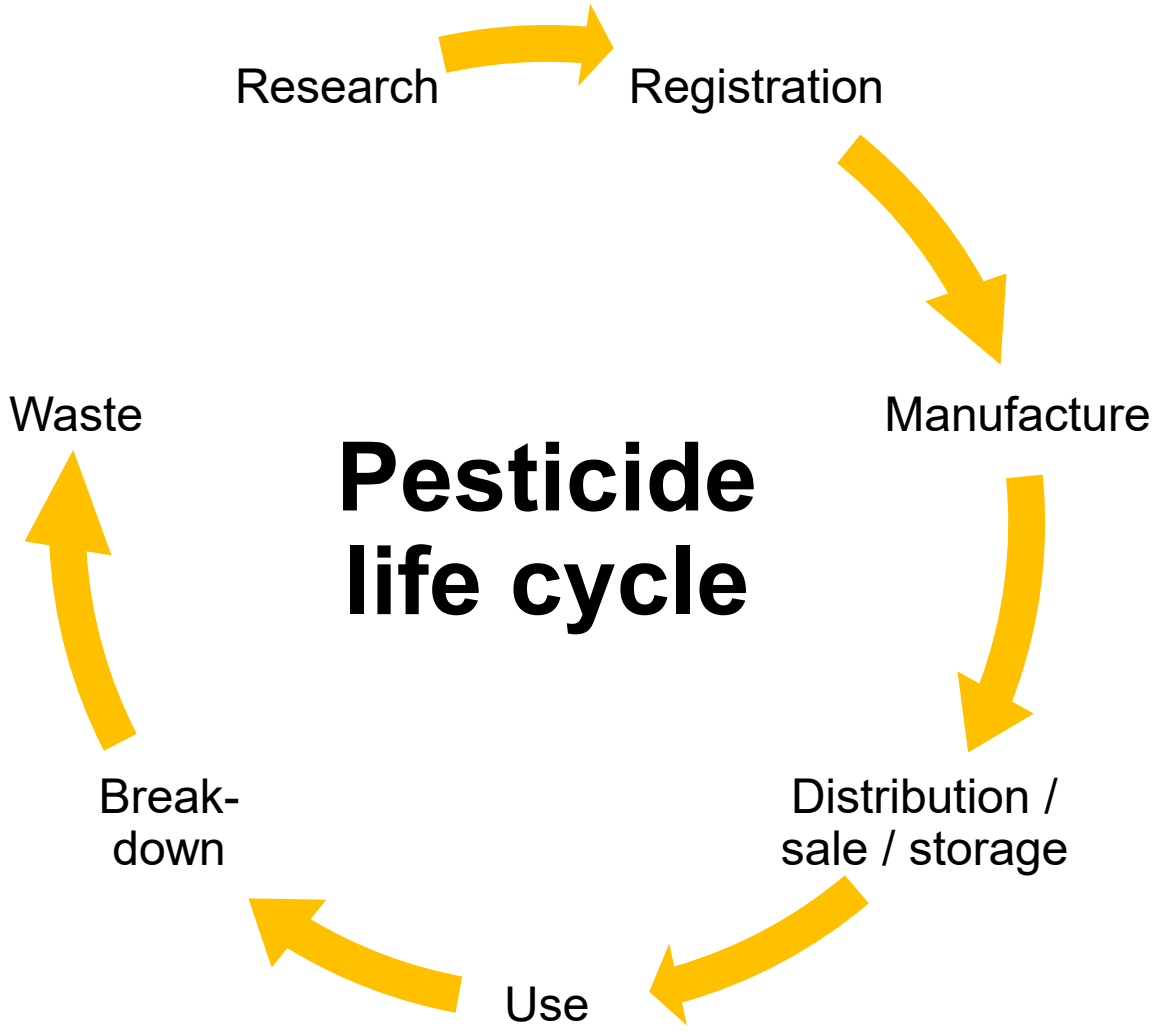
3. Augmentative biological control

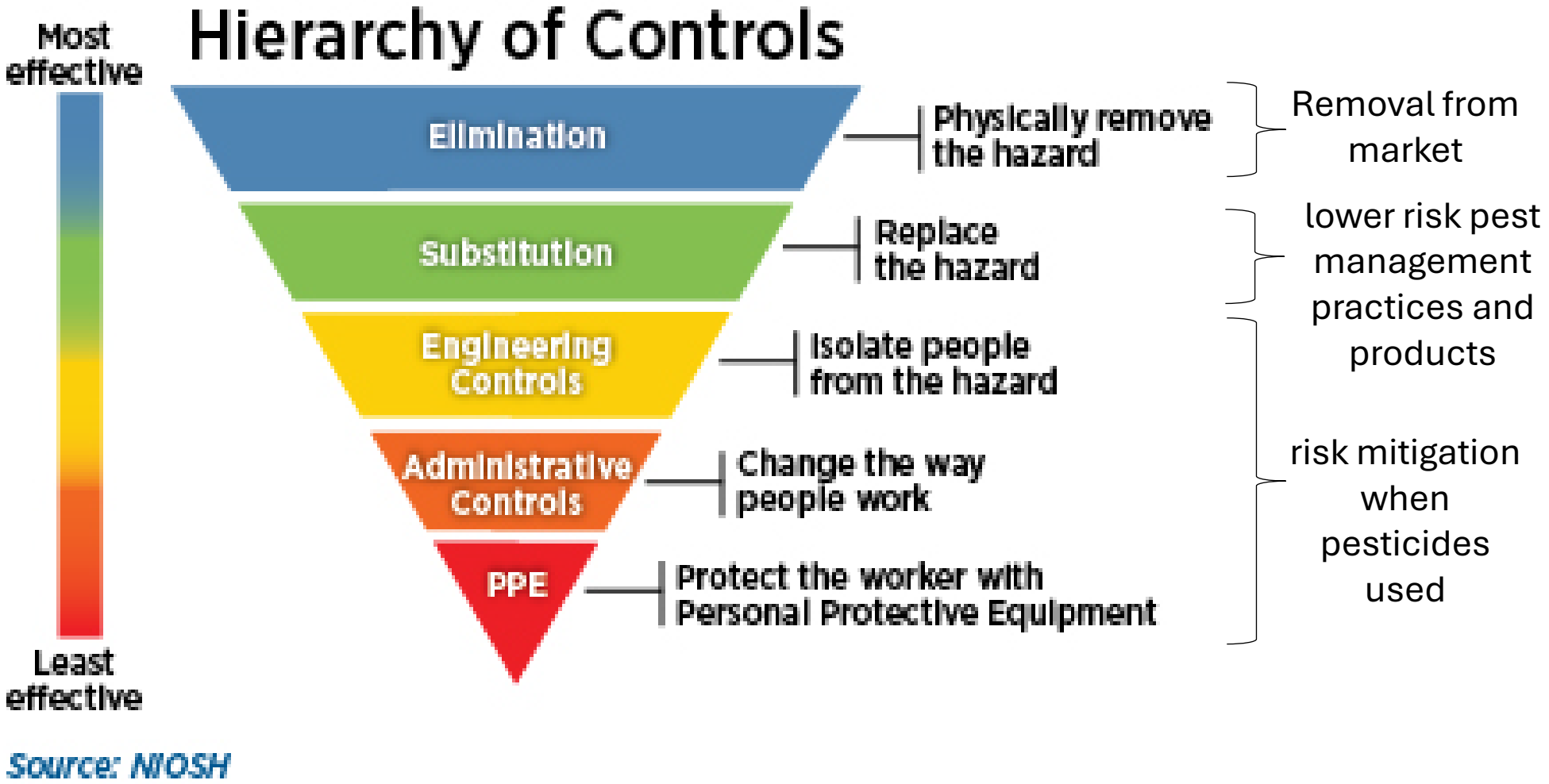
3. Pesticide Risk Reduction

Pesticide life cycle management

Over the course of a pesticide's life cycle

- Different risks at each stage
- Risks to applicators, farm workers, bystanders, communities, non-target organisms, soil and water, consumers, market access, etc.
- There are also opportunities for risk reduction




Hierarchy of Controls
Most effective
Least effective
Elimination
Physically remove the hazard
Substitution
Replace the hazard
Engineering Controls
Isolate people from the hazard
Administrative Controls
Change the way people work
PPE
Protect the worker with Personal Protective Equipment
Removal from market
lower risk pest management practices and products
risk mitigation when pesticides used
Source: NIOSH

Examples of lower risk products and practices for use in IPM

Regulators

Private sector

Advisors

Farmers

- CULTURAL CONTROLS TO AVOID, PREVENT OR SUPPRESS PESTS
  - Resistant / tolerant varieties / certified seed
  - Crop rotation
  - Adjusting planting location and planting date, plant spacing
  - Field sanitation
  - No-till or minimum till
  - Attractant / repellent plants
  - Augmentative, classical and conservation biocontrol
  - Physical barriers (mulch, nets)
- MONITORING
- DIRECT CONTROLS
  - Biopesticides
  - Low-risk synthetic pesticides
- POST-HARVEST CONTROLS

Examples of risk mitigation measures when pesticides are used

Regulators

Private sector

Advisors

Farmers

- Restrict use of high-risk pesticides
- Require lower risk formulations
- Ready to use products
- Reduced rate or fewer applications
- PPE, REI, PHI
- Drift reducing application techniques
- Resistance management
- Limit application to select crop stages
- Use of buffer zones
- Other stewardship measures

4. Registration of biopesticides

Biopesticide demand

- Use of biopesticides contributes to pesticide risk reduction since they are usually inherently less toxic than conventional pesticides and have good compatibility with beneficial organisms
- There is increasing demand for biopesticides as a tool in the IPM toolbox – approx 900 biopesticide products authorised in the EU and 2,000 registered in the US
- Tremendous growth biopesticide market can be seen globally
- In countries like Brazil, some biopesticides like *Metarhizium* are basically used by default as a preventive measure in many crops
- In some other countries, few or even no biopesticides are registered

Regulatory barriers to the registration of biopesticides

- Biopesticides are often regulated under the same legislation as chemical pesticides
- This can impose an unnecessarily high regulatory burden
- Many data requirements and evaluation criteria that are necessary to assess risks associated with conventional pesticides are not relevant to biological pest control agents
- Review of data from the CABI Bioprotection Portal indicates that, on average, countries with a regulatory framework for the registration of biopesticides have more biopesticide products registered than countries that treat biopesticides the same as conventional pesticides

Regional harmonisation of registration of biopesticides

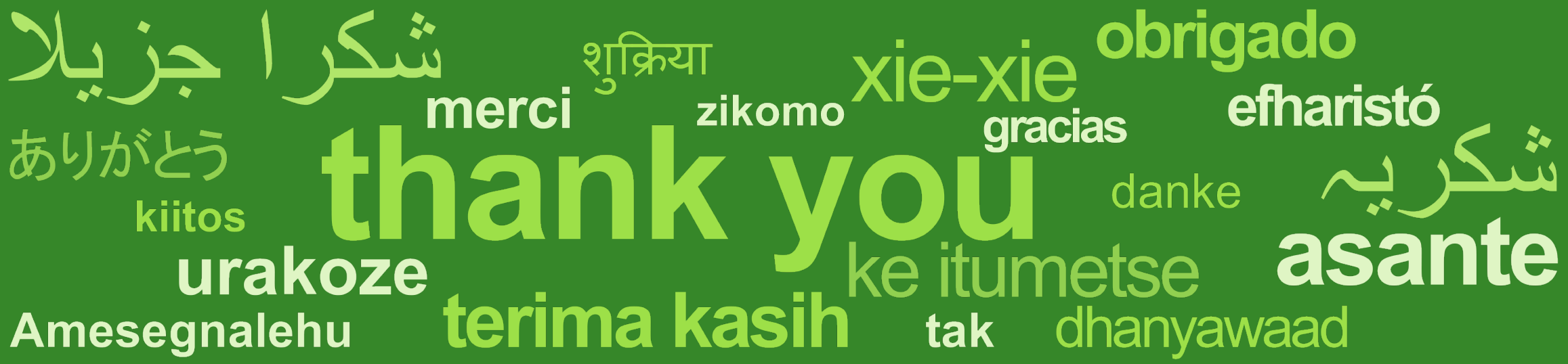
- Harmonization of the procedures for the registration of biopesticides is high on the agenda for many regions
  - Supports embedding good practice, for risk assessment
  - Reduces complexity
  - Grows the pie
- Examples
  - ASEAN
  - Caribbean, Central and South America
  - East African Community
  - Southern African Development Community
  - Etc.

Resources and collaboration

- Guidelines support identification and alignment with best practices
  - OECD various guidelines
  - FAO Guidelines for the registration of microbial, botanical and semiochemical pest control agents for plant protection and public health uses
  - EAC Harmonized Guidelines For The Registration Of Biopesticides And Biocontrol Agents For Plant Protection
  - ASEAN Guidelines on the Regulation, Use and Trade of Biological Control Agents
- Partnerships
  - FAO, USDA, AgAligned, CABI, ICGEB, IICA, CropLife, STDF
  - Sharing of expertise and lessons learned across countries and regions

National domestication

- New or amended rules and regulations
- Updated processes, training of regulatory staff
- Awareness raising with interested stakeholders



CABI as an international intergovernmental not-for-profit organization, gratefully acknowledges the generous support received from our many donors, sponsors and partners. In particular we thank our Member Countries for their vital financial and strategic contributions.

Overview of status of biopesticide regulation in Africa, success stories through regional harmonization, next steps for continental harmonization

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African Union

Inter-African Phytosanitary Council of the African Union (AU-IAPSC)

History

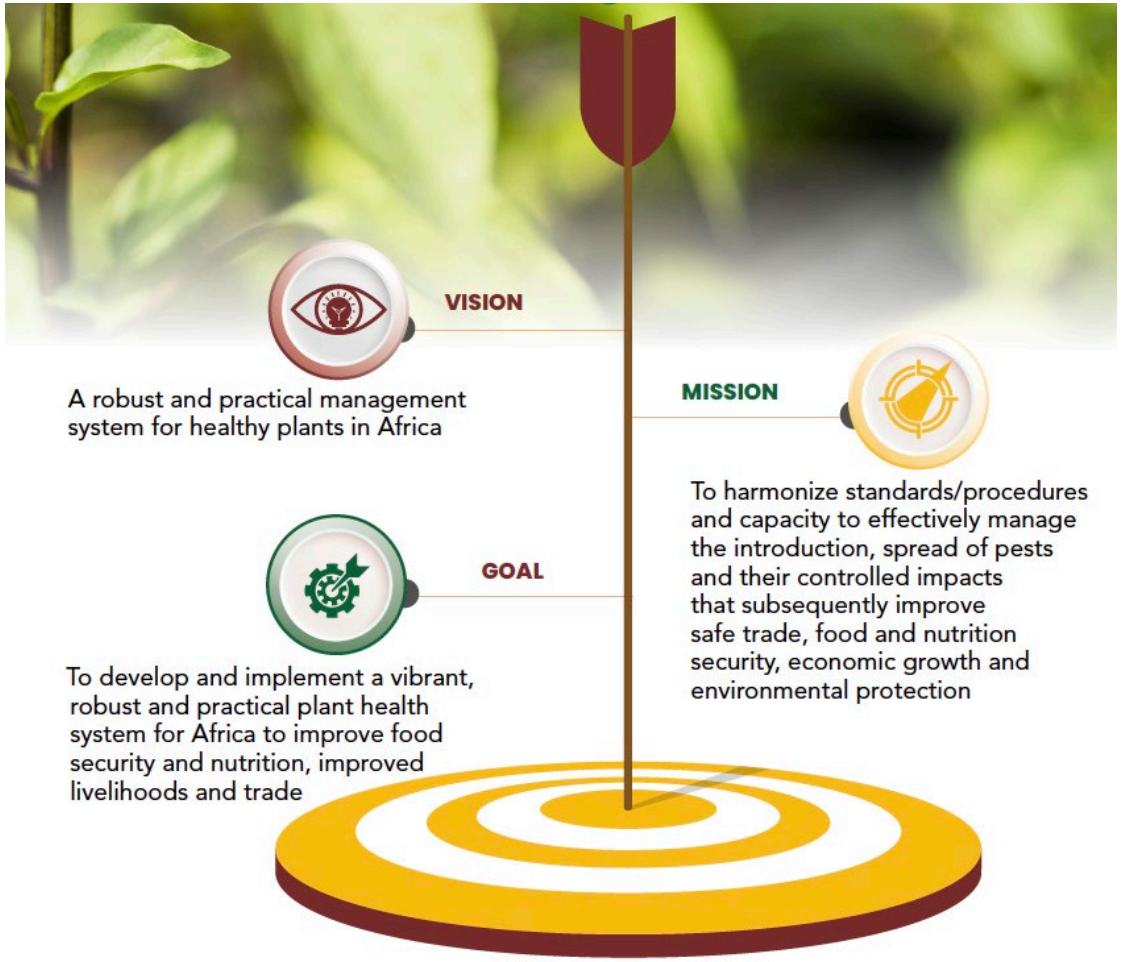
- The African Union Inter-African Phytosanitary Council (AU-IAPSC) was established on the recommendation of FAO in 1956 in London and became part of the Organization of African Unity (OAU) in 1965.
- In 1967, the headquarters of the Council was transferred from London to Yaoundé, Cameroon.
- A Specialized Technical Offices (STO) of DARBE and RPPO of IPPC

Context: No plants, no life

- Life on Earth depends on plants. They sustain all other life forms and provide oxygen, food, clothes, shelter, and medicines. Because they are so fundamental to humans, plants require protection.
- The introduction and spread of plant pests among food crops is a severe threat with far-reaching economic, social, and environmental consequences.

- Agenda 2063, CAADP
- UN SDGs
- AfCFTA
- PHSA

THE PLANT HEALTH STRATEGY



THEORY OF CHANGE FOR PLANT HEALTH STRATEGY FOR AFRICA 2022– 2036

CHALLENGES

- Insect pests and diseases constraints
- Climate change risks
- Limited infrastructure for plant protection
- Limited knowledge of sustainable agri. technologies
- Uncoordinated policy and regulations

- Low adoption of agriculture technologies
- Low crop productivity
- Pre- and postharvest losses
- Food and nutrition insecurity
- Fragile ecosystems
- Weak household resilience
- Poverty
- Low intra-African trade
- Limited compliance with SPS and other trade requirements in member states

ASSUMPTIONS/RISKS

- Stakeholders' ownership of the strategy
- Adequate funding to support implementation of the PHSA
- Existence of vibrant private and public sectors
- Effective coordination, communication and participation in plant health actions across continental, regional and MS levels
- Positioning the PHSA to pivot continental plant health initiatives that contribute to the realization of the AfCFTA and economic growth
- Countries are willing to share information on data on plant health protection systems (including pests and disease analysis protocol etc
- Economic and political stability at national, regional, and continental levels.
- Favourable and conducive climate and weather conditions.

KEY ACTIVITIES

- Strengthen institutional capacity and coordination for the plant health system;
- Improve and build capacities for research, pest monitoring and management strategies and control measures that can aid the plant health interventions to improve production along the value chain;
- Assist Member States to improve phytosanitary communication and awareness and build and strengthen stakeholder relationships.

- Improve legislative frameworks for plant health interventions
- Enhance continental harmonization of phytosanitary policies, regulations and standards and promote continental cooperation and mutual recognition of the application of equivalent phytosanitary measures;
- Strengthen phytosanitary capacity in the region to support market access;
- Assist Member States to effectively participate in international coordinating mechanisms and influence continental plant health positions

SPHERE OF CONTROL

OUTPUTS

- Plant Health institutional capacity and coordination strengthened at country, regional, and continental levels.
- Enhanced plant health research capacity and coordinated interventions for pest monitoring and management at all levels.
- Improved phytosanitary communication among MS and enhanced awareness and relationships among stakeholders at all levels

- Legislative environment for Plant Health interventions in Member states enabled
- Harmonized phytosanitary legislative framework (policies, regulations, and standards)
- Improved market access for plants and plant products
- Enhanced influence of Africa on global phytosanitary matters in International Standard Setting Bodies (ISSBs)

SPHERE OF INFLUENCE

OUTCOME

Increased crop production and productivity

Increased access to the export market and facilitate trade

IMPACT AREAS

- Improve food and nutrition security
- Increased employment and poverty reduction
- Resilient economic growth
- Resilience

SPHERE OF INTEREST

SGDS & CONTINENTAL & GLOBAL POLICY FRAMEWORKS CONTRIBUTIONS

Continental & Global Policy frameworks

- AU Agenda 2063
- IPPC
- CAADP
- Malabo Declaration
- AfCFTA
- WTO-SPS Agreement

Cross-cutting : Monitoring, Evaluation & Learning, Gender inclusion, Climate Change, Communication & knowledge sharing , partnerships and collaboration

Context

- Agriculture is central for African countries and to their economy, accounting for 40% of GDP, 15% of exports, 60 to 80% of employment, and 75% of intra-African trade.

- The establishment of the AfCFTA, African countries have committed to boosting intra-African trade and economic integration.

- Countries across the continent face pest and pesticides management issues. Invasive species, climate change and other factors are leading to increasing pest pressure.

- African Union and its partners is committed to protect food security, food safety and enhance plant health, environmental protection and livelihoods,

- The use of chemical control has been the norm for many years; however, misuse and overuse of synthetic chemicals can be harmful to beneficial non-target organisms, human health, and the environment.
- Invasive pests and disease usually arrive without their complex of natural enemies making residents in new territories.
- for many crops of importance in Africa, both for consumption and export, maximum residue limits (MRLs) regulations impact trade negatively.
- Missing and low MRLs may necessitate the non-use of certain chemicals if the produce is to be accepted for exportation.

Growing human and environmental health concerns

- Conventional chemical pesticides are proven hazardous for human health
- Organophosphate (OP) for example insecticides inhibit the level of the enzyme acetylcholinesterase (AChE) in the nervous system of insect pests,
- The chemical pesticides used in pest control are not specific but kill other insects as well, including pollinators and parasitoids, mammals, birds and reptiles, aquatic organisms can be affected
- Misuse and overuse of chemical pesticides also lead to resistance build ups

Growing human and environmental concerns

- Pesticides regulators have struggled to keep pace with the increasing demand and the rapid growth in pesticide sales.
- Fraudulent pesticides of dubious quality account for roughly one-third or more of all pesticides sold.
- The use of unregistered and smuggled products, and the sale of banned products and counterfeit pesticides have been reported in many countries.
- Detections of pesticide residues which are not registered for use in the country of origin confirms that there is sometimes a problem in this regard.
- Export-oriented countries are under pressure from international trade partners to avoid hazardous chemicals, and to register lower risk pesticides.
- Import markets are in turn encouraging registration of lower risk products.

Risks of being affected by chemical Desert Locust control

Livestock

Wildlife

Pollinators, natural enemies of crop pests

Fish

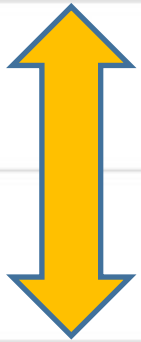
Soil organisms

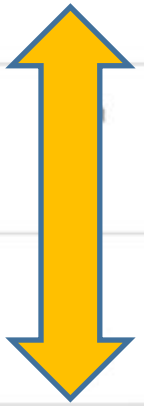
Aquatic invertebrates

High

Medium

Low





- Crop protection cannot be achieved at the expense of human, animal and environmental health countries must comply with phytosanitary quarantines measures for trade.

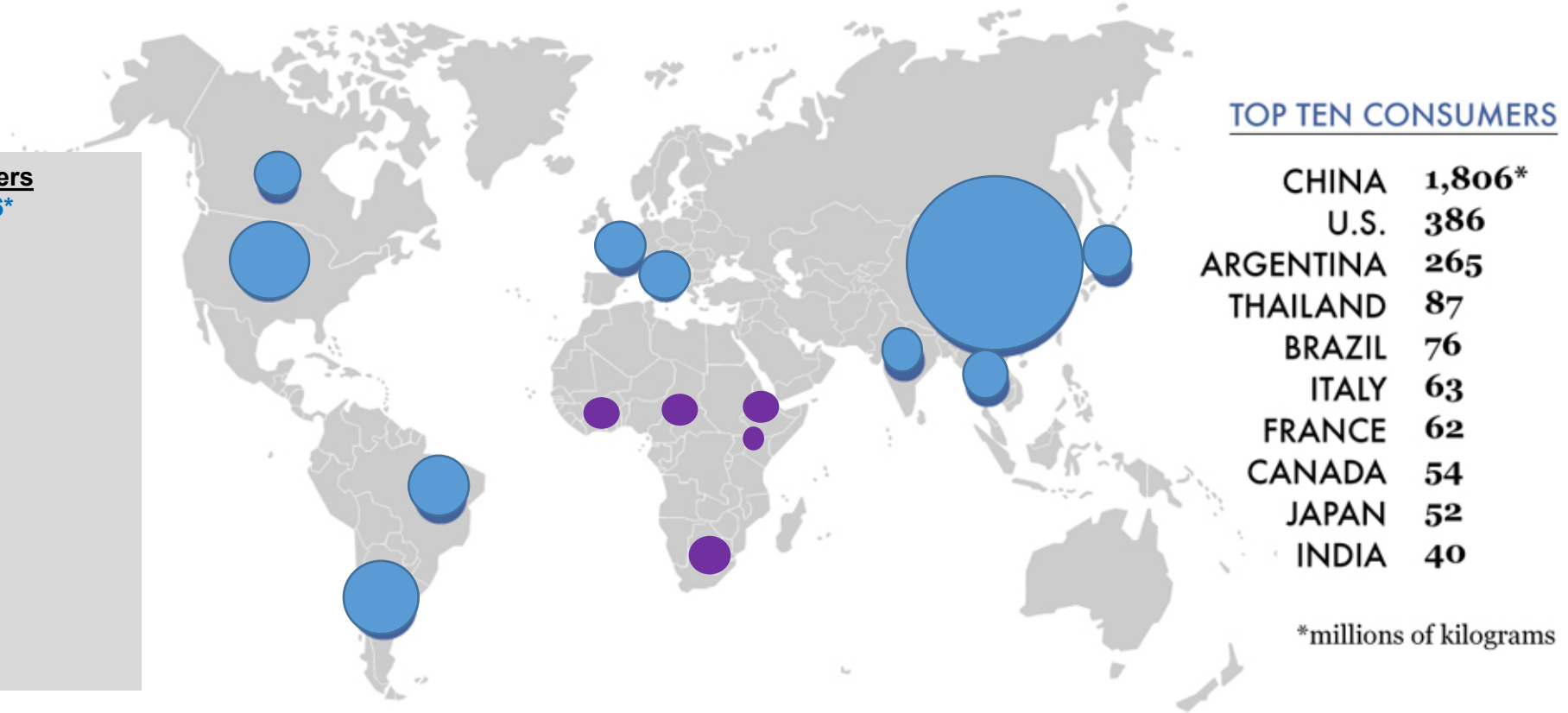
- Significant barriers to progress exist in identifying, making available, and supporting uses of low-risk pesticides/bio-pesticides in IPM frameworks against pest.

- These barriers span from regulation and access, capacity for reducing pesticide risks, farmer engagement and education, and economic and efficacy data

Annual pesticide consumption worldwide – 3.5 billion kg AI per year

Top consumers

- China 1,806*
- USA 386
- Argentina 265
- Thailand 87
- Brazil 76
- Italy 63
- France 62
- Canada 54
- Japan 52
- India 40
- S/Africa 27
- Ghana 15
- Cameroun 11
- Ethiopia 4
- Kenya 1.6



TOP TEN CONSUMERS

CHINA	1,806*
U.S.	386
ARGENTINA	265
THAILAND	87
BRAZIL	76
ITALY	63
FRANCE	62
CANADA	54
JAPAN	52
INDIA	40

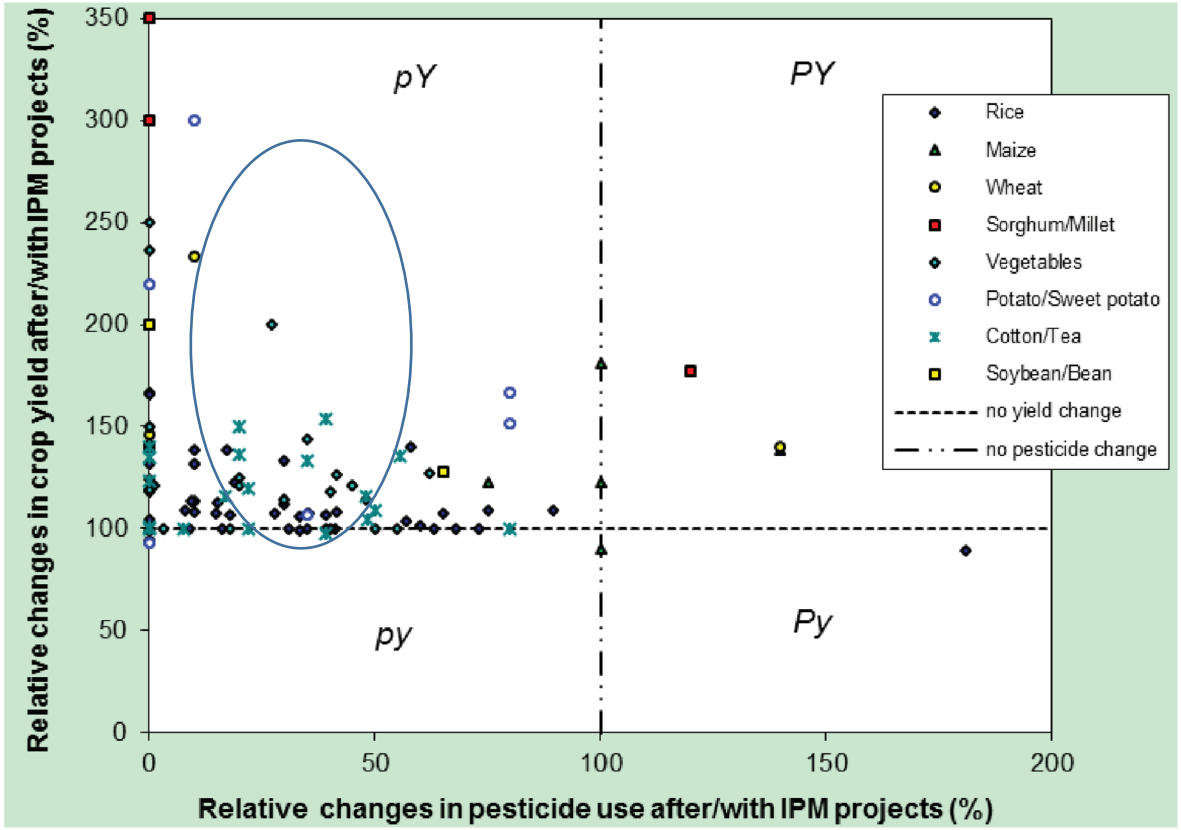
*millions of kilograms

Sources: Pretty and Bharucha, *Insects*, 2015, FAOSTAT, OECD.

Courtesy, icipe

Impact of various IPM approaches on crop yield

Bio-based IPM less reliant on external inputs is the option for Africa



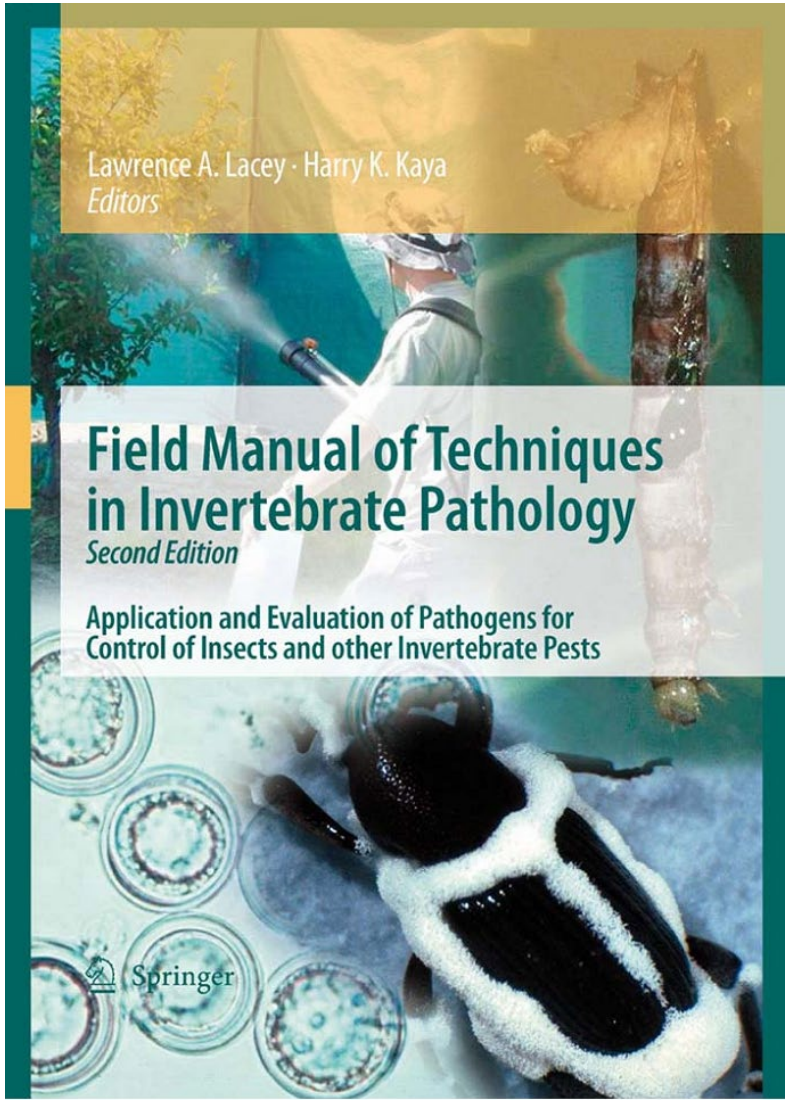
pY – low pesticide/Higher yield gain; py – low pesticide/low yield gain; Py – High pesticide/High yield gain; Py – high pesticide use/lower yield

Courtesy, icipe

Pretty and Bharucha, 2015

What is a biopesticide?

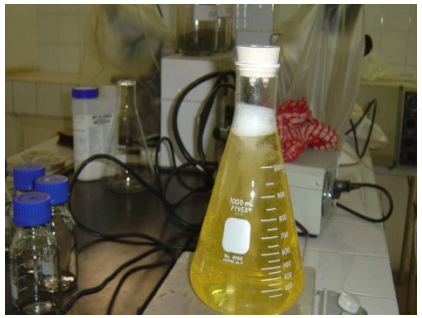
- *A biopesticide is a biological substance or organism that damages, kills, or repels organisms seen as pests.*
- *Biological pest management intervention involves predatory, parasitic, or chemical relationships.*
- *They are obtained from organisms including plants, bacteria and other microbes, fungi, nematodes, etc.*



Pathway Biopesticide Development

Prospection

Isolation & Purification



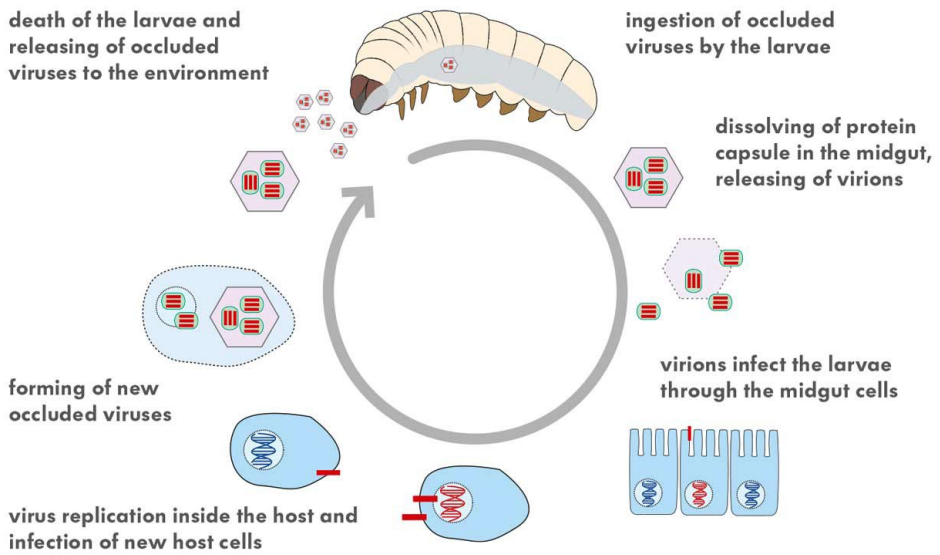
Mass production

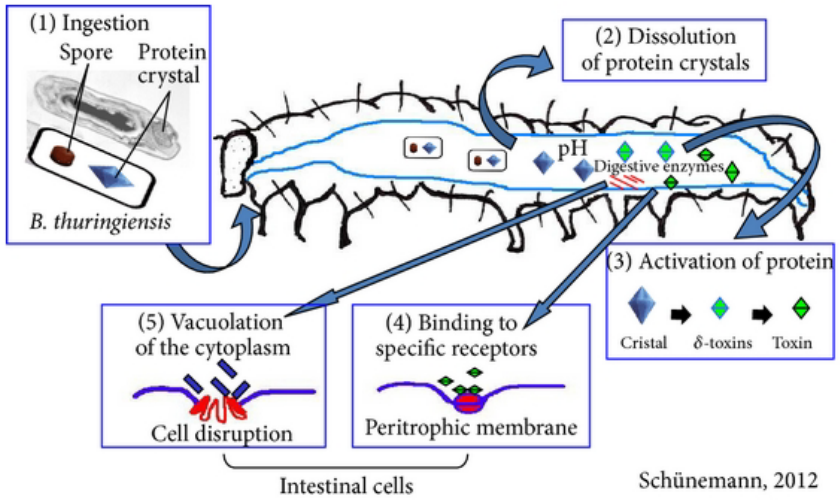
Dry spores

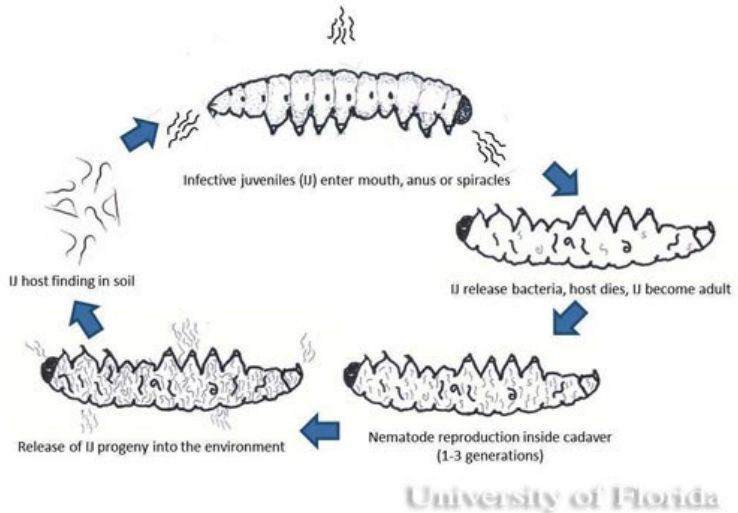
African Union

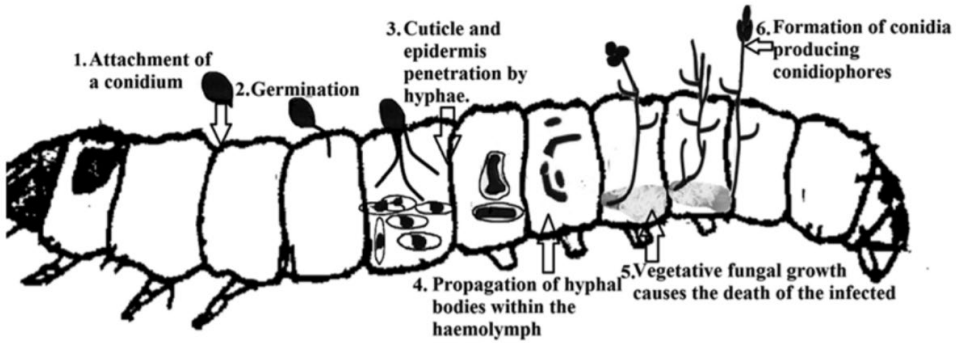
Inter-African Phytosanitary Council of the African Union (AU-IAPSC)

Mode of action of some biopesticides







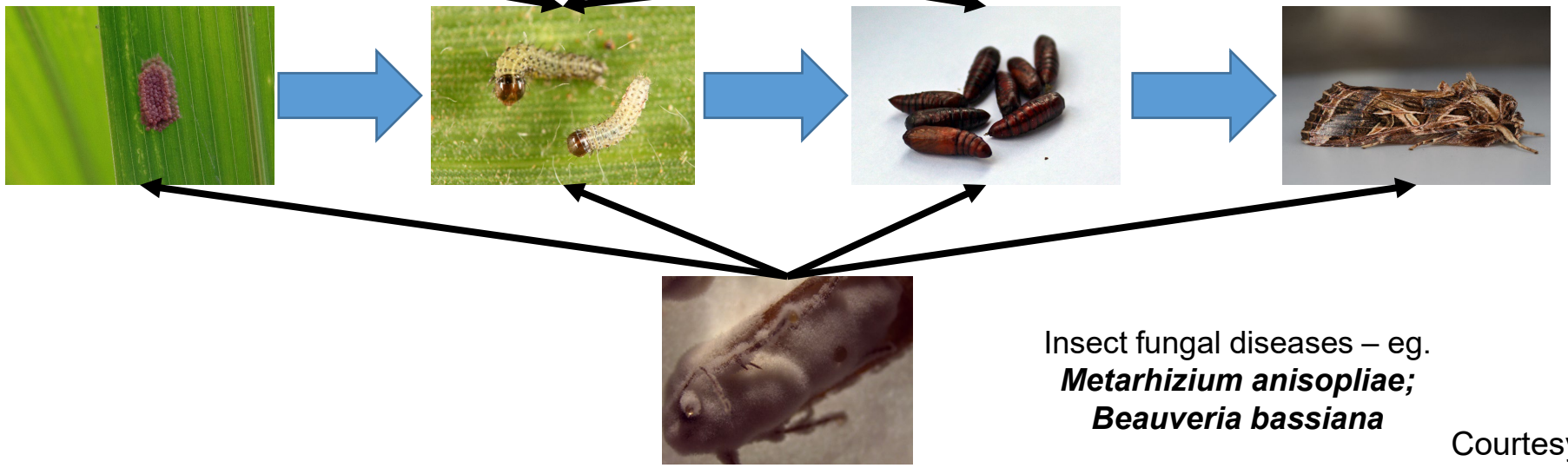


Development of a Biopesticide products for all stages for FAW

Insect viral diseases – eg. **Baculoviruses**

Entomopathogenic nematode– eg. **Baculoviruses**

Insect bacterial diseases – eg. ***Bacillus thuringiensis***



Insect fungal diseases – eg. ***Metarhizium anisopliae; Beauveria bassiana***

Courtesy icipe

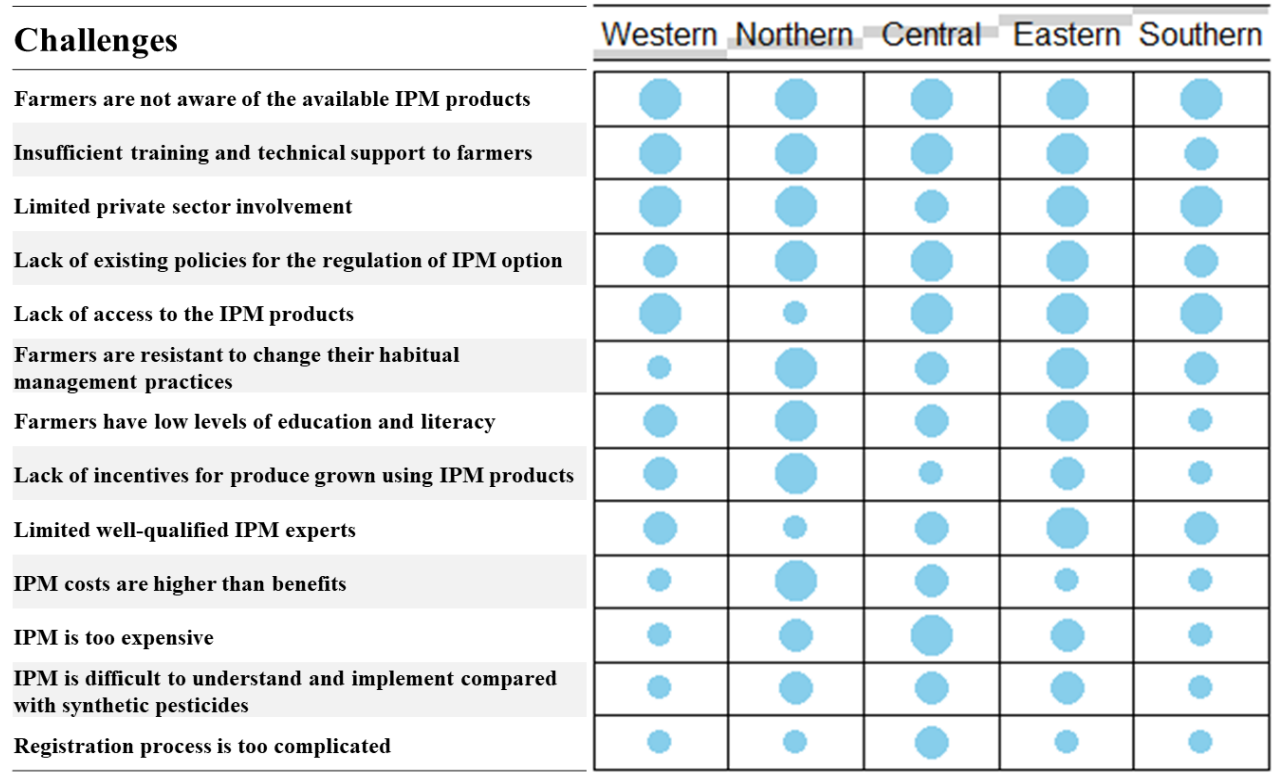
Advantages of biopesticides

- Ecologically safe, biodegradable and no harmful residue in the crop.
- Can be cheaper than chemical pesticides when locally produced.
- Often highly effective for management of pesticide-resistant insects and more effective than chemicals in the long-term.
- Target specific and safe to natural enemies.
- Can be effectively integrated with sustainable pest management approaches.

- When used in conjunction with good crop management they can help to keep pest levels under control, reducing the need to apply other pesticides.
- There are commercial biopesticide products against pest available for import from the Americas and Europe, and some have been developed in tropical Africa.

Barriers to the Uptake of IPM Technologies

Challenges	Frequency (%)
Farmers are not aware of the available IPM products	14
Insufficient training and technical support to farmers	12
Lack of access to the IPM products	12
Limited private sector involvement	11
Lack of existing policies for the regulation of IPM options	10
Limited well-qualified IPM experts	8
Farmers have low levels of education and literacy	8
Farmers are resistant to change their habitual management practices	7
Lack of incentives for products grown using IPM products	6
IPM is too expensive	5
IPM is difficult to understand and implement compared with synthetic pesticides	3
Registration process is too complicated	3
IPM costs are higher than benefits	1



Technical Challenges Specific to Biopesticides

- Challenges that influence uptake of biopesticides in Africa include product efficacy and speed of action (no knock-down effect),
- Biopesticides are more target-specific and may be less appealing to the farmer who can use a synthetic pesticide that targets multiple pests
- Another key challenge is availability, mainly revolving around registration and distribution
- Biopesticides are not widely available for multiple crops, and regulatory constraints also mean biopesticides are only sold in a few selective markets reducing the target market size for companies to develop viable solutions

Technical Challenges Specific to Biopesticides

- Lack of knowledge of pest, and speed/ scale of spread
- Lack of awareness and availability of solutions
- Slow response to the pest challenge
- Overcome barriers to IPM adoption that incorporates pesticide use when necessary
- Develop effective education programs for IPM adoption that place pesticides in an IPM context
- Identify innovative ways for mass production, formulation and application of Biopesticides.

Technical Challenges Specific to Biopesticides

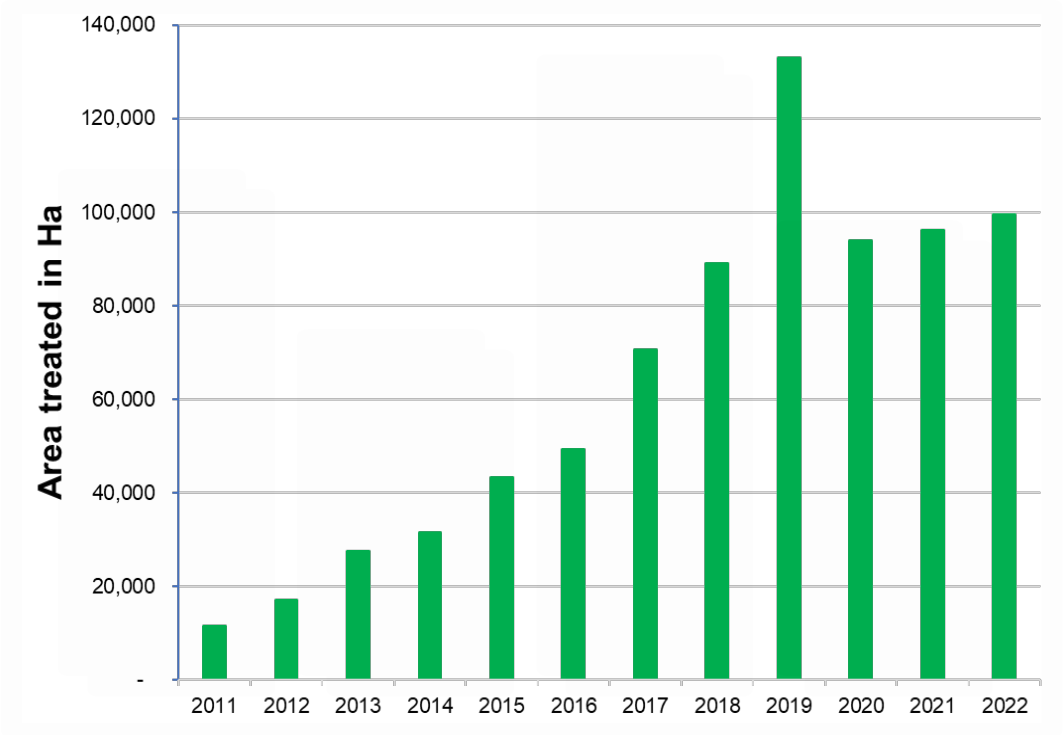
- Awareness and training programs are critical
- Identify existing biopesticides that have been discovered in many labs and scale them out with PPP
- Enable local researchers, hand-in-hand with international expertise available in-country, to identify and commercialize biological solutions
- Evaluation and evidence gathering concerning efficacy experiments that can be conducted by independent third parties
- Sharing experimental data and distributing information

Beyond the Technical Challenges Specific to Biopesticides

- Instrumentation and Infrastructure
- Market Reality and Food Consciousness
- Agroecological Transition and Food System
- New Advances in Application Technologies including Drones

Leadership: A multi-institutional alliance to educate on, disseminate and promote biopesticides with IPM PPP, digital platforms, private investment.

Scaling up of commercialized biopesticides



Registration status -
Registered in 13 countries

- **Area treated (2022):** 99,510 ha compared to 132,994 ha in 2019 due to COVID-19 restrictions
- **Growers adopting biopesticides (2022):** 39,804 (35% women 65% men)
- **Direct beneficiaries (2022)**: 238,824 grower household members

Courtesy Akutse

Current status of regional harmonisation of plant protection products in Africa

The African Union CAADP aims to:

- improve rural infrastructure and trade-related capacities for market access and improve agriculture research, technology dissemination and adoption.
- enhance resilience to climate variability through the development of disaster preparedness policies and strategies, early warning response systems and social safety nets at national and regional levels.

The RECs support the economic integration of their members, and they support the development and harmonisation of agricultural policies.

The work of the RECs is interlinked with that of the AU, and the RECs serve as the building blocks of the AU.

To achieve these ambitious goals, it is imperative to scale out agricultural technologies such as biopesticides and biological control products to all member states, to promote access to millions of smallholder farmers but, most importantly, to harmonize the registration procedures at regional and continental levels.

- The aim is to make a case for the establishment of a continental mechanism to support harmonisation of pesticides management, focusing on guidelines that support the registration of plant protection products.

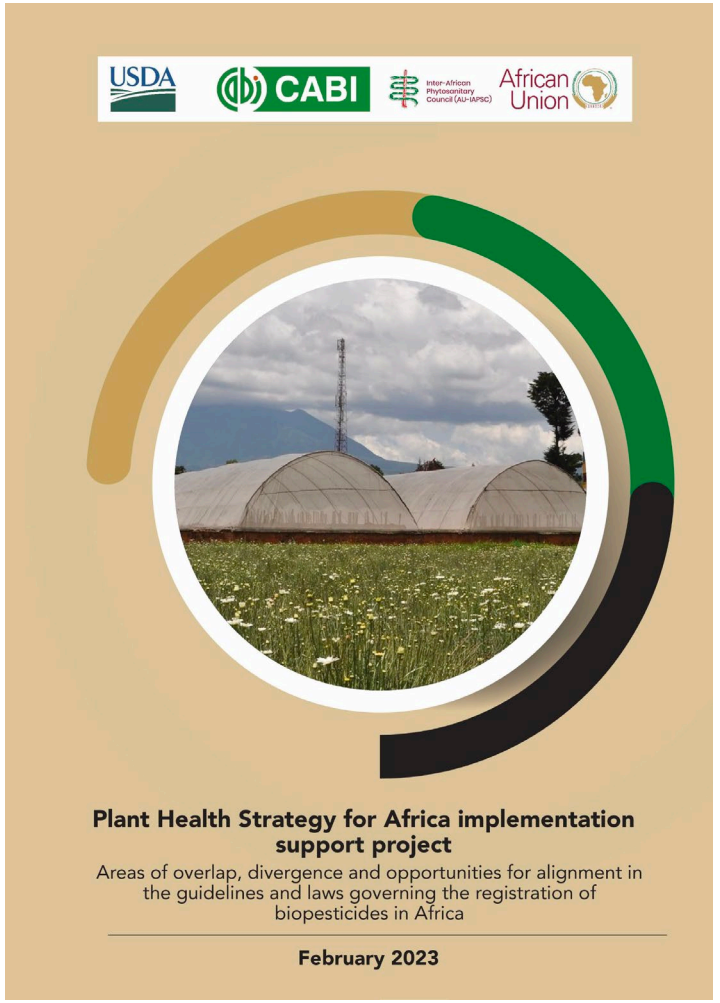
- It provides an overview of the needs addressed by regional harmonisation, the current status of regional harmonisation and the case for regional and continental mechanisms.

- It proposes a modality and way forward for continental harmonisation.

Two Studies

1. ***Continental Guidelines for the registration of biopesticides***.

2. ***An overview of biopesticide regulatory frameworks across the African Continent*** was conducted as a first step.



Methodology

- Literature search, key informant interviews with representatives of AU-IAPSC, the RECs and national governments, and recommendations from two stakeholder consultative workshops, namely th AU-IAPSC Workshop

- Strengthening Member States and RECs Pesticide and Biopesticides Registration Guidelines in May 2022 in Nairobi, Kenya;

- Workshop on Advancing Regulatory Harmonization and Biopesticide Innovation in Africa held in March 2024 in Cape Town, South Africa

- African Union Commission (AUC) and each of the RECs (CEN–SAD, EAC, ECCAS, ECOWAS, IGAD, SADC).
- Additional information from CEMAC, CILSS, WAPRC, UEMOA, and ICGEB.

Current status of regional harmonisation of plant protection products in Africa

- Many of the RECs have established initiatives for harmonisation of the registration and management of plant protection products.
- A recent analysis found that participation in regional harmonisation initiatives is relatively high, with 93% of AU Member States participating in one or more initiatives.
- However, the harmonisation system at continental level remains fragmented given the fact that countries' level of integration varies.

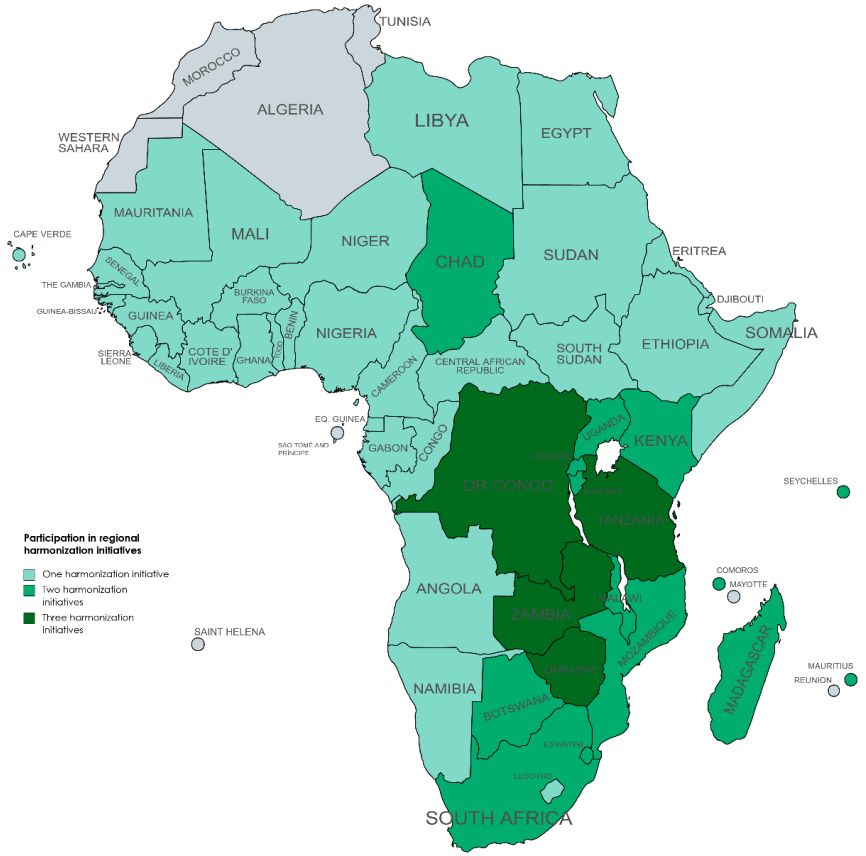


Figure 1 Map illustrating country participation in regional harmonization initiatives (IAPSC and CABI, 2024)

WAPRC : the implementation tool

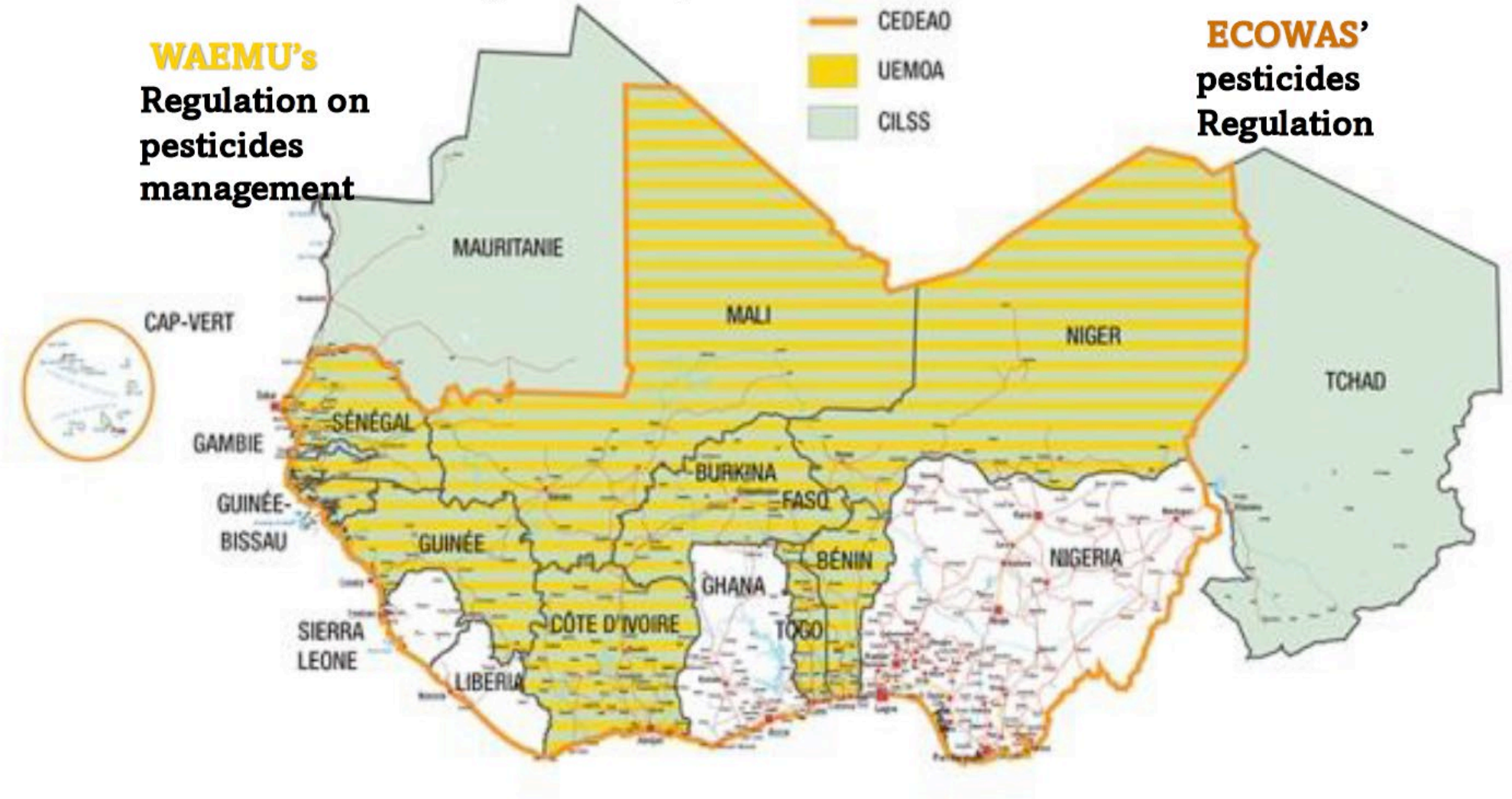
WAPRC → Support the regional registration of pesticides in the Sahel and WA

I. Pesticides regulatory background

CILSS' common regulation on pesticides

WAEMU's Regulation on pesticides management

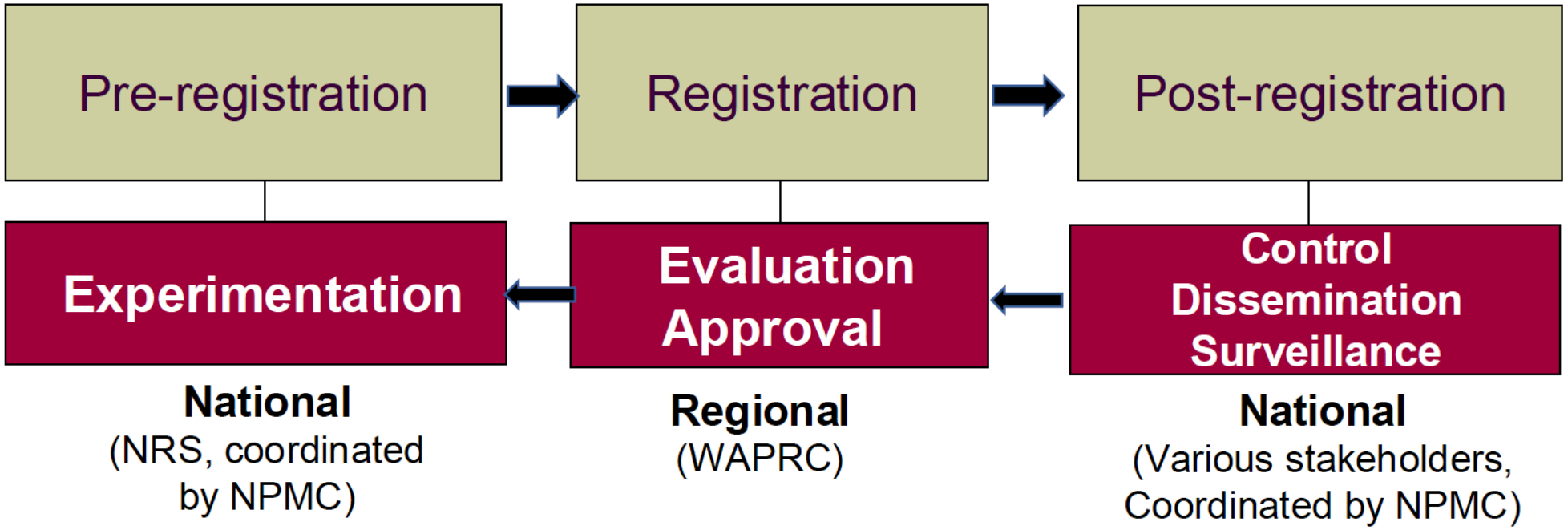
ECOWAS' pesticides Regulation



Harmonization of the rules governing pesticides registration and management in the ECOWAS-WAEMU-CILSS region since 2010

II. Implementation of the regional harmonization

A regional approach with 3 levels taking into account the entire life cycle of pesticides



Scientific assessment of registration files (Risk assessment)

1. Administrative information
2. Phys–chem file
3. Bioefficacy file
4. Analytical file
5. Toxicology file
6. Environnement / Ecotoxicology file
7. Residues file
8. Labelling and packaging

PEST CONTROL PRODUCTS BOARD

REGISTRATION OF PRODUCTS FOR USE IN KENYA

Pre-registration consultation

Application submitted through Online Pesticide Registration System

Range of products

- ✓ Mites (*Acaricides*)
- ✓ Fungicides
- ✓ Insecticides
- ✓ Herbicides
- ✓ Rodenticides
- ✓ Nematicides

Technical dossier

Summary dossier

Analytical grade a.i.

Proposed label

Dossier/ Application Evaluation

YES

NO

Inform applicant

Issuance of trial permit

Local efficacy trials

Technical Review: Technical committee of experts conducts health and environmental risk assessment and review performance

Rejection

YES

NO

Approval/Registration

PCPB ISO 9001:2008 Certified. Promoting Productivity , Safeguarding Human Health & the Environment to attain Vision 2030

Main recommendations

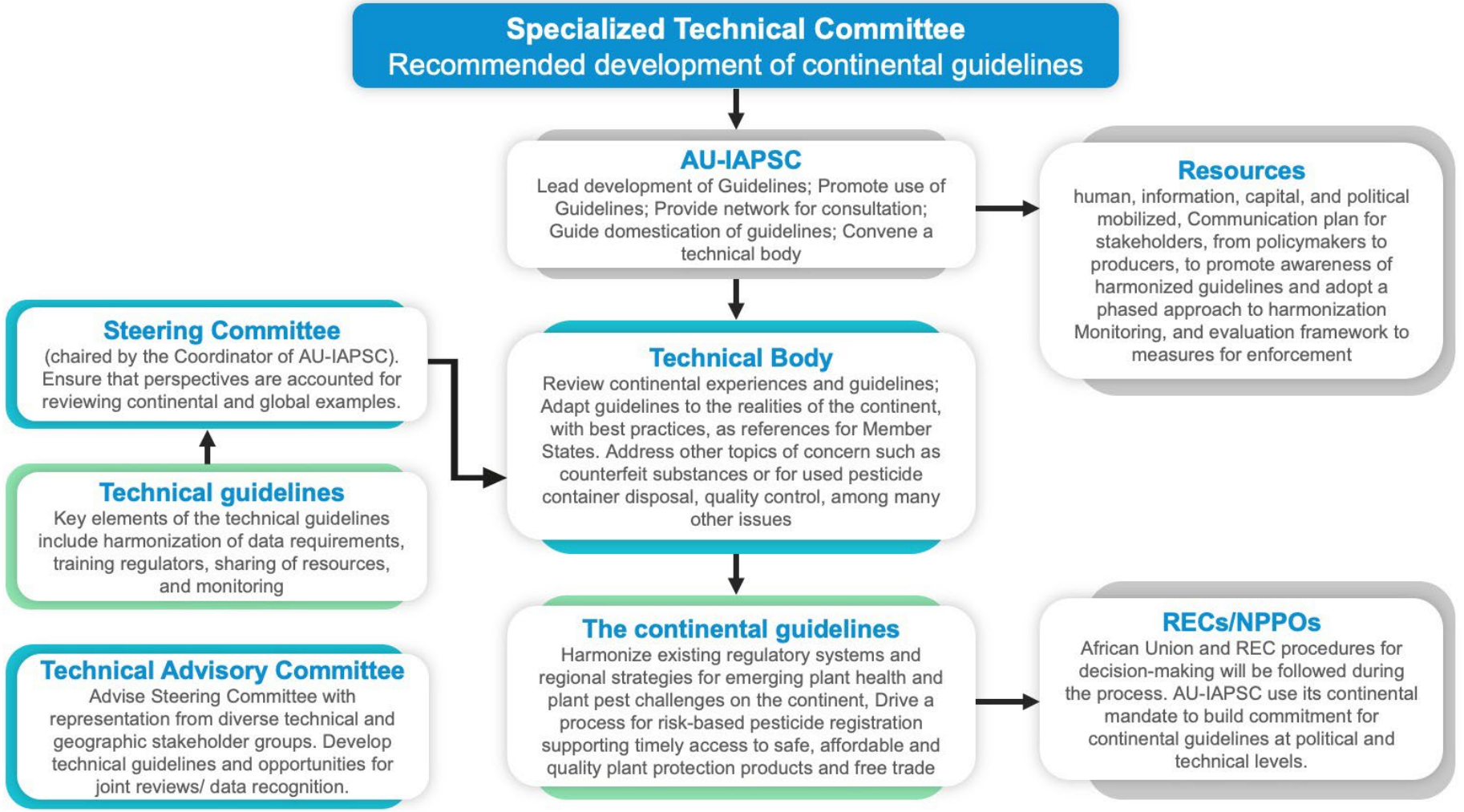


Figure 2: Modalities for developing continental guidelines

Inter-African Phytosanitary Council of the African Union (AU-IAPSC)

Main recommendations

- Several of the initiatives maintain lists of authorized agencies for field trials, authorized laboratories, registered active ingredients and/or formulated products authorized for sale in the subregion, and banned products.

- Ban lists can be problematic for the availability of tools, and training and licensing of applicators are crucial etc.

- Other key functions include liaison, communications and advocacy, domestication, capacity development, and implementation monitoring.

Main recommendations

- Biopesticides should be used alongside, not instead of, chemical pesticides as part of a larger integrated pest management strategy.
- To track progress and ensure effectiveness, a system for monitoring biopesticides development, use and effectiveness is needed;
- Communication and collaboration with industry is an important piece of this for innovation and stewardship.
- Collaborative approach across Africa with harmonized biopesticide guidelines to provide faster access to more safe and effective tools for farmers and the environment that will make trade easier and ensure consistent standards.

Main recommendations

- Scientific risk assessment is a cornerstone of this system.
- Training and clear guidelines are crucial for regulators to understand the unique nature of biopesticides and regulate accordingly.
- The industry's role in providing innovations, quality information and collaboration to streamline registration.
- The need for capacity building efforts to underpin regulatory and technological innovations, research that considers local conditions, and promoting biopesticides as a sustainable tool in farmers' IPM toolkit.

Way forward for continental harmonisation of the registration and management of plant protection products

- ❖ Acknowledging the complexity of the goal under its mandate, it was agreed that AU-IAPSC will use its continental mandate to build commitment for continental guidelines at political and technical levels.

- ❖ To ensure perspectives are accounted for, a technical body will be formed and overseen by a Steering Committee (SC) chaired by the Coordinator of AU-IAPSC or designee.

- ❖ The SC may be guided of advised by Technical Advisory Committees, with representation by diverse technical and geographic stakeholder groups, to develop technical guidelines and opportunities for joint reviews/ data recognition.

Thank you!

Merci!

Obrigado!

Gracias!

شكرا جزيلا!

Asante!

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(AU-IAPSC)

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Paving the Way for Lower-Risk Crop Protection

Regulatory Pathways for the Registration of Bio-Pesticides in Pakistan

Presented by

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Ministry of National Food Security and Research (MNFSR),
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Annual Bio-Control Industrial Meeting (ABIM)
24th October 2024, Basel, Switzerland

Introduction: Setting the Stage for Bio-Pesticides in Pakistan

Why Bio-Pesticides in Pakistan?

- Growing demand for **sustainable**, **low-risk** crop protection.
- **Pakistan's Context:** Agricultural sector heavily dependent on conventional pesticides.
- Bio-pesticides **offer** a safer, eco-friendly alternative with fewer residues and minimal environmental impact.

DPP's Commitment:

- A comprehensive regulatory framework for bio-pesticides has been developed.
- **Objective**: Facilitate smoother registration and use of bio-pesticides for local agriculture.

Steps in Developing the Registration Process

1. **Regulatory Framework Development:**
    - Drafted in alignment with global standards (e.g., FAO, WHO, OECD).
    - Extensive consultations with stakeholders, including regulatory bodies, manufacturers, and farmers.
2. **Evaluation and Risk Assessment Criteria:**
    - Special protocols for bio-pesticides, focusing on low toxicity and eco-sustainability.
    - Risk-based assessments to ensure efficacy and safety without stifling innovation.
3. **Field Trials and Pilot Programs:**
    - Field trials in key agricultural regions to evaluate bio-pesticide effectiveness on local pests.
    - Feedback loops between field performance and regulatory refinement.
4. **Collaboration and Capacity Building:**
    - Partnering with CABI, international regulatory experts, and local academia for scientific validation.
    - Training workshops to build regulatory capacity and awareness.

Key Requirements for Bio-Pesticide Registration Applicants

1. Comprehensive Technical Dossier:

- Full disclosure of product formulation, mode of action, and safety profile.
- Specific data requirements for toxicity, environmental impact, and product stability.

2. Efficacy Trials and Performance Data:

- Evidence of product efficacy through independent field trials.
- Comparative performance with conventional pesticides.

3. Risk Assessment Documentation:

- In-depth environmental risk analysis, addressing non-target effects and biodegradability.
- Minimal risk to human health and ecosystem components.

4. Compliance with Labelling and Usage Regulations:

- Clear and compliant labelling, including safe use instructions, target pests, and crops.
- Alignment with Pakistan's regulatory requirements, including the DPP's mandates for bio-pesticides.

Key Crops & Pests in Pakistan Requiring Bio-Control Solutions

1. High-Priority Crops:

- **Wheat:** Staple crop; bio-pesticides for aphids, rust, and leaf blight.
- **Cotton:** Vulnerable to bollworms and whiteflies; strategic for Pakistan's export economy.
- **Rice:** Bio-solutions for stem borers and leaf folder to reduce chemical dependency.
- **Mango & Citrus:** Bio-pesticides for fruit flies, citrus canker, and scales.
- **Vegetables (Tomatoes, Potatoes, Onions):** Control of aphids, thrips, and leaf miners.

2. High-Priority Pests:

- **Fruit Fly (*Bactrocera dorsalis*):** Key pest threatening mango and citrus exports.
- **Pink Bollworm (*Pectinophora gossypiella*):** Persistently damaging cotton.
- **Aphids (Aphis spp.):** Affecting a wide range of crops like wheat and vegetables.
- **Fall Armyworm (*Spodoptera frugiperda*):** Emerging threat, especially for maize and vegetables.

Future Priorities and Next Steps for 2025

1. Expanding Bio-Pesticide Use:

- Roll-out of bio-pesticides to more regions and for more crops.
- Encourage local production of bio-pesticides to reduce costs and enhance availability.

2. Enhancing Regulatory Framework:

- Simplify the registration process while maintaining safety and efficacy standards.
- Harmonization of bio-pesticide regulations with international best practices for faster market access.

3. Capacity Building and Training:

- Expand training programs for farmers and extension workers on the safe and effective use of bio-pesticides.
- Build technical expertise within DPP to handle bio-pesticide evaluation and monitoring.

Future Priorities and Next Steps for 2025 (Contd.)

4. Strengthening Public-Private Partnerships:

- Facilitate collaboration between industry, research institutions, and the government for R&D in bio-pesticides.
- Incentivize local manufacturers to invest in bio-pesticide production.

5. Public Awareness and Adoption Campaigns:

- Develop campaigns to raise awareness among farmers and consumers about the benefits of bio-pesticides.
- Leverage government subsidies or incentive schemes to encourage widespread adoption.

Towards a Sustainable Future in Crop Protection

- **Commitment to Lower-Risk Crop Protection:**
  - Pakistan is fully committed to transitioning to safer, eco-friendly agricultural practices.
  - Bio-pesticides will play a critical role in achieving sustainable agriculture.
- **Call for Global Collaboration:**
  - Global partnerships with industry leaders, researchers, and regulators will accelerate innovation.
  - Joint efforts can lead to a resilient agricultural sector with lower pesticide residues, enhanced safety, and ecological sustainability.

Thanks