



INTEGRATED PEST MANAGEMENT

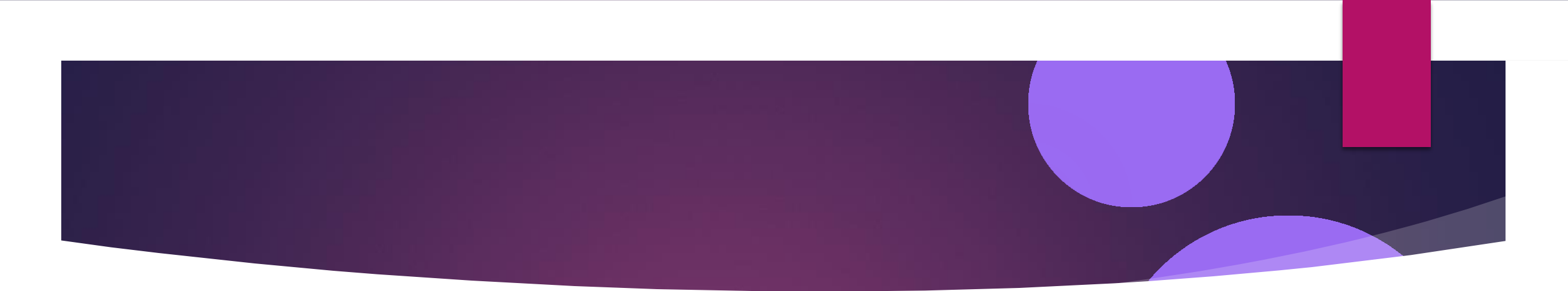
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Introduction

- Food security and increased income are the primary goals of most poor farmers throughout sub-Saharan Africa where the majority of agriculture is carried out on smallholdings, often of less than ONE hectare. Farm size limits what farmers can produce, and this can be a great burden when most families' livelihoods depend on the amount of food they can produce.
- It has been estimated that for every 10% increase in farm yields, poverty was reduced by 7% in Africa (Irz *et al.*, 2001). According to the International Fund for Agricultural Development (IFAD) an increase of just 1% in agricultural per-capita Gross Domestic Product (GDP) would reduce the poverty gap five times more than a similar increase in GDP in any other sector, and would particularly target the poorest people. So helping smallholders to produce more food can alleviate poverty.

Introduction cont

- Among the many factors that affect food production in Africa are pests and diseases that can lead to total crop failure. Accessibility of synthetic pesticides for pest and disease control is limited for many farmers due to their cost and restricted distribution networks. Products are frequently adulterated by unscrupulous traders, and inappropriate application can exacerbate pests and lead to pesticide resistance. Pesticidal plants are widely available at minimal or no cost to farmers, and have been used for centuries, so are culturally relevant.

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- *Pests are organisms that damage or interfere with desirable plants in our fields and orchards, landscapes, or wildlands, or damage homes or other structures. Pests also include organisms that impact human or animal health. Pests may transmit disease or may be just a nuisance. A pest can be a plant (weed), vertebrate (bird, rodent, or other mammal), invertebrate (insect, tick, mite, or snail), nematode, pathogen (bacteria, virus, or fungus) that causes disease, or other unwanted organism that may harm water quality, animal life, or other parts of the ecosystem*

AFRICA BOLLWORM



APHID



STINK BUG



CABBAGE LOOPER



WEBWORM



CUT WORM



DIAMOND BACKMOTH



FRUIT FLY



MEELY BUGS



STRIGA WEED



Parasite attachment to the host roots



Sorghum field devastated by heavy infestation of Striga hermonthica

ROOT KNOT



GIANT EAST AFRICA SNAIL



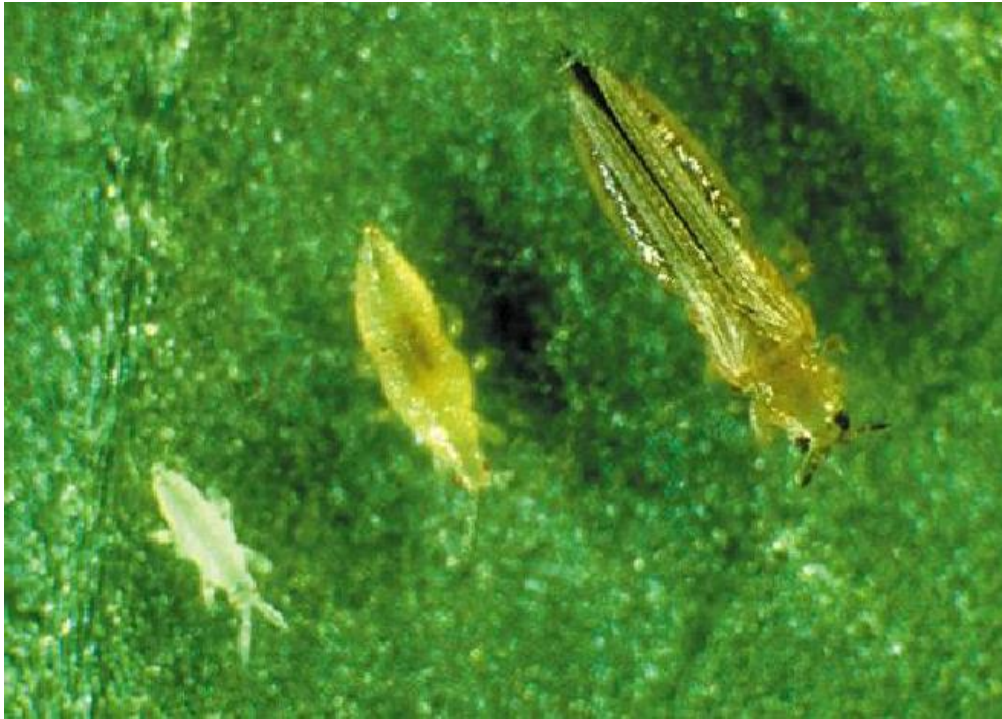
LEAF MINERS



SPIDER MITE



THRIPS



WHITE FLIES



FALL ARMYWORM



ANTHRACNOSE



BACTARIAL WILT



BLACK ROT



EARLY BLIGHT



FUSARIUM WILT



LATE BLIGHT



POWDERY MILDEW



IPM DEFINITION

- **Integrated Pest Management (IPM) is an ecosystem approach to crop production and protection that combines different management strategies and practices to grow healthy crops and minimize the use of pesticides.**

ESSENTIALS OF AN IPM PROGRAM

- **Monitoring.** This includes regular site inspections and trapping to determine the types and infestation levels of pests at each site.
- **Record-Keeping.** A record-keeping system is essential to establish trends and patterns in pest outbreaks. Information recorded at every inspection or treatment should include pest identification, population size, distribution, recommendations for future prevention, and complete information on the treatment action.
- **Action Levels.** Pests are virtually never eradicated. An action level is the population size which requires remedial action for human health, economic, or aesthetic reasons.
- **Prevention.** Preventive measures must be incorporated into the existing structures and designs for new structures. Prevention is and should be the primary means of pest control in an IPM program..
- **Evaluation.** A regular evaluation program is essential to determine the success of the pest management strategies.

IPM METHODS

1. Cultural method

Revolves around the use of different agronomic practices in the field which are not meant for pest management but end up helping in reducing their population.

They include:

- Timely planting
- Soil cultivation
- Weeding
- Watering

Cultural methods cont

- Fertility management
- Crop rotation
- Clean planting materials

2. Behavioral method

- Involves the deliberate change of behavior of pests by introducing favorable or unfavorable conditions
- 1. Use of attractants e.g. if you planting sunflower in a maize field all weaver birds will be attracted to the sunflower and leave your maize
- 2. Use of repellants e.g. onions, garlic, dania, Mexican marigold if intercropped with vegetables will repel a number of soft bodied insects.

4. Biological methods

- Revolves around the use of living organisms to manage pests (natural enemies)
- They include :
 1. Predators: These are organisms that prey and feed on other organisms. They often feed on various stages of the host (pest): eggs, larvae, pupae and adult.
 - 2. Parasitoids: Organisms that during the larval stages feed on pests (external parasitoids) or *in* the pest (internal parasitoids). They complete their development on a single host, killing it. In their adult stages they are mostly free-living and feed on pollen and nectar or other sugary substances such as honeydew.
- The most common parasitoids are parasitic wasps and flies

Parasitoids cont

- some parasitoids lay eggs in or on other species of insect (called hosts) and the larval stage kills the host as it feeds on it and develops

A beneficial wasp, *Aleiodes laphygmae*, parasitizing a fall armyworm caterpillar pest.



Pathogens:

- Organisms that can cause diseases of pests. They include fungi, bacteria, viruses and nematodes. They can be important in controlling pest populations in agricultural systems. However, naturally occurring pathogens often are too rare to serve as important control agents or occur when the damage has already been done.
- Some pathogens such as the bacterium *Bacillus thuringiensis* (Bt) and the fungus *Trichoderma viride* are commercially available in many countries, including Kenya
- Other fungi such as *Zoophthora*, *Verticillium* and *Entomophthora* can be readily found in the field at particular times of the year, infecting aphids, beetles, caterpillars, grasshoppers and whiteflies.

Cont

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3. Pathogens: These are fatal or debilitating diseases to arthropod pests and include fungi, nematodes, bacteria, viruses, and other microbes. Fungi, particularly *Deuteromycetes*, can infect pests externally under favourable conditions, but other pathogens must be ingested to be effective as control agents. Pathogens are very specific to their hosts.

Examples of predators – lady bird



Hoverfly



Assassin bug



Chameleon



Praying mantis



Rove beetle



Predatory wasp



Predatory thrip



Predatory mite



PARASITOIDS

parasitic wasp



Braconid wasp



Tricnid fly



Conservation of natural enemies

- Reduced use of chemicals that are non selective and will kill both the pest and their natural enemies
- Growing flowering plants which provide nectar and pollen to farmers' friends such as adult parasitoid wasps, hover-flies and ladybird beetles adults by having living fences (hedges) around the crop to provide shelter and refuge for farmers' friends should be encouraged. These are called refugia, and examples include beetle banks (grassy areas near crops) flowering plants and unsprayed field edges
- Mulching and having life fences to provide habitat for ground for natural enemies

BOTANICAL PESTICIDES

- **PLEASE REFER TO Pest Control on INFONET BIOVISION WEBSITE (https://infonet-biovision.org/plant_pests)**

https://infonet-biovision.org/plant_pests

Infonet
biovision



Home Plant ▾ Human ▾ Animal ▾ Environmental ▾ TOF/MKM Publications Get Involved

▸ Crops Fruits & Vegetables

▸ Indigenous Vegetables

▾ Pest & Diseases

- African armyworm
- African bollworm
- African cassava mosaic virus (ACMV)

Plant Health / Pests and Diseases



African armyworm



African bollworm



African cassava
mosaic...