

Insect pests and viral disease management

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Seed Enterprises Management Institute

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SEMI's FIELD PESTS AND DISEASES DIAGNOSIS OF SEED CROPS COURSE

Overview



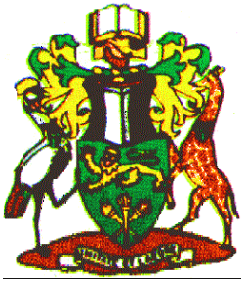
- Definitions
- Methods for managing pests and viral diseases
- Advantages and disadvantages of pesticides
- IPM

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Definitions



- **Pest:** An organism that interferes in some way with human welfare or activities
- **Pesticides:** substances with inherent ability to kill/repel pests and may be hazardous to man and the environment
- **IPM** an ecological approach that considers the environment while combining different tools that complement each other for the management of insect pests (uses pesticides along with other practices)



Methods for insect pest management

- They are cultural practices, biological control, ecological alternatives and chemical pesticides which:
- Change the environment in which the pest is present to make it uncomfortable for them to live and survive
- Utilizes more of natural control through prevention and intervention and uses chemicals as a last resort (uses host resistance, natural enemies, use of pheromones to lure and hormones to disrupt life cycles).

Cultural practices

Manipulates environment to make survival of the pest difficult using what is available within the farm/field



These are:

- crop rotation;
- selecting resistant varieties;
- planting pest free materials;
- physically removing the pests (caterpillars, nymphs, rogueing of plants)
- Use of companion cropping/border cropping/strip cropping to manage pests
- Use of garlic, pyrethrins and Sulphur and other botanicals to help control pests



Contd' Cultural/physical practices

- Use of physical barriers (Nets, bags, trenches)
- Use of lethal temperatures (cold or hot)
- Use of botanicals Neem, Melia, Tithonia (wild sunflower), Castor oil, Ginger, tobacco, Tephrosia, etc

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Biological control

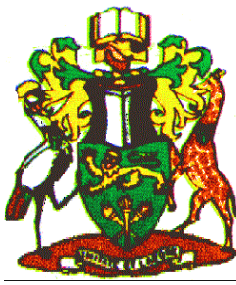
Using live organisms to manage insect pest populations

These are biocontrol agents – predators, parasitoids and pathogens

- Predators: organisms that hunt and kill prey (most of the time they are generalists)
- Parasitoids :parasitic wasps which lay eggs on or in host and develop utilizing the host tissue and by the time they hatch they leave having killed the host
- Pathogens: microbes (bacteria, fungi, viruses, protozoa) that infect and cause disease to the insects causing death Bt, Bb, Ma, PL, VI, EPNs



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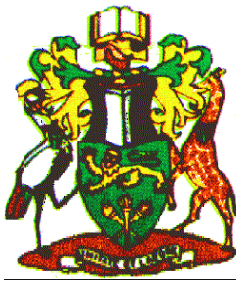


Genetic methods

- Utilizing host resistance (selecting desired genes through breeding) that confer tolerance and resistance to the plants -- hence resist attack or damage)
- Sterilization by destroying the ability of insects to breed with chemicals or x-rays, re-arranging chromosomes; interfering with cytoplasmic compatibility
- Genetic engineering

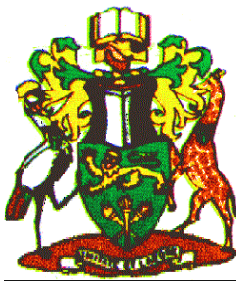
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Chemical control

- Use of toxic substances to manage pest populations (kill or repel/suppress)
- These are mainly Insecticides but chemicals that confer systemic acquired resistance (SAR) can be applied
- Desired attributes for the chemical to use. It should:
 - Kill only target pest
 - Not cause genetic resistance in the target organism
 - Disappear or break down into harmless chemicals after application and effect
 - Be more cost-effective than doing nothing



Benefits vs no benefits of chemical use

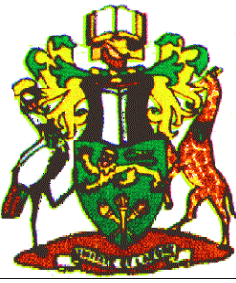
ADVANTAGES

- Increased yield and quality of crop
- Pesticides control most pests quickly and at a reasonable cost.
- They have a long shelf life
- Easily shipped and applied
- Are safe when handled properly.
- When genetic resistance occurs, farmers can use stronger doses or switch to other pesticides.
- Proponents feel they are safer than the alternative

DISADVANTAGES

- Difficult to contain in one position
- Pesticide resistant development (super bugs) 520 insect and mites have developed resistance
- Pollutants of environment
- Minor pests changed to major pests
- Kill non targets

Integrated pest management



- IPM: a balanced, tactical approach
- Anticipates and prevents damage
- Uses several tactics in combination
- Improves effectiveness, reduces side effects
- Relies on identification, measurement, assessment, and knowledge

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Why practice IPM?

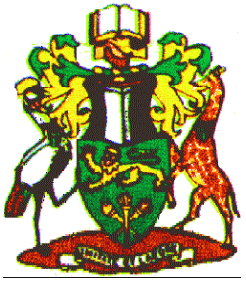


- Maintains balanced ecosystems
- Pesticides alone may be ineffective/ cause pesticide resistance
- Promotes a healthy environment
- Saves money
- Maintains a good public image

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Integrated Pest Management

is driven by decisions



1. Identify the pest and know its biology
2. Monitor and survey for pests
3. Set IPM goal: prevent, suppress, eradicate
4. Implement
 - Select control strategies
 - Timing
 - Economics
 - Environmental impacts
 - Regulatory restrictions
5. Evaluate and Educate/Learn



IPM

A dark blue 3D rectangular box with the letters 'IPM' in a bright green, bold, sans-serif font.