INSECT PESTS IN SEED PRODUCTION

SEMIs SEED PRODUCTION COURSE
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Introduction

- Insect pests are generally grouped into field pests and storage pests.
- Field pests attack crops while in the field from germination to maturity.
- Storage pests attack crops that are storable in a dry state while maturing in the field and continue on into storage.
Field pests

- Loosely grouped according to common pests attacking related crops such as cereals or legumes, oil crops, flowers,

- Also grouped based on individual crops and the part of plant damaged e.g root feeding pests, leaf eating pests, stem girdlers,

- These groupings may overlap they are not exclusive
Pests of cereals

(maize, sorghum, rice and millets)

**Major pests**

- **Maize stalk borer** (*Busseola fusca*) Lepidoptera: Noctuidae
- **Spotted stem borer** (*Chilo partellus*) Lepidoptera: Pyrallidae
- **Pink stalkborer** (*Sesamia calamistis*) Lepidoptera: Noctuidae
- **Armyworm** (*Spodoptera exempta*) Lepidoptera: Noctuidae
- **Fall Armyworm** (*Spodoptera spp.*) Lepidoptera: Noctuidae
- **African bollworm** (*Helicoverpa armigera*) Lepidoptera: Noctuidae
- **Sorghum shoot fly** (*Atherigona soccata*) Diptera: Muscidae
- **Stock eyed shoot fly** (*Diapsis thoracica*) Diptera: Diaspidae
- **Maize leaf hopper** (*Cicadulina mbila*) Homoptera: Ciadellidae
- **Sorghum aphid** (*Aphis sorghi*) Homoptera: Aphididae
Minor Pests

- **Cutworms** *Agrotis sp* (Lepidoptera: Noctuidae)
- **Cotton leaf worm** *Spodoptera littoralis* (Lepidoptera: Noctuidae)
- **Maize webworm** *Marasmia trapezalis* (Lepidoptera: Pyralidae)
- **Maize ladybird beetle** *Epilachna simulis* (Coleoptera: Coccinellidae)
- **Corn lantern fly** *Peregrimus maidis* (Homoptera: Delphacidae)
- **Maize Aphid** *Rhophalosiphum maidis* (Homoptera: Aphididae)
- **Termites Genus** *Microtermes*
  & *Macrotermes* (Isoptera: termitidae)
Pest of cereals

minor pests contd,

- **Edible grasshopper** *Hormorococcyphus nitidulus / vicinus* wlk (Orthoptera: Tetigomidae)
- **Elegant grasshopper** *Zonocerus elegans* (Orthoptera: Tetigomidae)
- **Green stink bug** *Nezara viridula* (Heteroptera: Pentatomidae)
- **Lygus bug** *Taylorilygus vosseleri* (Heteroptera: Miridae)
- **Wheat aphid** *Schizaphis graminum* (Homoptera: Aphididae)
- **Rice skipper** *Borbo barbomica* (Lepidoptera: Hesperiide)
- **Sorghum midge** *Contarinia sorghicola* (Diptera: Cecidomidae)
Maize Stem Borers

- major pests of maize and sorghum
- **Alternate hosts**: grasses of *Setaria spp*, *Eleusine spp* and other cereals

**Damage:**

- caterpillars feed on the tender leaves in the funnel or central shoot of the plant
- dead hearts’ symptoms where the central shoot is killed
- larval feeding on the funnel produces characteristic line of windows across leaves as they unfold
Maize stem borers

*Pink stem borer (S. calamistis) adult and larvae*

*Maize stalk borer (Buseola fusca) larvae and its damage on leaves*

*Stem borer damage: windowing on leaves and tunnelling of stems*
Management

Cultural control

- Destroy all crops residues which contain diapausing larvae
- Early planting at the same time in one area
- Eliminate thick stemmed grasses that may harbor larvae
- Enforcement of a closed season for at least two months

Chemical control: Use registered products for control of stem borers e.g. Beta cyfluthrin and chloropyrifos granules, dimethoate + alphacypermethrin EC, put in the funnel or spray at one foot height of crop
Armyworm (*Spodoptera exempta*)

- major pest of maize, wheat, barley, sorghum, pastures and rice in East Africa

**Alternative hosts:** a wide range of cereals and wild grasses

**Damage:**
- Young caterpillars scrape off the tissues on one side of the leaf giving a scotched effect
- Older caterpillars eat the whole leaf except the midribs.
- high populations destroy whole fields of cereals quickly
Major pests contd’

Armyworms

(*Spodoptera exempta*) Chew the whole leaf blade and leave only the ribs during outbreaks

- *Helicoverpa spp* on maize eats leaves and seeds on cob are sporadic pests
- *(Management with chemicals like armyworms)*
Armyworm-- Management

- Infestation can be controlled early using a number of chemicals e.g. Fenitrothion, Thiodan,

- A number of natural enemies have been recorded including viruses but they have difficulty in preventing outbreaks during optimal conditions. They take time to establish
Fall army worm

- New pest in Africa said to have migrated from the Americas
- It feeds on 80 different species of plants but preferred host is maize
- Maize feeds over 200 M people in Sub Saharan Africa (SSA)
Fall armyworm life cycle:

- Eggs: 3-5 days
- Larvae: 14-28 days
- Pupa: 7-14 days
- Adults: 11-14 days
Management

- The fall army worm may be present in the field for most of the time but the populations are usually most damaging at 3-8 weeks into the rainy season.

- Use traps, light or pheromone or both combined, to monitor the activity of the adult moths (10 adults/week or 10 larvae/m² should give a signal for action).

- Some chemicals recommended for control. They should be changed frequently.

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Rate (g/acre)</th>
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<tbody>
<tr>
<td>Metaflumizone 240SC</td>
<td>455</td>
</tr>
<tr>
<td>Indoxacarb 3 WG</td>
<td>100</td>
</tr>
<tr>
<td>Novaluron 0.83EC</td>
<td>340</td>
</tr>
<tr>
<td>Spinetoram 120SC</td>
<td>200</td>
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<tr>
<td>Spinosad 2 SC</td>
<td>230</td>
</tr>
<tr>
<td>Pyridalyl 4EC</td>
<td>170</td>
</tr>
<tr>
<td><em>Bacillus thuringiensis</em> strains</td>
<td>Various formulations</td>
</tr>
</tbody>
</table>
Other minor pests

Maize aphids (*R. maidis*) late season pests

Aphids are suckers if 50% plants are infested by about 400 aphids/plant at late whorl to early tasseling stage, take control measures.

Cutworm (*Agrotis spp*)

Larvae cut young seedlings at ground level or hollow out the stem underground, then plants wilt and die. Pests are sporadic. Control with chemical in the evening by soil drenching areas with the damage (use *Dimethoate*).
Pests of Pulses/Legumes
Beans, soy beans, pigeon peas, cowpeas, green grams, black beans)

**Major pests**
- Bean fly *Ophiomya phaseoli* (Diptera: Agromyzidae)
- Spotted pod borer *Maruca testulalis* (Lepidoptera: Pyralidae)
- Pod borer *Helicoverpa armigera* (Lepidoptera: Noctuidae)
- Stripped bean weevil *Alciclodes leucogrummus* (Coleoptera: Cucurbitidae)
- Black bean aphid *Aphis fabae* (Homoptera: Aphididae)
- Groundnut aphid *Aphis craccivora* (Homoptera: Aphididae)
- Pea pod borer *Etiella zinnenella* (Lepidoptera: Pyralidae)
Pests of Legumes contd’

Minor pests

- Pollen beetles *Coryna spp* (Coleoptera: Meloidae) and *Mylabris spp* (Coleoptera: Meloidae)
- Red spider mites *Tetranychus spp* (Acarina: Tetranychidae)
- Bean flower thrips *Taeniothrips sjostedti* (Thysanoptera: Thripidae), *Megalurothrips spp* (Thysanoptera: Thripidae) and *Frankiniella spp* (Thysanoptera: Thripidae)
- African bollworm *Heliothis armigera* (Lepidoptera: Noctuidae)
- Bean leaf beetle *Ootheca mutabilis* (Coleoptera: Chrysomelidae)
- Spiny brown bugs *Acanthoria/ Clavigralla spp* (Heteroptera: Coreidae)
Pests of Legumes – minor pests contd’

- Giant coreid bug *Anaplocnemis curvipes* (Heteroptera: Coreidae)
- Cotton lygus *Taylorilygus vosseleri* (Heteroptera: Miridae)
- Green stink Bug *Nezara viridula* (Heteroptera: Pentatomidae)
- Black helmet bug *Brachyplays testudoniga* (Heteroptera: Pentatomidae)
- Helmet bugs *Coptosoma spi* (Heteroptera: Pentatomidae)

Other Heteropteran bugs:

*Riptortus dentipes, Aerosternum spp, Mirperus jaculus and Riezoderus hybeneri*
Bean Fly (*Ophiomyia phaseoli*)

- **Main host:** Beans
- **Alternate hosts:** A wide range of leguminous crops

- **Damage:** new larvae barrow down through the petiole of the leaf through the stem until they reach the ground level where they feed on stem tissue

**Result:** swollen stems that eventually split, roots recede, plant wilts/wither and die
Control

Chemical:
- seed dressing with imidacloprid,
- sprays on seedlings using Dimethoate, lambda cyhalothrin,

Nb. limited success once the seedlings have been damaged

Cultural:
- All planting in an area should be done at the same time
- Destruction of crop residue and removal of volunteer plants
- Avoid short seasons beans in dry areas
Pod Borers (*Maruca testulalis*) and *Helicoverpa spp*

- major pests of pigeon pea and cowpea

**Damage**

- caterpillars eat leaves, flowers, flower buds and pods, serious damage on pods where seeds are destroyed
- Spray at flowering with alphacypermethrin, dimethoate, imidaclorpid,
Pea Pod Borer (*Etiella zinnenella*)

- Serious pest on pigeon pea and will feed on cow pea, green grams and other leguminous crops

**Damage**
- Early larvae feed inside developing seeds, later instars feed freely inside the pods. The partly grown caterpillar may leave original pod and penetrate one or more fresh pods before reaching maturity

**Control**
- Chemical control: difficult in the field (not usually economical)
Pod borers

- Maruca spp. above
- Pea moth below
Pod Fly - *Melanogromyza obtusa*

- wide spread and major pest of pigeon pea, cow pea

Damage
- no obvious external symptoms of pod fly attack till fully grown larvae chew holes in the pod walls leaving a “window” from which adult flies out
Pod flies (Adult and damage)

- Adult fly is black, lays eggs in pods, pupae found in pod
- Larvae chew holes in pods and damage seeds

Pictures courtesy of ICRISAT training resource
Pod Fly -- Control

- use systemic insecticides e.g. Dimethoate and Monocrotophos, non systemic insecticides e.g. Endosulfan kill adults.

- Practice a closed season during which no pigeon pea pods should be available to help reduce infestation

- avoid growing a mixture of cultivators of differing durations

- Use resistant cultivars
Pod Sucking Bugs - Acanthomia spp

- Pests of beans, pigeon peas, cow peas and *Dolichos lablab* mainly. They also feed on other pulse crops

**Damage:**

- Bugs suck developing seeds through the pod wall. The seeds become shriveled with dark patches. Such seeds do not germinate and are not acceptable as human food.
Pod Sucking Bugs --

- A fungus (*Nematospora coryli*) is often associated with *Clavigralla* damage but it is not certain whether the fungus is introduced by the bug itself or whether it enters the seed via the feeding punctures.

- Spiny brown bug (*Acanthomia spp*)
Pod Sucking Bugs -- Control

- Use insecticide with some systemic action e.g. Dimethoate and Monocrotophos
- Use/ screen for resistant varieties
Pests of flowers

- Blister beetles, feeds on flowers reducing no of pods formed

Control
- No insecticides are effective but synthetics may work reasonably
- Manual picking is best alternative
THANK YOU

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