

## Lecture No 6

### PESTS OF PULSES - REDGRAM AND CHICKPEA

#### Pest of redgram

Pod borers, blue butterfly, mites as vectors cause significant yield reduction in redgram.

Major pests				
1.	Gram pod borer	<i>Helicoverpa armigera</i>	Noctuidae	Lepidoptera
2.	Blue butterfly	<i>Lampides boeticus</i>	Lycaenidae	Lepidoptera
3.	Grass blue butterfly	<i>Euchrysops cnejus</i>	Lycaenidae	Lepidoptera
4.	Plume moth	<i>Exelastis atomosa</i>	Pterophoridae	Lepidoptera
5.	Spotted pod borer	<i>Maruca testulalis</i>	Pyraustidae	Lepidoptera
6.	Spiny pod borer	<i>Etiella zinckenella</i>	Phycitidae	Lepidoptera
7.	Field bean pod borer	<i>Adisura atkinsoni</i>	Noctuidae	Lepidoptera
8.	Pod fly	<i>Melanagromyza obtusa</i>	Agromyzidae	Diptera
9.	Stem fly	<i>Ophiomyia phaseoli</i>	Agromyzidae	Diptera
10.	Eriophyid mite	<i>Aceria cajani</i>	Eriophyidae	Acari
Minor pests				
10.	Blister beetle	<i>Mylabris pustulata</i>	Meloidae	Coleoptera
11.	Pod wasp	<i>Tanaostigmodes cajaninae</i>	Tanaostigmatidae	Hymenoptera
12.	Flower webber	<i>Eublemma hemirrhoda</i>	Noctuidae	Lepidoptera

#### Major pests

##### 1. Gram pod borer: *Helicoverpa armigera* (Noctuidae: Lepidoptera)

**Distribution and status:** World wide

#### Host range

Cotton, sorghum, lablab, pea, chillies, groundnut, tobacco, okra, maize, tomato, soybean, safflower, gram, etc.

#### Damage symptoms

It is a polyphagous species and is an important pest on pulses. Caterpillar first feeds on foliage; later bores into pods and feeds on seeds.



Larva is seen feeding with the head alone thrust inside the parts and the rest of the body hanging out. Boreholes on pods, absence of seeds on pods and defoliation in early stages are the symptoms of attack.

**ETL:** One larva per five plants in the pod initiation stage

### Bionomics



Adult moth is greenish to brown with a 'V' shaped speck on forewings and dull black border on the hind wing. Eggs are laid on the host plants singly. The egg period is 7 days. Full grown larva is 2" long, greenish with dark brown gray lines and dark and pale bands. It shows colour variation from greenish to brown. The larval duration is 14 days. It pupates in soil for 10 days. One generation is completed in 28 days under favorable conditions.

### Management

1. Grow Helicoverpa resistant varieties like,
  - Red gram:** T 21, Bori, BDN 2, ICPL 332, ICPL 84060, ICPL 88039, PPE 45-2, ICP 19640, ICP 7035, MA 2, Pant A1, BSMR 1, JG 315 and JG 74 for central zone and ICCV 7
  - Chickpea:** ICCV&, ICCVIO, Dulia
2. Install bird perches @ 50/ha to pick the larvae
3. Set up light trap to monitor, attract and kill the moths
4. Set up pheromone traps @ 12 nos./ha
5. Inundative release of egg parasite *Trichogramma* spp. and egg larval parasites, *Chelonus blackburnii*
6. Spray nuclear polyhedrosis virus (NPV) @ 500 LE/ha in 0.1% teepol.
7. Apply any one of insecticides at 25 kg/ha - endosulfan 1.5 D, quinalphos 1.5 D, carbaryl 5D or spray any of the following insecticides in 700-1000 L of water per ha.
 

• Azadirachtin 0.03% 2.5-5.0 L	• Lambda cyhalothrin 5 EC 400-500 ml
• <i>Bacillus thuringiensis</i> serovar <i>kurstaki</i> (3a,3b,3c) 5 WP 1.0-1.25 kg	• Lufenuron 5.4 EC 600 ml

- Benfuracarb 40 EC 2.5 L
- Emamectin benzoate 5 SG 220 g
- Ethion 50 EC 1.0-1.5 L
- Indoxacarb 14.5 SC 333-400 ml or 15.8 SC 335 ml
- Methomyl 40 SP 750-1125 g
- NPV of *H. armigera* 2 AS 250 -500 ml
- Spinosad 45 SC 125-160 ml
- Endosulfan 35 EC 1.25 L

**2. Blue butterfly: *Lampides boeticus* (Lycaenidae: Lepidoptera)**

**Distribution and status:** India

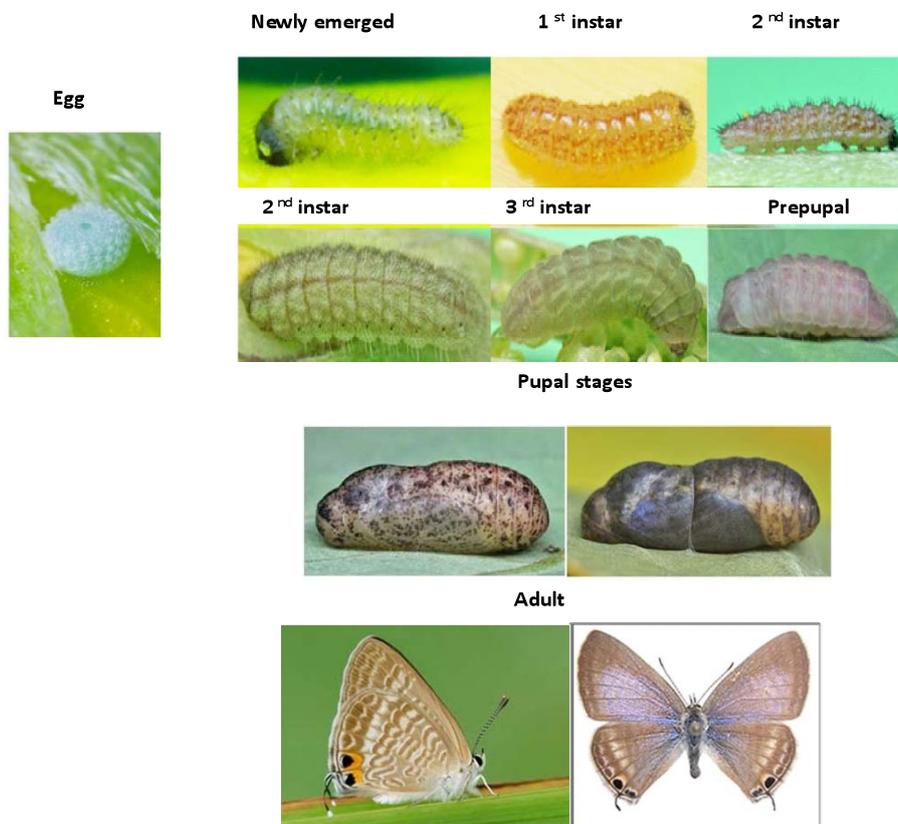
**Host range:** Cowpea, redgram, blackgram, lablab and niger.

**Damage symptoms**

The larva feeds inside flower buds; green pods with bore holes and presence of slug like caterpillar.



**Bionomics**



The adult moth is greyish blue with prominent black spots in the hind wings and a long tail. It lays eggs singly or in group of 2-3 on flower buds, green pods, shoots and leaves. The egg period is 4-7 days. The larva is pale green with a rough skin and measures 1mm in length. The larval period is 9-27 days. It pupates in leaf, twig or pod. The pupal period lasts for 17-19 days.

### 3. Grass blue butterfly: *Euchrysops cnejus* (Lycaenidae: Lepidoptera)

**Distribution and status:** Throughout India. Regular pest

**Host range:** Blackgram, peas, redgram and lablab.

#### **Damage symptoms**

Buds, flowers and young pods with boreholes and presence of slug like caterpillar.

#### **Bionomics**

The adult butterfly is blue, medium sized with 5 black spots in the hind wings and two black spots in the inner margin. It lays 60-200 eggs singly on stem, pod, and leaf petioles. They hatch in 2-10 days.



The pale green or yellow larva measures about 13 mm in length with a red line and short black hairs on the body. It feeds on flowers; flower stalks and enters the pod. The entry hole on the pod is plugged with excreta. The larval period is 10-21 days with four instars. It pupates in soil or between fallen leaves and debris of the plant for a period of 5-12 days.

#### **Management for Blue butterfly**

1. Discourage dense or close planting.
2. Avoid early or late sowing.
3. Dig soil regularly during the period of infestation to kill larvae and pupae.
4. Pick and destroy the larvae, pupae & adults.
5. Release egg parasitoid *Trichogramma* sp.
6. Conserve larval parasitoids *Aploymia* sp., *Hyperencyrtus lycaenephila*, *Listrodromus crassipes*.
7. Chemical control measures are the same as redgram pod borer

#### 4. Plume moth: *Exelastis atomosa* (Pterophoridae: Lepidoptera)

**Distribution and status:** India, Nepal and New Guinea

**Host range:** Red gram, lablab, niger and horse gram

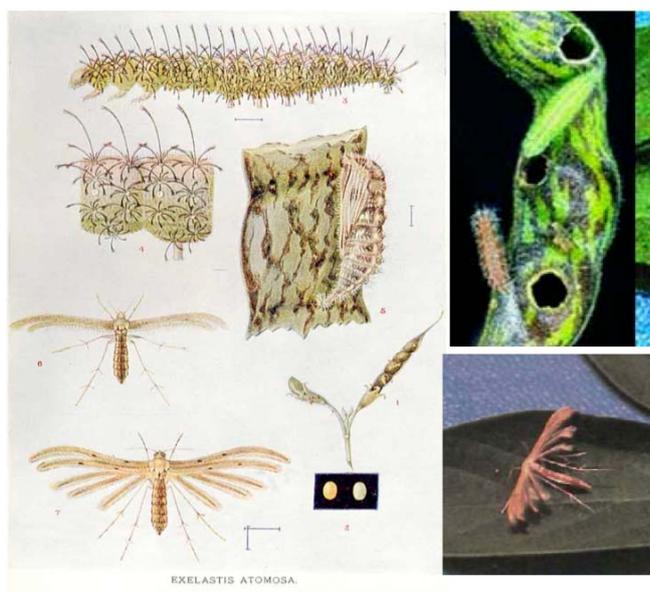
#### **Damage symptoms**

The tiny larva bores into unopened buds, flowers and tender parts. 5-20% pods are damaged.



#### **Bionomics**

Adult is delicate, brown coloured small moth with plumed wings. Eggs are laid on flower buds and tender pods. Egg period is 4 days. Larva is greenish brown, 10 mm in length densely packed with short hairs and spines. Larval period is 14-30 days. It pupates on the pods itself. Pupal period is 4-8 days.



1. Egg on redgram pod

2. Magnified egg

3. Larva

4. details of larva

5. Pupa

6, 7. Moths

#### **Management**

- Conserve Larval parasitoids, *Apanteles paludicolae*, *Diadegma* sp.,
- Chemical control measures are the same as redgram pod borer

## 5. Spotted pod borer: *Maruca testulalis* (Pyraustidae: Lepidoptera)

### Distribution and status

Tropical and sub tropical regions of the world.

### Host range

Beans, peas, castor, groundnut, cowpea, rice, sesame, soybean, tobacco, daincha, sugarcane, redgram, lablab, niger, greengram and blackgram.

### Damage symptoms



The larva bores the buds, flowers or pods; infested pods and flowers are webbed together. The larva feeds on seeds. The assessment of damage in pigeonpea pods has shown that 5-20% pods may get affected depending upon the locality, month and variety.

### Bionomics



Female lays eggs singly on flowers, buds or pods. After hatching larva bores buds or pods and feed on seeds. The full-grown larva is 20 mm in length. It pupates in the dry leaves (or) debris.

### Management

- Grow resistant cultivars like ICPL 98001, ICPL 98003, ICPL 98008, ICPL 9804
- Conserve larval parasitoids *Bracon lebetor*
- Chemical control measures are the same as redgram pod borer

## 6. Spiny pod borer: *Etiella zinckenella* (Phycitidae: Lepidoptera)

### Distribution and status

India, Japan, Burma, Australia, Sri Lanka, Indonesia, USA, Mexico, West Indies, South America, Europe, Egypt, India. It is a serious pest of lentils and green peas in North India

### Host range

Redgram, horsegram, cowpea and greengram, lentil and green peas.

### Damage symptoms

The larva feeds inside green pods and then on pod surface, webbing together 2-4 pods.



### Bionomics

Eggs are laid singly (or) in groups preferably at the junction of the calyx and pod or on the pod surface. A female lays 47-178 eggs, which hatch in 5-6 days. The larva bores within the green pods and feeds on seeds. Larval period lasts for 10-13 days. When fully grown the larva drops to ground and forms a cocoon about 2.5 cm or so below ground or under dry leaves. Pupal duration lasts for 9-20 days depending on the climate. The moths pair 24-30 hour after emergence.



### Management

1. Conserve natural enemies like *Tetrastichus* sp., *Bracon hebetor*, *Phanerotoma* sp. and *P. hendecasisella*.
2. Chemical control measures are the same as redgram pod borer

### 7. Field bean pod borer: *Adisura atkinsoni* (Noctuidae: Lepidoptera)

**Distribution and status:** Cold weather pest found throughout India

**Host range:** Pigeonpea, lablab and niger

### Damage symptoms

The larva bores inside the pod and feeds on the seeds within.



### Bionomics

Moths are yellowish brown in colour. Eggs are laid singly on flowers, buds and pods. The eggs are minute in size. The egg, larval and pupal periods lasts 3, 14-15 and 11 days respectively. Full grown larva is 28-35 mm long, brownish green in colour. When full fed, caterpillar pupates in rice store. During February to November, it hibernates in the pupal stage.

### Management

- Conserve natural enemies like *Bracon hebetor*.
- Chemical control measures are the same as redgram pod borer

### 8. Pod fly: *Melanagromyza obtusa* (Agromyzidae: Diptera)

**Distribution and status:** India, South East Asia, Japan.

**Host range:** Redgram, Bhendi and Safflower.

### Damage symptoms



Maggots cause damage by boring into the soft seeds and feed on grains. The damaged seeds are unfit for consumption as well as for germination. The extent of damage may be even upto 60-70% during severe infestation.

### Bionomics

Eggs are laid by them singly or in cluster inside the pod wall by piercing through the ovipositor. The fly lays about 60-80 eggs. Incubation period is 2-4 days. Larval period is about 5-18 days and pupal period varies from 7-10 days. A number of overlapping generations are found in a year.



## Management

1. Conserve natural enemies like *Euderus lividus*, *Eurytoma* sp., *Euderus agromyzae*
2. Spray Carbaryl 50 WP 1.5 kg or endosulfan 35 EC 1.25 L or lambda cyhalothrin 5 EC 400 -500 ml or Lufenuron 5.4 EC 2.5 L with 700 L water/ha

## 9. Stem fly: *Ophiomyia phaseoli* (Agromyzidae: Diptera)

### Distribution and status

India, Sri Lanka, Laos, New South Wales Philippines, Burma, East Indies, China, Pakistan, Indonesia, Malaysia, Africa, Fiji, Australia, Thailand, Singapore and Samoa.

### Host range

Red gram, bean, cowpea, soybean and lima bean

### Damage symptoms

Drooping of the tender leaves and yellowing characterize serious damage of young plants. The sites where maggot and pupae are present become swollen and start ribbing. Older plants show stunting but are not usually killed.



### Bionomics



The adult is a small black fly. A female lays 38-79 eggs singly on pods or on flower buds. The egg period lasts about 3 days. The maggot first makes galleries just below the epidermis of the seed feeding deeper into the seeds later. Larval period lasts for 5-6 days. The larva pupates in the larval groove for 8-9 days.

### Management

1. Conserve natural enemies like *Euderus lividus*, *Eurytoma* sp., *Euderus agromyzae*
2. Seed pelleting with chlorpyrifos @ 4 ml/kg of seed may reduce stem fly.
3. Spray any one of contact insecticide in the early stages of the attack. Carbaryl 50 WP 1.5 kg or endosulfan 35 EC 1.25 L in 700 L water per ha

#### 10. Red gram sterility mite: *Aceria cajani* (Eriophyidae : Acari)



#### Distribution

Identified only in India where it is widespread and common. It is the vector of the pigeon pea sterility mosaic disease.

#### Damage symptoms

Infected plants develop light green or chlorotic leaves which have mosaic patterns. Most infected plants do not bear flowers.

#### Bionomics

The mites are difficult to see with the naked eye. They are 0.2 mm long, light pink, spindle shaped, and are normally found feeding on the underside of leaflets. Milky white eggs are found on vegetative terminals. Many nymphs are found on young folded leaflets. Plant - to-plant infestation occurs by the wind dispersal of infective mites.

#### Management.

Use resistant pigeonpea varieties.

Spray dicofol 18.5 EC 1.0 L or wettable sulphur 40 WP 3.0 kg or endosulfan 35 EC 750 ml or dimethoate 30 EC 1.0 L or phosalone 35 EC 1.0 L in 700 L water per ha

Avoid synthetic pyrethroids as they cause resurgence after repeated spray.

#### Minor pests

#### II. Flower Feeder

#### 10. Blister beetle: *Mylabris pustulata* (Meloidae: Coleoptera)

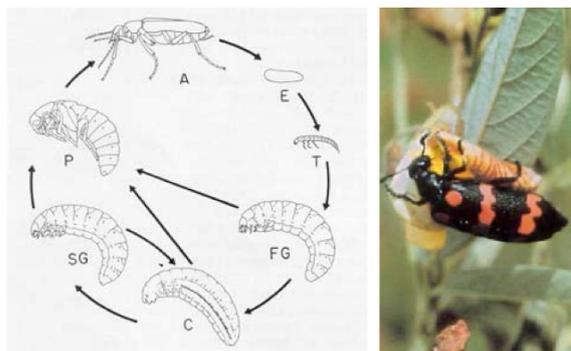
**Distribution and status:** Throughout India

#### Damage symptoms

The adult feeds voraciously on buds and flowers. A single beetle can destroy as many as 20-30 flowers/day.

#### Bionomics

The eggs are laid by female beetle in clusters of 60-80 eggs at 2-3 cm depth in soil. Eggs are light yellowish in colour and cylindrical in shape. Incubation period is about three weeks. Young grubs are white in colour. It pupates inside the soil tunnel.



A- Adult, E – Egg ,T – Triungulin or first instar, FG – first grub phase C- Coarctate phase in instar six/seven, SG- second grub phase, P - pupa

### 11. Pod wasp: *Tanaostigmodes cajaninae* (Tanaostigmatidae: Hymenoptera)

**Distribution and status:** Andhra Pradesh, Orissa, Bihar, Maharastra and Karnataka.

**Host range:** Red gram

#### Damage symptoms

The larva feeds on young seed of basal locules of pods causing complete abortion of the seed. Larva also feeds on the pod wall after consuming the seed. When the pod is attacked immediately after flower drop, it becomes dry and is shed.

Larva



Adult



#### Bionomics

Eggs are laid on flowers and very young pods. The white larva is apodous and 2-5 mm long when full-grown. Larval stage lasts for 8-10 days. Pupation is inside pod for 5-7 days.

### 12. Flower webber: *Eublemma hemirrhoda* (Noctuidae: Lepidoptera)

Larva webs together the flowers and feeds on them. Adult has yellow forewings with purple patches and white hind wings. Larva is green with a black head.

## Integrated Pest Management in Pulses

### A. Cultural methods

1. Summer deep ploughing is effective in destroying the eggs, larvae and pupae of various pests
2. Pest population of pulses can also be suppressed to some extent by resorting clean cultivation.
3. Early sowing crop escapes the first two broods of stem fly.
4. Increase the seed rate to compensate the damage due to stem fly.
5. Soil raking through weeding may reduce the soil grubs.

6. Apply 50 kg potash/ha to the crop raised with closer spacing (20x10 cm) to reduce the stem fly and pod borer incidence
7. Remove the weeds in and around the field.
8. Collect and destroy egg masses and pupae.
9. Dry the seeds adequately to reduce the moisture level to 8% for the grain purpose.
10. Resistant strains of gram like G-130 & C 214 are less susceptible to *H. armigera*.

#### **B. Mechanical methods**

1. Set up light trap to monitor, attract and kill the pod borer moths.
2. Set up pheromone traps @ 12 nos./ha to reduce gram pod borer incidence.

#### **C. Biocontrol methods**

1. Release egg parasite *Trichogramma* spp. and egg larval parasite *Chelonus blackburnii* for the control of *H. armigera*.
2. Conserve natural enemies like *Microbracon* sp., *Cotesia* sp, *Bracon hebetor* and *Apanteles* sp. parasitizes the caterpillar pests.
3. Apply NPV @ 500 LE/ha to control *H. armigera*.

#### **D. Chemical methods**

1. Soil treatment with chlorpyrifos 5D or quinalphos 1.5 D 2 25 kg/ha against cut-worms and other insects hiding below or on the soil surface.
2. Seed pelleting with chlorpyrifos @ 4 ml/kg of seed may reduce the early pests like stem fly.
3. For sucking pests, spray methyl demeton 25 EC 500 ml (or) dimethoate 30 EC 500 ml/ha (250 l spray fluid / ha)
4. For pod borer, apply any one of the insecticides @ 25 kg/ha endosulfan 4 D, quinolphos 4D and carbaryl 5D.
5. Spray endosulfan 35 EC 1250 ml (or) monocrotophos 36 SL 625 ml/ha or NSKE 5% twice followed by triazophos 0.05% (spray fluid 500 l/ha).
6. For seed purpose: Mix 1 kg of activated kaolin or malathion 5 D for every 100 kg of seeds. Pack in polythene lined gunny bags for storage.
7. Neem seed kernel powder 3% effectively controls the storage pest, bruchid beetle.

#### **Pest of Chickpea**

This type is used both as food by human beings and as feed for animals. In general, the kabuli plants and seeds are much more susceptible to insect attack than the desi type.

## Questions

- Boreholes on pods, absence of seeds in pods and defoliation are caused by
  - Spiny pod borer
  - Spotted pod borer
  - Field bean pod borer
  - Gram pod borer**
- is a tiny larva that bores into unopened buds, flowers and tender parts of redgram. **Plume moth**
- Infested pods and flowers of redgram webbed together is the symptom of
  - Gram pod borer
  - Spotted pod borer**
  - Field bean pod borer
  - Blue butterfly
- Which entomopathogenic agent is used to control aphids in cowpea field  
***Fusarium pallidoroseum***
- causes damage by boring into the soft seeds and feed on grains  
**Pod fly**
- Drooping of tender leaves and yellowing is caused by
  - Pod fly
  - Stem fly**
  - Blue butterfly
  - Grass blue butterfly
- Which coleopteran pest feeds voraciously on flowers and pods of pulses while the grubs are predators- **Blister beetle**
- is the scientific name of pulse pod wasp - ***Tanaostigmodes cajaninae***
- Red gram sterility mosaic virus is transmitted by ----- ***Aceria cajani***
- Cowpea mosaic virus is transmitted by following pest
  - Aphis craccivora***
  - Aphis gossypii*
  - Myzus persicae*
  - Bemisia tabasi*
- is scientific name of arhar pod fly - ***Melanagromiza obtuse***
- Webbing of infested pods and inflorescence in redgram is due to \_\_\_\_\_ spotted pod borer ***Maruca testulalis***

13. *Exelastis atomosa* belongs to the family
- a. Agromizidae
  - b. **Pterophoridae**
  - d. Lycaenidae
  - d. None of the above
14. Alternate host of *Lampides boeticus* \_\_\_\_\_
- a. cotton
  - b. niger
  - d. pulses
  - d. **both b and c**
15. \_\_\_\_\_ is the scientific name of spotted pod borer
- a. ***Maruca testulalis***
  - b. *Amsacta albistriga*
  - c. *Exelastis atomosa*
  - d. *Lampides boeticus*
16. \_\_\_\_\_ is the alternate host of *Maruca testulalis*
- a. sugarcane
  - b. tobacco
  - c. rice
  - d. **all the above**
17. \_\_\_\_\_ is the alternate host of *Adisura atkinsoni*
- a. niger
  - b. lablab
  - c. pigeonpea
  - d. **all the above**
18. \_\_\_\_\_ is the alternate host of *Melanagromyza obtuse*
- a. redgram
  - b. okra
  - c. safflower
  - d. **all the above**
19. Drooping of tender leaves and yellowing are the damage caused by \_\_\_\_\_  
**stem fly , *Ophiomyia phaseoli***
20. Hymneopteran pest on pulses
- a. *Mylabris phalerata*
  - b. ***Tanaostigmodes cajaninae***
  - c. *Adisura atkinsoni*
  - d. *Lampides boeticus*