

## 14. An Overview: Pests of Millets and Its Management

**Sarita Dadhich**

Assistant Professor,  
Entomology,  
G.S.G.D Girls Agriculture College,  
25 BB, Padampur, SriGanganagar, Rajasthan, India.

**Shubham Chawla**

Assistant Professor,  
Horticulture,  
G.S.G.D Girls Agriculture College,  
25 BB, Padampur, SriGanganagar, Rajasthan, India.

### **Abstract:**

*The threat of pests to millet crops is a significant concern in agriculture, with approximately 150 insect pests identified as potential infestations. Major pests such as shoot flies, stem borers, and earhead midges pose substantial risks to millet cultivation. In India, reports indicate yield losses ranging from 10% to 20% attributed to insect pests in millets. Shoot flies and stem borers, in particular, are associated with millets and cause extensive damage, exacerbating issues created by various sucking pests. Emerging challenges include newly observed pests attacking millets, and the transformation of minor pests into major threats in specific regions, exemplified by the polyphagous white grubs causing devastating impacts on millet crops.*

*To address these challenges, it is crucial to gather comprehensive information on the newly recorded pests, including factors contributing to their outbreak, bionomics, and associated yield losses.*

*While chemical interventions have been employed, primarily on high-yielding varieties and hybrids, a holistic approach incorporating cultural practices and the cultivation of resistant cultivars has proven effective.*

*This integrated pest management (IPM) strategy serves as a vital measure for sustainable pest control, minimizing the reliance on chemical solutions and fostering resilience in millet crops.*

### **Keywords:**

*Shoot flies, stem borers, earhead midges, integrated pest management, Millets, Sorghum.*

### 14.1 Introduction:

The overall incidence and damage by different pests vary in time and space and is reflected in low grain yields at farmer's fields. Some insect pests are associated with millet crops whereas pests like white grubs are specific to some region (Table 14.1).

Sporadic attacks of blister beetles, armyworms, grasshoppers, chinch bugs, leaf beetles, head caterpillars and head bugs result in severe yield losses in certain seasons.

**Table 14.1: Major Insect Pests of Millets and Sorghum in India and Their Status**

Common name	Damaging stage	Plant part attacked
<b>Pearl millet</b>		
Shoot fly	Maggot	Growing point
Grey weevil	Grubs	Roots
Spotted stem borer	Larvae	Stem, leaves, growing point
Pink borer	Larvae	Stem, leaves
White grubs	Grubs	Roots
<b>Kodo millet</b>		
Shoot fly	Maggot	Growing point
Gall midge	Maggot	Spikelet
Stem or Pink borer	Caterpillar	Stem
<b>Foxtail millet</b>		
Shoot fly	Maggot	Growing point
Flea beetle	Adult	Leaf
Army worm	Caterpillar	Leaf

**Table 14.2:**

Common name	Damaging stage	Plant part attacked
Leaf roller	Caterpillar	Leaf
<b>Little millet</b>		
Shoot fly	Maggot	Growing point
Gall midge	Maggot	Spikelet
Proso millet		
Shoot fly	Maggot	Growing point
Termites	Workers	Seed to seedling
<b>Barnyard millet</b>		
Shoot fly	Maggot	Growing point
Pink borer	Caterpillar	Stem/leaf

Common name	Damaging stage	Plant part attacked
<b>Finger millet</b>		
Pink or stem borer	Caterpillar	Stem/leaf
Sorghum stem Borer	Caterpillar	Stem
Earhead caterpillar	Caterpillar	Ear
Root aphid	Nymph and Adult	Root
Leaf hopper	Nymph and Adult	Leaf
<b>Sorghum</b>		
Shoot fly	Maggot	Growing point
Stem borer	Caterpillar	Stem/leaf
Pink stem borer	Caterpillar	Stem/leaf
Shoot bug	Nymph and Adult	Leaf
Aphids	Nymph and Adult	Leaf/panicles
Earhead bug	Nymph and Adult	Ear

## 14.2 Seedling Stage Pests:

**Shoot Flies:** Shoot fly is a seedling pest and normally occurs in the 1st–4th week after germination. The adult is small (3 mm long); dark grey housefly like with its abdominal segments marked with dark spots (Singh *et al.*, 2017). The maggot enters the seedling through the whorl and destroys the growing point and exhibit 'dead heart' symptoms.

### 14.2.1 Foliage Pests:

- **Leaf Caterpillars:** Moths of leaf caterpillars emerge with the onset of monsoon and lay eggs in clusters. Early-stage larvae feed gregariously on plants, later stages spread across the field and feed voraciously. Fully grown larvae are reddish brown and hairy all over the body causing severe defoliation.
- **Cutworms and Army Worms:** They cut tender stems of young and growing plants. Larvae hide during day time in the soil and become active at dusk. In severe cases, entire foliage is eaten making the field appear as if grazed by cattle.

### 14.2.2 Sucking Pests:

Both nymphs and adult of aphids, shoot bugs, plant bugs, suck the sap from young leaves and whorls causing distortion, yellowing and wilting of plants leading to shrivelled and chaffy grains. Few sucking pests are also vectors of plant diseases.

- **Aphids:** Colonies of immature and adult aphids can be seen in central leaf whorl, stems, or in panicles sucking the plant sap. Severe infestation causes yellowish mottling of the leaves and marginal leaf necrosis, and stunted plants. Aphids produce honeydew on which molds grow.

- **Shoot Bug:** The adult is yellowish brown to dark brown with translucent wings. Nymphs and adults suck the plant sap causing reduced plant vigour and yellowing. In severe cases, the younger leaves start drying and gradually extend to older leaves. Heavy infestation at vegetative stage may twist the top leaves and prevent either the formation or emergence of panicles.

#### **14.2.3 Stem Borers:**

Among the stem borers, *Chilopartellus* and *Sesamiainferens* are pre-dominant in India. Pearl millet appears to be immune to stem borer attack at initial stages of crop growth, but it becomes susceptible to internodes injury in latter stage (Dey 2020).

#### **14.2.4 Spotted Stem Borer:**

The larvae feed on the upper surface of whorl leaves leaving the lower surface intact as transparent windows (Tefera 2010). As the severity of the feeding increases, blend of punctures and scratches of epidermal feeding appears prominently. Sometimes, dead heart symptoms also develop in younger plants due to early attack. Subsequently, the larvae bore into the stem resulting in extensive stem tunneling. Peduncle tunneling results in either breakage or complete or partial chaffy panicle. During the dry season, the larva enters into diapauses and survives in harvested stalks/ stems as well as stubbles left in the field.

#### **14.2.5 Ragi Stem Borer/Pink Borer:**

The female moth lays about 150 creamy-white and hemi-spherical eggs that are arranged in 2 or 3 rows between the leaf sheath and the stem. The pink larva bores into the stem and damages the central shoot resulting in dead heart.

### **14.3 Spotted Stem Borer, *Chilopartellus* (Swinhoe):**

#### **14.3.1 Marks of Identification:**

Spotted stem borer (*Chilopartellus*) is the most important insect pest of during Kharif season causing yield losses in the range of 26-80% in different agro-climatic regions of India. Eggs are flat, oval, yellowish and are laid in overlapping clusters. The larva is creamy pink to yellowish brown with 4 rows of dotted stripes along the back with reddish brown head. The larval period is completed in about 14-28 days. The forewing of adult female moth is brown-yellowish with darker scale patterns forming longitudinal stripes. In male moths, hind wings are pale straw-colour, and in females, they are white. The life cycle is completed in about 5-6 weeks.

#### **14.3.2 Nature of Damage:**

Adult of moth of spotted stem borer prefers 3-5 leaf stage jowar and maize for egg laying. Eggs are generally laid on lower surface of leaves. Eggs hatch in 3-4 days and the newly hatched larvae crawl inside the leaf whorl and feed in groups. When the rolled leaves of

whorl unfurl series of pin holes and papery windows are visible, which is the first symptoms of spotted stem borer attack. After a week onwards, larvae move out of whorl and bore upwards the developing stalk, often reaching meristem. When meristem is fed upon, the leaf whorl dries up known as 'dead heart' and the plant usually dies and often gives rise to tillers (Oyewala *et al.*, 2020).

### 14.3.3 Integrated Pest Management:

- Collection and destruction of the stubbles.
- Deep summer ploughing (not recommended under conservation agriculture)
- Planting of Napier grass in the boundary as a trap crop.
- Inter-crop with cowpea in 2:1 ratio.
- Two releases of *Trichogramma achaeae* 8 cards/ha (1,50,000 parasitized eggs/ha) at 7 and 15 days after germination.
- Remove and destroy dead hearts
- When infestation crosses 10%, spray Chlorantraniliprole 18.5 SC @150ml/ha

### 14.3.4 Natural Enemies:

**Egg parasitoid:** *Trichogramma achaeae*

**Larval parasitoid:** *Cotesia flavipes*

**Pupal parasitoid:** *Xanthopimpla stemmator*, *Tetrastichus howardii*

**Predators:** *Chrysoperla carnea*, coccinellid, spider, ear wig, dragon fly, preying mantid, Pentatomid bug, reduviid bug, robber fly, rove beetles, wasp, king crow.

## 14.4 Pink stem borer, *Sesamia inferens* Walker:

### 14.4.1 Identification:

Pink stem borer is the most important pest during Rabi season (winter) causing yield losses in the range of 25.7-78.9%. Eggs are creamy white, bead-like laid in 2-4 longitudinal rows inside the sheath of 1-2 lower leaves. Larva of this pest is light pink in color with a purplish tinge (Saujanya *et al.*, 2021). The larval period varies from 22-36 days. The adult female is medium sized, stout straw coloured moth coppery tinged shining scales with brown streaks. Forewings have three small black dots on the dorsal side and an intermediate brown strip. Hind wings are white in colour. The antennae were pectinate in males and filiform in female moths. The total life cycle varies from 40-53 days.

### 14.4.2 Nature of Damage:

On hatching, pink borer larvae feed in concealment inside the leaf sheath in groups and feed on the epidermal layer of the leaf sheath preferably on first three leaf sheaths. The larva bore into the central shoot resulting in drying up of growing point and formation of dead

heart in young plants. The larva forms circular shaped tunnels inside the stem and exit holes at the surface. The tunnels are filled with excreta. Sometimes circular ring like cuts on lower inter nodes will be observed due to larval feeding

#### **14.4.3 Management:**

- Collection and destruction of the stubbles
- Deep summer ploughing (not recommended under conservation agriculture)
- Removal and destruction of dead hearts.
- When infestation crosses 10%, spray chlorantraniliprole 18.5 SC @150ml/ha
- Natural Enemies
- Egg parasitoid: *Trichogramma chilonis*
- Larval parasitoid: *Cotesia flavipes*
- Predators: *Chrysoperla carnea*, coccinellid, spider, ear wig, dragon fly, preying mantid, Pentatomid bug, reduviid bug, robber fly, rove beetles, wasp, king crow.

#### **14.5 Fall Armyworm, *Spodoptera frugiperda* (J. E. Smith):**

##### **14.5.1 Marks of Identification:**

Fall armyworm (FAW) is an invasive insect pest causing serious damage to maize at all stages of its growth (Kumar *et al.*, 2022). It was first reported in India in May, 2018. The female moths lay egg masses on upper or under side of the leaf and covered with tan-coloured scales. Each egg mass contains 50-150 eggs. Incubation period varies from 4-5 days.

The larvae are smooth-skinned and vary in colour from light tan or green to dull grey body with three creamy yellow dorsal and lateral lines. The larva contains reddish brown head with predominant white, inverted Y-shaped suture between the eyes. The larva contains 6 instars in which the larval period varies from 15-18 days. On 8th and 9th abdominal segment, four large spots are arranged in a square shape on segment 8 and in trapezoid pattern on segment 9. Pupa is reddish brown in color. After 7-9 days, adults emerge from pupae. The forewing of adult male moth consists of fawn coloured spot and a white patch at the apical margin of the wing while female moths are less distinctly marked ranging from uniform grayish brown to a fine mottling of grey and brown. The total lifecycle completes in about 30-35 days which vary according to climatic conditions. Adult longevity varies from 4-7 days. The adult moth can fly up to 500 km before oviposition.

##### **14.5.2 Nature of Damage:**

FAW attacks all stages of maize crop from seedling emergence (V2) to ear development (R6). The young larvae of FAW feed in and around the whorl leaves by scraping and skeletonizing the upper epidermis leaving a silvery transparent membrane resulting into papery spots. The damage also results in pinhole symptoms on the leaves. Older larvae remain and feed inside the whorl. The damages by late instars (4th instar onwards) result in extensive defoliation of leaves and presence of large amounts of faecal pellets in whorls.

Damage during vegetative stage leads to leaf damage but if damage happens during reproductive stage, it may damage tassels or may bore inside the corn ear and eat away the kernels. The whorl damage by FAW results in significant yield losses while ear feeding results in both quality and yield reduction.

### **14.5.3 Management:**

Based on available information, experimental findings and expansion of label claims by CIB&RC, IPM strategies have been formulated and has been upgraded from time to time.

Current IPM schedule, infestation threshold for crop growth and spray schedule is given below:

#### **A. Pre-Planting Practices:**

- Deep plough the fields to expose pupae to sun light and predatory birds (not recommended under conservation agriculture)
- Add neem cake @ 200kg/acre to the fields when maize is grown with zero tillage or wherever possible
- Maintain field bunds clean and plant flowering plants such as marigold, sesame, niger, sunflower, coriander, fennel etc. to attract natural enemies.

#### **B. Sowing to Six Leaf Stage:**

- Timely and uniform sowing over larger area
- Follow ridge and furrow planting method instead of flat bed sowing
- Apply only the recommended dosage of NPK as basal dose
- Seed treatment: Cyantraniliprole 19.8% + Thiamethoxam 19.8% FS @ 6 ml/kg of seed offers protection for 15-20 days of crop growth
- Plant 3-4 rows of napier grass/hybrid napieras trap crop around maize fields
- Intercrop maize with legumes, viz., pigeonpea, cowpea, black gram, kidney bean etc. in 2:1 to 4:1 ratio
- Erect bird perches @ 10/acre to encourage natural FAW predation by birds
- Install pheromone traps @ 4/acre soon after sowing and monitor moth catches#
- Adopt clean cultivation to eliminate possible alternate hosts
- Destruction of egg masses and larvae by crushing
- Application of sand or soil mixed with lime in 9:1 ratio into whorl of maize plants
- First spray should be with 5% neem seed kernel extract (NSKE)^ or azadiractin, 1500 ppm (1 litre/acre) @ 5ml /litre after observation of one moth/trap/day or 5% FAW infestation on trapcrop or main crop
- If monitoring indicates more than one moth/trap/day install pheromone traps @ 15/acre for mass trapping [Note: For success of mass trapping go for community action] OR release egg parasitoids viz., *Telenomus remus* @ 4000/ acre or *Trichogramma pretiosum* @ 16,000/acre. Two releases of parasitoids at weekly interval should be done. [Note: Release of parasitoids should not be opted if mass trapping is followed]

- At 5-10% infestation whorl application of *Bacillus thuringiensis* v. *Kurstaki* formulations (400g/acre) @ 2g/litre or *Metarhizium anisopliae* or *Beauveria bassiana* with spore count of  $1 \times 10^8$ cfu/g (1 kg/acre) @ 5g/litre or SfNPV (600 ml/acre) @3ml/litre or entomopathogenic nematode (EPN) (4kg/acre) @20g/litre of water is recommended
- If infestation is more than 10%, whorl application of any one of the recommended insecticides for FAW, viz., Chlorantraniliprole 18.5 SC (80 ml/acre) @ 0.4 ml/litre; Thiamethoxam 12.6 % + Lambda cyhalothrin 9.5% ZC (50ml/acre) @ 0.25 ml/litre; Spinetoram 11.7 % SC (100ml/acre) @ 0.5 ml/litre; Emamectin benzoate5% SG (80g/acre) @ 0.4g/litre is recommended

### **C. Seven Leaf Stage to Flowering:**

- Monitoring of FAW using pheromone traps @ 4/acres should be continued#
- Spray 5% NSKE<sup>^</sup> or azadiractin, 1500 ppm (one litre/acre) @5 ml /l after observation of one moth/trap/day or 5% of fresh FAW infestation
- If infestation is more than 10%, whorl application of *Bacillus thuringiensis* v. *Kurstaki* formulations (400g/acre) @ 2g/litre or *Metarhizium anisopliae* or *Beauveria bassiana* with spore count of  $1 \times 10^8$ cfu/g (1 kg/acre) @ 5g/litre or SfNPV (600ml/acre) @3ml/litre or entomopathogenic nematode (EPN) (4kg/acre) @20g/litre of water is recommended
- If infestation is more than 20%, whorl application of any one of the recommended insecticides for FAW, viz., Chlorantraniliprole 18.5 SC (80 ml/acre) @ 0.4 ml/litre; Thiamethoxam 12.6 % + Lambda cyhalothrin 9.5% ZC (50ml/acre) @ 0.25 ml/litre; Spinetoram 11.7 % SC (100ml/acre) @ 0.5 ml/litre; Emamectin benzoate5% SG (80g/acre) @ 0.4g/litre is recommended.

Poison baiting is effective for late instar larvae and is optional. Mix 10 kg rice bran + 2 kg jaggery with 3 litres of water. Keep the mixture for 24 hours to ferment. Add any one of the recommended insecticides mentioned above at their recommended dosages and 1 kg of sand just half an hour before application. Make into small pellets and apply into whorls of infested plants only. [Use hand gloves during mixing and application]

### **D. Flowering to Harvest:**

- Hand picking and destruction of larvae boring into ears
- At 10% ear damage, application of *Bacillus thuringiensis* v. *kurstaki* formulations (400g/acre) @ 2g/litre or *Metarhizium anisopliae* or *Beauveria bassiana* with spore count of  $1 \times 10^8$ cfu/g (1 kg/acre) @ 5g/litre or SfNPV (600ml/acre) @3ml/ litre or entomopathogenic nematode (EPN) (4kg/acre) @20g/litre of water is recommended.

Pheromone traps– Funnel trap with FAW lure should be installed at a height adjusted each week matching with crop canopy. Traps should be separated by a minimum distance of 75 feet. Observe traps for number of moths caught twice or once in a week and work out the catch/day. FAW lures should be changed once in 30 days in case of monitoring. Preparation of Neem Seed Kernel Extract (NSKE) for one acre–10 kg of neem seed kernel is required for one acre. Grind 10 kg of neem seed kernels to make powder.



Soak the powder in 50 litres of water overnight. Stir and filter the contents using cotton cloth. Add 200 g detergent powder or 200 ml of soap solution to the filtered solution. Make up the volume to 200 litres by adding water. Caution upon release of egg parasitoids—Minimum one-week interval should be there between parasitoid release and application of neem or chemical insecticides

Precautions for pesticide use: Not more than two chemical sprays are to be used in entire crop duration. Same chemical should not be chosen for second spray. Sprays should always be directed towards whorl and applied either in early hours of the day or in the evening time.

Use protective clothing, facemask and gloves during preparation and application of pesticides. Enter the field only 48 hours after spraying pesticide. Interval between application of chemical insecticide and harvest of corn should be minimum 30 days.

### E. Natural Enemies:

- Egg Parasitoid: *Trichogrammapretiosum*, *Telenomusremus*
- Egg-larval Parasitoid: *Chelonussp*
- Larval parasitoid: *Coccygidiumsp*, *Campoletischloridae*
- Predators: Predatory Pentatomid bugs, ear wigs
- Entomopathogen: *Nomuraearileyi*

### 14.6 Shoot fly (*Atherigonasoccata*Rondani; *Atherigonanaqvii*Steyskal):

#### 14.6.1 Marks of Identification:

Shoot fly, *Atherigona* spp. was reported to be a serious pest in Spring maize which cause heavy plant loss if sown during third week of February to first week of March.

Spring maize is cultivated in North-Western plain zone of India in the states of Punjab, Haryana, Uttarakhand and Uttar Pradesh (Kumar *et al.*, 2018). It was reported to cause up to 60% plant loss and around 21% grain yield loss. The species of *Atherigona* present in Punjab is *A. naqvii* whereas, the region contiguous of Haryana, Delhi, Uttarakhand and Uttar Pradesh has a species complex with *A.*

*soccata* and/or *A. orientalis* in majority and *A. naqvii* in minority, the proportion of which is yet to be resolved. Eggs of *A. soccata* and *A. orientalis* are elongated like a small rice grain, milky white in colour with two wing-like projections and those of *A. naqvii* are cylindrical with fine ridges on surface.

The incubation period is 1-3 days. Larval period is 7-10 days with 3-4 instars. Full grown maggot is yellow in colour. Pupation takes place inside the stem. The pupa is dark brown, barrel-shaped.

The pupal period lasts for about a week. The adult lives for 3-4 days. The life cycle is completed in about 3 weeks.

#### **14.6.2 Nature of Damage:**

*Atherigona* spp. infests maize from 2-day old seedlings to three weeks after emergence by ovipositing of eggs on the abaxial surface of basal leaves, shoot and in soil very close to base of the plant.

Maggots bore into shoot while feeding, gradually killing the growing point leading to withering of central shoot called dead heart, which is formed within two weeks of germination.

#### **14.6.3 Management Strategies:**

Sowing must be completed by first fortnight of February

- Seed treatment with imidacloprid 600 FS @ 6 ml/kg seed or Thiamethoxam 30 FS @ 8.0 ml per kg seed
- Removal and destruction of dead hearts
- Natural enemies
- Predator: Coccinellid, spider, robber fly, pentatomid bug, ear wigs.

#### **14.7 Greasy cutworm: *Agrotis ipsilon*:**

##### **14.7.1 Nature of Damage:**

- Young larvae feed on the epidermis of the leaves
- Older larvae come out at night and feed young plants by cutting their stems
- Consume less destroy more

##### **14.7.2 Management:**

- Flood the infested fields
- Handpick and destroy the larvae in morning and evening hours on cracks and crevices in the field
- Plough the soil during summer months to expose larvae and pupae to avian predators
- Set up light trap @ 1/ha
- Pheromone traps @ 12/ha to attract male moths
- Spray insecticides like chlorpyrifos 20 EC @ 1 lit/ha or neem oil @ 3%

#### **14.8 White Grub:**

- Coleopteran Pest grub feed on roots
- Damaging Stage: Grub/ larva
- Adults feed on higher tree foliage
- Eggs are laid in singly in soil or FYM
- Polyphagous pest/ wide host range

### **14.8.1 Management:**

- Light trap installation for management as adults are attracted to light
- Shaking of higher trees in evening followed by collection and destruction of beetles
- Farm yard manure should be treated before taking it to farm
- Soil drenching of chlorpyrifos 20EC @ 2ml/litre of water

### **14.8.2 Non-Insect Pest Rodents:**

**Rats: *Rattus rattus* Wrougall**

**Muridae: Rodintia**

**Nature of Damage:** Rats feed on many spices may be the end product in terms of seed

### **14.8.3 Control Measure:**

- Use of zinc phosphide or warfarin poison bait is found to be effective.
- Trapping with the help of preferred food.
- Use of sticky traps.

Other rodent porcupine is one of the devastating pests of saffron but could not be killed because of under the India Schedule IV of the Indian Wildlife Protection Act of 1972

## **14.9 Integrated Pest Management:**

### **14.9.1 Cultural Methods:**

- Collect and burn stubbles and chaffy ear heads which will prevent the carryover of overwintering pest.
- Deep ploughing one month before planting will expose the immature stages of insects and predators that prey upon them.
- Adopt synchronous and timely/early sowings of cultivars with similar maturity to reduce the damage by shoot fly, midge and head bugs.
- Crop rotation is recommended with cotton, groundnut or sunflower, to reduce the damage by shoot fly, midge and earhead bugs. Intercropping sorghum with pigeon pea, cowpea, or lablab also reduces the damage by stem borers.
- Use high seed rates 1.5 times more and delay thinning (to maintain optimum plant stand) to minimize shoot fly damage.

### **14.9.2 Mechanical Methods:**

- Set up light traps till midnight to monitor, attract and kill adults of stem borer, grain midge, June beetle and other moth pests.

- Set up the fishmeal traps impregnated with insecticide @12/ha till the crop is 30 days old.

#### **14.9.3 Biorational Methods:**

- Apply balanced fertilizers having adequate NPK to promote better plant growth, that results in reduced damage by shoot fly and stem borers.

#### **14.9.4 Chemical Methods:**

- Treat the seeds with thiamethoxam 30 FS @10 ml/kg of seeds to reduce the damage by shoot fly and to some extent stem borer and sucking pests.
- When the shoot fly damage reaches 5–10% of the plants with dead hearts, the crop may be sprayed with cypermethrin 10 EC (750 ml/ha) or quinalphos 25 EC (400 g a.i./ha) or carbofuran granules (5–7 granules/plant) may be applied in the leaf whorls.
- For stem borers, carbofuran 3 G granules may be applied in the whorls @8–12 kg a.i./ha.
- For earhead bugs (1–2 bugs/panicle) and head caterpillars (2–3 larvae/panicle), the crop may be sprayed at the completion of flowering and at the milk stage with cypermethrin 25 EC @0.5 ml/litre.
- For managing sucking pests like shoot bug, aphids, apply dimethoate 0.03% and neem seed kernal suspension 0.04%+soap.

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