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12. Sucking Pest of Pulse Crop and Management

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Abstract:

Over the year's pulses have been a medium of sustainable crop production in the world. In India pulses are one of the major crops grown. Pluses can fix and use atmospheric nitrogen (under favorable conditions), potentially reducing the need for synthetic nitrogen fertilizer. This nitrogen-fixing properties of pulses improves soil fertility, which also improves and extends the productivity of farmland. But besides this, pulses are prone to get attacked by various insect, pests and diseases. Some of the major insect, pests of pulses include thrips, whitefly, leafhopper, black aphid, pod borers, stem fly, etc. There are several IPM practices which can be used to control these insects, pests.

Keywords:

Pulse, Crop, Production, Sustainable, Atmosphere

12.1 Introduction:

Pulses are one of the major crops grown in India. India is one of the leading producers of pulses. As per Second Advance Estimates, the estimated production of pulse crops for 2022-23 is 278.10 Lakh Tones (Ministry of Agriculture and Farmers Welfare). Pulses are annual crops which can be grown in Kharif, Rabi and Zaid seasons. Rajasthan, Madhya Pradesh, Maharashtra, Uttar Pradesh, and Karnataka are the top five pulse-producing states. Major pulses are grown chickpeas (gram), pigeon pea (tur or arhar), moong beans, urad (black matpe), masur (lentil), peas and various kinds of beans. Pulses are the nutritionally dense edible seeds of legumes. They are high-protein, high-fiber, rich in minerals and vitamins. According to the Indian Council of Medical Research (ICMR), 40 gm of pulses is the recommended daily intake for a balanced diet for an average sedentary man.

There has been tremendous increase in production of pulses in India, but pest attacks are also increasing which leads in damage and loss of yield. About 250 insects have been recorded feeding on pulse crops. Of these, about one dozen insects including pod borers, stem borers, leaf miners, foliage caterpillars, cutworms, jassids, aphids and whiteflies are most important. Some polyphagous insects also feed on these crops and cause considerable damage. The sucking pests which were earlier recognised as minor pests in pulses with lesser economic significance are attaining a status of major pests (Saxena et al. 2018). Productivity of pulses has been severely threatened by increasing difficulties in managing these sucking pests due to their ability to evolve resistance to insecticides, resurgence and

their secondary outbreak due to indiscriminate and injudicious application synthetic insecticides. To attain economically feasible, ecologically sound, and socially acceptable management strategies against sap feeding pests of pulses, the detailed information on pest complex, their status and temporal association with host plant, yield losses, nature of damage, and feeding symptoms is of great significance.

12.2 What Are Sucking Pests:

The mouthparts of sucking insects are specialized for piercing and sucking. These pests damage plants by inserting their mouthparts into plant tissue and removing the juices or by sucking the cell saps. These sucking pests or sap feeders have an intense physiological effect on the growth of the host plant along with changes in both plant nutrients (Masters and Brown 1992) and plant secondary metabolites (Karban and Myers 1989). There are acknowledged in removing the nutrients from xylem or phloem of the host plant, thereby decreasing photosynthetic rates and plant growth (Meyer 1993). The pulse crops are affected by a number of sucking pests such as thrips, aphids, leafhoppers, plant bugs, whiteflies, scales, mealybugs, and mites which causes direct or indirect yield losses by attacking as vectors of viral diseases.

Table 12.1 Sucking Pests of Chickpea/ Bengal Gram

Sr. No.	Common name	Scientific name and family	Identification of pest	Nature of damage and symptoms	Control measures
1.	**Black aphid**	*Aphis craccivora* Koch Aphididae	Nymphs and Adult – dark coloured with cornicles in the abdomen	• Suck the sap from tender leaves, flower stalks and pods. • Leaves, inflorescence stalk and young pods covered with dark coloured aphids. Honey dew secretion with black ant movements	• Growing resistant varieties. • Spray of Acetamiprid @ 25g/100 L and Thiamethoxam @ 20g/100 L. • Use entomopathogenic fungus *Fusarium pallidoroseum* or *Beauveria bassiana* to cause epizootics in aphids. Lady bird beetles, Syrphids and green lacewings are reported as common predators of aphids.
2	**Pea aphid**	*Acyrthospihon pisum* (Harris) Aphididae	Adult aphids are soft bodied, long legged, pear-shaped, green yellow or pink in colour.	• Both nymphs and adults suck the sap from young shoots, ventral surface of tender leaves, inflorescence and even on stems. Curling and distortion of leaves, stunting and malformation shoots occur. Leaves turn pale and dry. Honeydew secretion of aphids leads to sooty mould which hinders the photosynthetic activity of the plants.	• Spray 1.0 L of dimethoate 30 EC in 750 L of water per ha when the attack starts and repeat after 15 days if necessary. • Use of entomopathogenic fungus *Pandora neoaphidis* has been reported to reduce *A. pisum* populations. • Lady bird beetles, green lacewings, hoverfly, damsel bug, minute pirate bug and various spiders are reported as common predators of aphids.

Sr. No.	Common name	Scientific name and family	Identification of pest	Nature of damage and symptoms	Control measures
3	**Cow bug**	*Tricentrus bicolor* Dist. Membracidae	Adults are black with prominent sub triangular pronotum overlapping the entire prothorax.	• Both nymphs and adults suck the plant sap and exude honeydew which attracts the black ant *Camponotus compressus.* • The damage caused is seldom severe resulting in drying of leaves/plant. The females cut tender branches,midrib of leaves,petioles,buds or lamina and lay eggs therein.	Spray of dimethoate at 2ml/ L
4	**Striped Mealy bug**	*Ferrisia virgata* Cockerell Coccidae	Nymphs are yellowish to pale white in color and adults are long, slender covered with white waxy secretions. Adult females have two longitudinal, submedian, interrupted dark stripes on the dorsum	• Mealybugs affect nutrient levels in plant by sucking the sap, thereby reducing growth, they often produce a sticky substance high in carbohydrates known as honeydew. • This honeydew is an excellent medium for growth of sooty mould fungus that forms a dark film on the leaf surface and impairs photosynthesis. Leaf discoloration and leaf and fruit drop are the markable symptoms of mealybug infestation.	• Debark vines and branches and apply methyl parathion paste. • Collect damaged bark, leaves, twigs and stems. • Use sticky traps on fruit – bearing shoots at a length of 5 cm. • Dimethoate 30 EC plus kerosene oil at 150 ml plus 250 ml in 100 ml of water. • Apply quinalphos dust in the soil at 25 kg/ ha to kill ants. • Release exotic predator, *Cryptolaemus montrouzieri* @ 10 beetles/vine. • Field release of parasitoids - *Anagrus dactylopii, Gyanusoidea mirzai.*

Table 12.2 Sucking Pests of Pigeon pea, Red gram or Tur

Sr. No.	Common name	Scientific name and family	Identification of pest	Nature of damage and symptoms	Control measures
1.	**Pod sucking bugs**	Clavigralla gibbosa Spinola (Spiny brown bug) Clavigralla scutellaris (West wood) Clavigralla tomentosicollis Stal.	**Spiny brown bug** • Adults are stout, about 10 mm long, furry and brown, having a pair of elongated spines projecting	• Both adults and nymphs feed by piercing the pod wall pf pigeonpea and sucking the sap from developing seeds. • The external symptoms of the damage are tiny	For all Pod sucking bugs Insecticides, particularly with systemic action such as acephate @ 1.0 g/l or dimethoate 1.7 ml/l are effective in controlling these pests.

Sr. No.	Common name	Scientific name and family	Identification of pest	Nature of damage and symptoms	Control measures
			interiorly on pro-thorax.	depressions on the pod walls and seed coat. Affected seeds lose viability, shrivel and rot.	
		Riptortus dentipes F.(Riptortus bug)	**Riptortus bug** • Adult bugs are slender and about 20 mm long. They are light brown with white or yellow lines on the lateral sides of the body.	• Both adults and nymphs feed by piercing the pod wall pf pigeonpea and sucking the sap from developing seeds. • The external symptoms of the damage are tiny depressions on the pod walls and seed coat. Affected seeds lose viability, shrivel and rot.	
		Anoplocnemis curvipes (Fabricius) (Hemiptera: Coreidae) (Coreid bug)	**Coreid bug** Adult is about 2.5cm long, causing damage similar to that of Clavigralla spp. Males have a single large spine on each hind leg, which is lacking in females. Newly hatched nymphs are bright red in colour, which gradually turn to black. There are five nyphals instars, initial stages resembling to ants.	• Both adults and nymphs feed by piercing the pod wall pf pigeonpea and sucking the sap from developing seeds. • Both adults and nymphs feed by piercing the pod wall of pigeonpea and sucking the sap from developing seeds.	
		Nezara viridula (L.) (Hemiptera: Pentatomidae) (Green stink bug)	**Green stink bug** Adults are about 1.2cm long, shield-shaped with an overall dull green color. The eyes are dark red or black. Small black dots can be found along the sides of the abdomen. The wings completely	• The green stink bug has piercing-sucking mouthparts consisting of a long beak- like structure called the rostrum. All plant parts are affected, however, growing shoots and developing pods are preferred. Attached shoots usually wither, or in extreme cases, may die. • The damage from the punctures are dark brownish or black spots. Pod growth is retarded, leading to withering and	

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			cover the abdomen.	dropping from the plant.	
2	**Cow bugs**	*Otinotus oneratus* W. *Oxyrachis tarandus* F. (Membracidae)	The adults are dark brown to black measuring approximately 7 mm in length and have horn-like projections on the thorax.	Nymphs and adults feed on sap from tender shoots. Heavy infestations during early growth of the crop may result in stunting and reduction of plant vigor. Cow bugs excrete honeydew, a sugary substance that attracts ants. The ants in return provide the bugs protection from natural enemies, which would otherwise keep cow bug population under check. The common name of cow bug is derived from this habit of providing 'milk' to the ants.	No specific control measures are recommended. Insecticides used to control major pests, particularly dimethoate 30 EC @ 1.7 ml/l reduce the population
3	**Leafhoppers**	*Empoasca fabae* (Harris) (Potato leafhopper)	Potato leafhopper Adults have pale to iridescent green bodies with 6 or 8 white spots on their pronotum They have a distinctive white H shape mark between their head and wing base.	• Both stages suck plant sap from tender plant parts, leaves and inject toxic saliva. • At high infestation levels stunted internodes can be observed. Visual damage caused by potato leafhopper is called "hopperburn". Hopperburn is not present until 5-7 days after leafhopper feeding has occurred. The first sign is yellowing of the leaf at the tip followed by necrosis and leaf curling. These symptoms are the result of the plant shutting down photosynthesis in the leaf in response to leafhopper feeding. As this pest weakens a plant, it becomes	No specific control measures are recommended.

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				more vulnerable to disease	
4	Mealy bugs	*Coccidohystrix insolita* (green)		• Crawlers congregate on leaves, stems and terminal shoots and suck the plant sap.	• Use of entomopathogenic fungus *Metarhizium anisopliae*
5	Scales	*Ceroplastodes cajani* Maskell *Icerya purchasi* Maskell (Hemiptera : Coccidae)		• Scale insects feed by sucking the fluids from tender stems, young shoots and leaves.	• Use of synthetic insecticides
6	Thrips	*Megalurothrips usitatus* (Bagnall) (Thysanoptera : Thripidae)	The black adults (1 mm) and nymphs are easily seen with the naked eye, particularly when they are on yellow flower petals.	• Adults and nymphs suck the sap from floral parts. • Heavy infestation of thrips can lead to shedding of buds and flowers.	• Insecticides such as dimethoate 30 EC @ 1.7 ml/l used to control major pests also reduce thrips' populations effectively.

Table 12.3 Sucking pests of Green gram, Black gram (Mungbeen, Urdbeen) and Cowpea

Sr. No	Common name	Scientific name and family	Identification of pest	Nature of damage and symptoms	Control measures
1	**Black aphid**	*Aphis craccivora* Koch Aphididae	Nymphs and Adult – dark coloured with cornicles in the abdomen	• suck the sap from tender leaves, flower stalks and pods. • Leaves, inflorescence stalk and young pods covered with dark coloured aphids • Honey dew secretion with black ant movements	• Growing resistant varieties. • Spray of Acetamiprid @ 25g/100 L and Thiamethoxam @ 20g/100 L. • Use entomopathogenic fungus *Fusarium pallidoroseum* or *Beauveria bassiana* to cause epizootics in aphids. • Lady bird beetles, Syrphids and green lacewings are reported as common predators of aphids.
2	**Coreid bug**	Anoplocnemis curvipes (Fabricius) (Hemiptera: Coreidae)	Adult is about 2.5cm long, causing damage similar to that of Clavigralla spp. Males have a single large spine on each hind leg,	• Both adults and nymphs feed by piercing the pod wall pf pigeonpea and sucking the sap from developing seeds.	• Insecticides, particularly with systemic action such as acephate @ 1.0 g/l or dimethoate 1.7 ml/l are effective in controlling these pests.

Sr. No	Common name	Scientific name and family	Identification of pest	Nature of damage and symptoms	Control measures
			which is lacking in females. Newly hatched nymphs are bright red in colour, which gradually turn to black. There are five nyphals instars, initial stages resembling to ants.		
3	**Green stink bug**	Nezara viridula (L.) (Hemiptera : Pentatomidae)	Adults are about 1.2cm long, shield-shaped with an overall dull green color. The eyes are dark red or black. Small black dots can be found along the sides of the abdomen. The wings completely cover the abdomen.	• Both adults and nymphs feed by piercing the pod wall of pigeonpea and sucking the sap from developing seeds. • The green stink bug has piercing-sucking mouthparts consisting of a long beak- like structure called the rostrum. All plant parts are affected, however, growing shoots and developing pods are preferred. Attached shoots usually wither, or in extreme cases, may die. • The damage from the punctures are dark brownish or black spots. Pod growth is retarded, leading to withering and dropping from the plant. • The females cut tender branches, midrib of leaves, petioles, buds or lamina and lay eggs therein.	• Insecticides, particularly with systemic action such as acephate @ 1.0 g/l or dimethoate 1.7 ml/l are effective in controlling these pests.
4	**Whitefly**	*Bemisia tabaci* Genn Aleyrodidae	Adult is a minute insect with yellow coloured body with white waxy bloom. Nymph is greenish yellow, oval in outline along with puparia on	• The damage is caused by both nymphs and adults, which are found in large numbers. They suck plant sap and lower its vitality. • Severe infestation results in premature	Spray any one of the following (Spray fluid 250 l /ha) • Methyl demeton 25 EC 500 ml/ha • Dimethoate 30 EC 500 ml/ha

Sr. No	Common name	Scientific name and family	Identification of pest	Nature of damage and symptoms	Control measures
			the under surface of leaves.	defoliation, development of sooty mould or honey dew and shedding of flowers and pods.	
5	**Lab lab bug**	*Coptosoma cribraria*	Nymphs and Adult - sub globular, oval and greenish shield bug.It has a characteristic buggy odour	• suck the sap • Cluster on the plant parts	• Use of synthetic insecticides
6	**Been mite**	• *Polyphagotarsonemus latus* *(yellow mite)* • *Tetranychus urticae, T. cinnabarinus* *(Red spider mite)*	Male mites are small and white to pale yellow in colour. Females are yellowish and bigger than the males. Adult - red or brown in colour	• Mite is seen on young leaves especially the top two to three leaves and the bud. • Affected leaves become rough and brittle and corky lines • Downward curling • Intermodes get shortened, • Shoots - stunted and deformed. • Nymphs and adults suck the sap from undersurface of the leaves • Affected leaves turn pale and have a dusty coating and fine webs. In severe attack the growth of the plants becomes stunted.	• Spray dicofol 18EC 2 ml/lit or ethion 50 EC 2 ml/lit • Application of wettable sulphur 80 WP 2g/lit using hand operated sprayer. • Spraying of dicofol 18.5 EC @ 2 ml/l or wettable sulphur @ 3 g/l

Table 12.4 Sucking Pests of Lentils

Sr. No	Common name	Scientific name and family	Identification of pest	Nature of damage and symptoms	Control measures
1	**Black aphid**	*Aphis craccivora* Koch Aphididae	Nymphs and Adult – dark coloured with cornicles in the abdomen	• suck the sap from tender leaves, flower stalks and pods. • Leaves, inflorescence stalk and young pods covered with dark coloured aphids • Honey dew secretion with black ant movements	• Growing resistant varieties. • Spray of Acetamiprid @ 25g/100 L and Thiamethoxam @ 20g/100 L. • Use entomopathogenic fungus *Fusarium pallidoroseum* or

Sr. No	Common name	Scientific name and family	Identification of pest	Nature of damage and symptoms	Control measures
					Beauveria bassiana to cause epizootics in aphids. • Lady bird beetles, Syrphids and green lacewings are reported as common predators of aphids.
2	**Pea aphid**	*Acyrthospihon pisum* (Harris) Aphididae	Adult aphids are soft bodied, long legged, pear-shaped, green yellow or pink in colour.	• Both nymphs and adults suck the sap from young shoots, ventral surface of tender leaves, inflorescence and even on stems. • Curling and distortion of leaves, stunting and malformation shoots occur. Leaves turn pale and dry. Honeydew secretion of aphids leads to sooty mould which hinders the photosynthetic activity of the plants.	• Spray 1.0 L of dimethoate 30 EC in 750 L of water per ha when the attack starts and repeat after 15 days if necessary. • Use of entomopathogenic fungus *Pandora neoaphidis* has been reported to reduce *A. pisum* populations. • Lady bird beetles, green lacewings, hoverfly, damsel bug, minute pirate bug and various spiders are reported as common predators of aphids.
3	**Green stink bug**	Nezara viridula (L.) (Hemiptera: Pentatomidae)	Adults are about 1.2cm long, shield-shaped with an overall dull green color. The eyes are dark red or black. Small black dots can be found along the sides of the abdomen. The wings completely cover the abdomen.	• Both adults and nymphs feed by piercing the pod wall of pigeonpea and sucking the sap from developing seeds. • The green stink bug has piercing-sucking mouthparts consisting of a long beak- like structure called the rostrum. All plant parts are affected, however, growing shoots and developing pods are preferred. Attached shoots usually wither, or in extreme cases, may die. • The damage from the punctures are dark brownish or black spots. Pod growth is	• Insecticides, particularly with systemic action such as acephate @ 1.0 g/l or dimethoate 1.7 ml/l are effective in controlling these pests.

Sr. No	Common name	Scientific name and family	Identification of pest	Nature of damage and symptoms	Control measures
				retarded, leading to withering and dropping from the plant. The females cut tender branches,midrib of leaves,petioles,buds or lamina and lay eggs therein.	
4	**Whitefly**	*Bemisia tabaci* Genn Aleyrodidae	Adult is a minute insect with yellow coloured body with white waxy bloom. Nymph is greenish yellow, oval in outline along with puparia on the under surface of leaves.	• The damage is caused by both nymphs and adults, which are found in large numbers. They suck plant sap and lower its vitality. • Severe infestation results in premature defoliation, development of sooty mould or honey dew and shedding of flowers and pods.	• Spray any one of the following (Spray fluid 250 l /ha) • Methyl demeton 25 EC 500 ml/ha • Dimethoate 30 EC 500 ml/ha
5	**Leafhopper**	*Empoasca kerri Pruthi (Cicadellidae)*	**Egg:** Elongated yellow-white egg is deposited in leaf vein. **Nymph:** Pale-green, wedge shaped, winged pads extend up to the fifth abdominal segment **Adult:** It is a wedge shaped and pale green insect	• Tips of affected leaves become brown, turn upwards and get dried up	• Spray dimethoate 30 EC 2ml/lit

Photo Plate

BLACK APHID

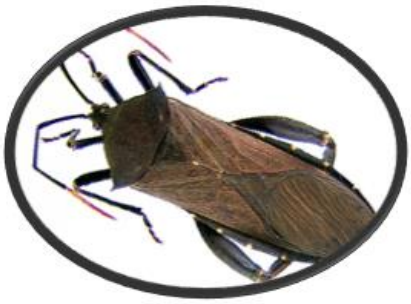
LEAFHOPPER

WHITEFLY

PEA APHID

GREEN STING BUG

RED SPIDER MITE



COREID BUG

LAB BUG

THRIPS

COWBUG

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