

INSECT FAUNA OF LUCERNE (*MEDICAGO SATIVA* LINN.) CROP IN DESERT BELT OF RAJASTHAN

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ABSTRACT

During surveys, 42 insects on lucerne crop were collected and identified of which 22 constituted as new records. Out of these, five viz. *Hypera postica*, *Utethesia lotrix*, *Therioaphis trifolli maculata*, *Rhopalosiphum maidis* and *Aphis craccivora* were found to cause serious damage to crop. Four hymenopterans parasites and 8 species of predators were also recorded.

INTRODUCTION

Lucerne or Alfalfa (*Medicago sativa* Linn.) is cultivated extensively in the irrigated belt of the Western Rajasthan (Balotra, Bilara, Mathania and now a days also in the canal command areas of the Indira Gandhi Canal). Investigations during 1982-84 in the Balotra sector of Thar desert revealed that numerous pests attack this important crop from the germination to the harvest throughout the cropping season. No information is available on pest fauna in the arid tract of the state on this crop. Hence, the study on fauna complex of this crop was undertaken.

MATERIAL AND METHODS

Extensive surveys were undertaken in the lucerne grown areas of 100 hectares located in the vicinities of villages viz. Asotara, Jasol. Meli, Janiyana and Korna of the Balotra section during the years 1982-84 on incidence of insect fauna, activities of predators and parasites. The insects were collected and brought to laboratory for their group identifications. With a view to study the feeding capacity of the predators, grubs and adults of coccinellids were collected from the crop and kept separately in the glass vials (6.5 x 4.5 cm diam.). About 100 freshly collected nymphs of aphids from the infested crop were introduced in each beaker alongwith fresh shoots of host plant and percentage of predation was recorded. Observations on the activities of some parasitic hymenopterans and dipteran insects alongwith their host species were also recorded.

RESULTS AND DISCUSSION

In all 42 insect species (Table 1-3) belonging to 27 families and 7 orders, viz. Hemiptera (13), Diptera (7), Coleoptera (5), Hymenoptera (8), Lepidoptera (1), Orthoptera (4) and Isoptera (4) have been recorded. These species were categorized

Table 1. Insect fauna of lucerne

Systematics of pest species	Nature of damage	Locality records	Extent of damage
LEPIDOPTERA			
Arctidae			
<i>Utethesia lotrix</i> (Cramer)	Moth casual visitor to flower	Jasol	Mild
HEMIPTERA (HETEROPTERA)			
Berytidae			
<i>Gamposocoris pulchellus</i> (Burm.)	Nymph and adult feed on the sap of stems, branches and leaves	Jasol	Moderate
Pentatomidae			
<i>Bagrada hilaris</i> (Burton)	Adult and nymph feed on the sap of stem, branches and leaves	Meli	Moderate
<i>Nazara hilare</i> (Say)	— do —	Meli	Moderate
<i>Acrosternum</i> sp	— do —	Meli	Moderate
Miridae			
<i>Campylomma</i> sp	Sap sucking insects collected from the leaves	Jasol	Mild
Lygaeidae			
<i>Pachybrachius</i> sp	Adult and nymph both plant juices from tenderleaves	Meli	Moderate
HOMOPETERA			
Cicadellidae			
<i>Psammotettix striatus</i> (Linn.)	Sap sucking insect on tender shoot and foliage, occasionally outbreak observed	Asotatra	Moderate
<i>Empoasca decipiens</i> (Paoli)	Sap sucking insect on tender shoot and foliage, occasionally outbreak observed	Asotatra	Moderate
<i>Austroagallis</i> sp	Casual visitor to tender leaves	Janiyana	Mild
Delphacidae			
<i>Sogatella</i> sp	Due to sap sucking leaves become greenish yellow on severe infestation sooty mould develops	Janiyana	Mild
Aphididae			
<i>Rhopalosiphum maidis</i> (Fitch)	Infestation occurs on the tender shoot and the undersurface of tender leaves Black. sooty mould develop on the honey due excreted by the applied	Meil	Heavy
<i>Therioaphis tritolia maculata</i> (Buckton)		Meli	Heavy
<i>Aphis craccivora</i> (Koch)	— do —	Janiyana	Moderate
Diptera			
Muscidae			
<i>Musca domestic</i> Linn.	Casual visitor to flowers	Jasol	Mild
Anthomyiidae			
<i>Delia platura</i> (Meigen)	“	Jasol	—
Sarcophagidae			

1	2	3	4
<i>Mittogrammina</i> sp	"	Janiyan	Mild
Ephydriidae			
<i>Scatella</i> sp.	Collected from foliage, feeding habits not observed	Korna	Mild
Tephritidae			
<i>Dacus (Bactocera)</i> sp.	Casual visitor to flowers	Korna	—
COLEOPTERA			
curculionidae			
<i>Hypera postica</i> (Gyllenhal)	Larva feeds first in leaf buds and later on large leaves	All the localities Jasol, Janiyana, Meli and Korna	Heavy
HYMENOPTERA			
Apidae			
<i>Apisflore</i> a (Fabricus)	Repeatedly visiting to flowers for nectar. A promising pollination.	All the localities Jasol, Janiyana, Meli and Korna	Heavy
Halictidae			
<i>Halictus</i> sp	It is also a pollinator	Meli and Jasol	Moderate
<i>Nomioides</i> sp. <i>variegata</i> group	Collected on foliage feeding habits not observed	Meli	Mild
Figitidae			
<i>Callaspidia</i> sp.	Collected on foliage, habits not observed	Meli	Mild
ISOPTERA			
Termitidae			
<i>Microtermes mycophagus</i> (Desneux)	The roots of plants were b nibbled and slowly eaten; up. The infested plants withered and dried	Jasol	Heavy
<i>M. obesi</i> (Holmgren)	— do —	Jasol	Heavy
<i>M. unicolor</i> (Snyder)	"	Meli	Moderate
<i>Eremotermes</i> sp	"	Korna	Mild
ORTHOPTERA			
Acridoidea			
Pyrgomorphidae			
<i>Chrotogonus trachypterus</i> (Blanchard)	Nymphs and adults defoliators generally feed in morning or evening hours.	Jasol	Heavy
<i>Pyrgomorpha bispinosa deserti</i> (Bei-bienko)	— do —	Meli	Mild
<i>Acrotylus humber</i> tianus (Saussure)	— do —	Janiyana	Mild
<i>A. inflicita</i> (Walker)	— do —	Janiyana	Mild

Table 2. Parasites and their host species

Order	Family	Parasite	Host species	Locality
Hymenoptera	Pteronidae	<i>Trichomalopsis apantoctena</i> (Crawford)	Larvae of <i>Utethesia</i> sp.	Meli
— do —	Braconidae	<i>Sphegigaster</i> sp <i>Opius</i> sp	<i>Phytomyza</i> sp. <i>Dacus</i> sp. <i>Phytomyza</i> sp.	Janiyana
— do —	Ichneumonidae	<i>Diplazon laetatorius</i> Fabricus	<i>Utethesia</i> sp.	Jasol

into four groups - defoliators and general feeders, sap suckers, pollinators and natural enemies of the insect pests.

1. Defoliators and general feeders

(i) Lucerne weevil : *Hypera postica* (Gyllenhal) : It has been observed as one of the most serious pests of the crop in all the localities visited during the study period. Maximum infestation was recorded during February to March, with an average of Ca. 120 grubs per 100 plants and the weevil population decreased (3-6 grubs per 100 plants) suddenly in the summer months (April to June/July). All stages of pest (egg, larva, pupa and adult) were visible on infested plants from mid of December to the second week of the March. It might be possible that the attack of pest can be avoided to a considerable extent if the cutting of crop during January-March periods is completed within the shorter intervals of a half month period at the very close to the ground. The life cycle of the pest completed within 30 days. Kushwaha and Jain (1966) recorded this pest on lucerne at Udaipur, attacking crop from January to March. The pest has already been reported elsewhere devastating lucerne, sengi and pea crops. (Lefroy 1909; Beeson 1941). The mature larva of *Hypera postica* has been parasitized by *Bathyplectes curculionids* (Thener) and *Necrumnus leucarthos* (Nees) (Subba Rao *et al.* 1967).

(ii) *Utethesia lotrix* (Cramer) : This was the most destructive lepidopteran pest of crop in the areas surveyed. The caterpillars fed on the leaves and young shoots of the crop. Pupation took place in the leaf folds and also in the soil. The life cycle was completed within 30 days.

(iii) Grasshoppers : Four species of grasshoppers have been collected and identified (Table 1) damaging young seedlings of the crop and widely distributed throughout the desert as minor pests of cultivated crops (Parihar 1987). Of these *Chrotogonus trachypterus* was one of the most important minor pests because of the fact that it bred 4-5 times in the year in the area of irrigated cropland and attacked lucerne throughout the season. Rest of species bred one or two times a year and

Table 3. Predators of insect pests in the lucerne yield field

Order	Family	Predator species	Host species (Aphids)	Locality	Corrected percentage of predation of aphids	
					Range	Average
Neuroptera	Chrysopidae	<i>Chrysoperla cornea</i> (stephens)	<i>Rhopalosiphum maidis</i> (Fitch.)	Meli & Jalor	21-70	45.5 ± 11.4
"		<i>Chrysopa scelestes</i> (Banks)	<i>Therioaphis</i> sp. <i>Aphis craccivora</i>	Meli & Jalor Janiyan	10-20 —	13.3 ± 2.2 —
Diptera	Syrphidae	<i>Shaerophoria</i> sp	<i>Therioaphis trifolia</i>	Meli	5-7	5.6 ± 0.6
"	Ephydriidae	<i>Psilopa</i> sp	<i>Rhopalosiphum</i> <i>Aphis craccivora</i>	Janiyan Korna	10-15 —	12.0 ± 1.1 —
Coleoptera	Coccinellidae	<i>Brunoides saturalis</i> Fabricius <i>Exochomus saltore</i> (Sicarb) <i>Monochilus sexmaculatus</i> (Fabricius) <i>Hyppodamia</i> (Adonia) <i>Variegata</i> (Goese)	<i>Aphis craccivora</i> <i>Rhopalosiphum maidis</i> <i>Aphis craccivora</i>	Meli Korna Meli Korna	35-80 — 25-90 40-75	62.0 ± 10.8 — 46.6 ± 13.8 57.5 ± 9.4
			<i>Therioaphis</i> sp.	Meli, Jasol, Janiyan	30-92	53.1 ± 15.4

preferred more sparsely distributed grasses for the oviposition whereas fully developed larvae and adults selected crops for the feeding.

(iv) *Termites* : Four species of termites have been identified devastating lucerne crop. All these species were subterranean and caused losses to crop by eating up roots at ground level of the plants. The pest species were more abundant in the dry hot season of the year (Parihar 1981). The low soil moisture and high ground temperatures were responsible for abundance of termites. Another cause of their emergence was the use of cow dung manure in the field that attracted termites to come out during foraging and caused considerable loss to the crops.

2. Sap suckers

These were mostly hemipterans and dipterans insects noticed on the crop and were casual visitors to the crop and did practically no harm to the crop. However among the hemipterans collected only aphids and jassids (*Empoasca* sp.) were considered important pests (i) Aphids—Three species of aphids have been recorded, these were *Therioaphis trifolli maculata* (Buckton), *Rhopalosiphum maidis* (Fitch) and *Aphis craccivora* (Koch). These were considered most important pests of crops. The peak period of their abundance was in the first week of February depending largely on incidence of low temperature and rainy or cloudy weather. In case of their severe attack, the leaves might be curled up, fade and fully dried up. Black sooty mould developed on the leaves. Elsewhere *Aphis craccivora* has been also recorded on wheat, berseem and cowpea crops, whereas *Rhopalosiphum maidis* from wheat, sorghum, cardamum and coffee (Nair 1986).

Empoasca decipiens (Paoli) : This was widely distributed throughout the Balotra sector and also attacked some other crops like berseem, wheat and castor. These generally feed the lower side of the leaves and the infested leaves appear crinkled with characteristic browning and other symptoms of hopper burn. The insects multiplied in large numbers during November to January and the peak of population was noticed in the first week of January and decreased considerably in months of April and May.

3. Pollinators

In all, 5 species of insects visited either occasionally or regularly on lucerne flowers, Out of these insects, only two of them, i.e. *Aphis flores Fabricius* and *Helictus* sp. showed longer stay and comparatively increased their visits repeatedly to the flowers. These two, therefore might be recognised as potential pollinators of the crop.

4. Natural enemies of crop pests

Some insect parasites and predators of crop pests were evaluated that have shown

some degree of potentiality to lower down the population of pest species, might be recognised as promising bio-control agents listed in Tables 2 and 3.

Parasites : The matured larvae of *Utethisia totrix* crumer has been parasiteized by *Trichomalopsis apantocentrum* and *Diplazon laetatorius*. Two other hymenopteran parasites *Opius* sp. and *Sphegister* have been observed as parasites of *Dacus* sp. and *Phytomyza* sp. in the same field of mustard crop.

Predatory insect species : Details of predator species and their associated host species are shown in Table 3. In all, 8 insect predators have been identified which were associated with aphids in lucerne crop. Among them, two were neuropterans, two dipterans and four coccinellids. Coccinellids showed maximum feeding (47-62%) of aphids, while that was the least (5-13%) by the dipterans. Elsewhere the intensity of predation of aphids by coccinellids have been reported on grass and pea crops (Saxena et al. 1970; Aziz et al. 1969).

Forgoing account of insects associated with this crop shows all possibilities to intensify the pest problem of the crop within passage of time and become a limiting factor in the successful cultivation of crop. It might further increase by the use of high irrigation schedules, high yielding seed variety and use of fertilizers in these areas.

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REFERENCES

- Aziz, S.A., Hyder, S.N. and Ali. M.H: 1969. Studies on the host preference of *Coccinella septempunctata* Linn. *Indian Journal Entomogy* 31 : 350-353.
- Beeson, C.F.C. 1941. *The Ecology and control of the forest insects of India and the neighbouring countries*. ii + 1007 pp. Vasant Press, Dehradun.
- Kushwaha, K.S. 1977. A review of progress in studies on forage and pasture insect pests of Rajasthan. In *Natural Resources of Rajasthan* (Ed.) M.L. Roonwol. Vol. I, pp. 387-411, University of Jodhpur, Jodhpur.
- Kushwaha, K.S. and Jain S.K. 1966. On some forage insect pests of Rajasthan. *Proc. 2nd All India Cong. Zool*, Varanasi, 2 : 404-410, 1962.
- Lefroy, H.M. 1909. *Indian Insect Life*. p. 461. Thackin Spink & Co., Calcutta.

- Nair, M.R.G.K. 1986. *Insects and mites of crops in India*. 408 pp. ICAR New Delhi.
- Parihar, D.R. 1981. Termitepests of Rajasthan and their management. CAZRI Monograph No. 16 - 31 pp.
- Parihar, D.R. 1987. Grasshopper pests of grazing land vegetation and their management in Indian desert. CAZRI Publ. No. 29.
- Saxena, H.P., Sircar, P. and Phokela, A. 1970. Predators of *Coccinella septempunctata* Linn and *Ischiadan scutellaris* Fabr. on *Aphis craccivora* Koch. Indian Journal of Entomology 32 : 105-106.
- Subba Rao, B.R., Baldev Prasad, Atma Ram, Singh, R.P. and Srivastava, M.L. 1967. Further notes on *Hypera postica* (Gyllanhan and natural enemies. Indian Journal of Entomology 29 : 370-379.