P: ISSN No. 0976-8602 RNI No.UPENG/2012/42622 VOL.-7, ISSUE-4, October-2018

E: ISSN No. 2349-9443 Asian Resonance

Occurrence of Insect Pests on Medicinal Plants in Arid Parts of Rajasthan

C. L. Verma
Associate Professor,
Deptt.of Zoology,
Govt Lohia College,
Churu, Rajasthan

Abstract

Survey for insect pests occurring on five naturally growing medicinal plants (*Withania somnifera, Solanum nigrum, Solanum surattense, Datura innoxia and Calotropis procera*) was undertaken in three arid districts (Sikar, Churu, Bikaner) of Rajasthan, India. The study revealed presence of six insect pests on *W. somnifera*, three on *S. nigrum* and *S. surattense*, three on *D.innoxia* and two on *C. procera*. *W. somnifera* also revealed presence of a mite species. Some insect pests were found causing severe damage to the medicinal plant species.

Keywords: Medicinal Plant, Insect Pest.

Introduction

Medicinal plants play a vital role in providing health care to human beings since the dawn of civilization. These plants have always been a basic resource for health related applications.The arid ecosystem of north-west Rajasthan, the part of Thar Desert, is a rich depository of genetic material of important arid medicinal plant wealth. Both fresh and dried portions of these plants constitute essential raw material in traditional system of medicines like Ayurveda, Sidha, Unani, Homeopathy and Tibetan. Flora of Rajasthan has been compiled by Bhandari (1995), while detailed information about medicinal properties of plants has been enumerated by Chatterjee and Pakrashi (2001) and Jain (2010).

The Thar Desert is characterized by high atmospheric temperature, low and erratic precipitation and soil being predominantly sandy with poor organic matter making a region not only thirsty but also hungry for plant life (Sen, 1965). Like other agriculture crops, medicinal plants are also subjected to attack by insect pests.

Review of Literature

The type of insect pests, their status and ecology related to medicinal plants have not been worked out in this part of the desert. Besides yield losses, insect-infestation may also deteriorate the medicinal value of plant or plant part.

Objectives of the Study

Medicinal plants play a vital role in providing health care to human beings. Their use for medicinal, cosmetic and aromatic purposes has a long tradition. Thefore, before adoption of control measures for any plant pest, it is necessary to assess pest population, extent of damage and time of damage. Thus, preliminary survey was undertaken in Churu, Bikaner and Sikar districts of Rajasthan to collect basic information on insect-pests occurring on natural growing medicinal plants.

Material and methods

Study Area

The survey was conducted in the three districts of Rajasthan viz., Churu, Bikaner and Sikar. Churu district is situated between 27^{o} 24'N to 29^{o} 00'N and 73^{o} 40'N to 75^{o} 41'E longitude, occupying an area of about 13858 sq. km. Bikaner district is lying between 27^{o} 11'N latitude and 71^{o} 54'E to 74^{o} 22'E longitude and covers 30247.90 sq. Km. Sikar district 27^{o} 21'N to 28^{o} 12'N latitude and 74^{o} 40'E to 75^{o} 25'E longitude, occupying an area of about 7742.44 sq. Km.

The study area is a part of the Thar Desert in India, situated 400 m above the sea level. The area is well known for huge diurnal and seasonal temperature variation from -3^{o}C in winter to 50^{o}C in summers with shifting sand dunes, erratic and scanty rainfall and high wind velocity, having thorny and poor vegetation. The sandy soil and bright sunlight are two important natural resources available in this region which are responsible for the development of desert vegetation having variable medicinal properties (Jain, 1991; Kaushik and Dhiman, 2000).

Plant Species

Five plant species which are medicinally important and occur most frequently in these three districts were selected for recording insect pest infestation. These are *Withania somnifera* Dunal, *Solanum nigrum* Linn. *Solanum surattense* Burm.f., *Datura innoxia* Mill. And *Calotropis procera* (Ait.) R.Br.

Faunastic Survey

Survey for insects infesting these plants was conducted from April to November at an interval of 45-50 days. Infested plants were examined with naked eyes and with the help of 10X hand lens for the presence of insect pests and damage caused to the plant species. Depending upon the nature of damage, number of infested leaves or number of infested plants were also counted at random.

Identification

Insect species infesting medicinal plants were collected and brought to laboratory. They were then examined with the naked eyes or using hand lens or with the help of sterio-binocular microscope. Identification of insect species was done with the help of literature and by sending insect samples to entomologist at Department of Entomology, Rajasthan Agriculture university campus, Jobner.

Observations

Withania somnifera

Following insect pests were recorded on *W. somnifera*.

Hada Beetle (*Epilachna viginioctopunctata*; Order-Coleoptera ; Family-Coccinellidae)

This pest was recorded on this plant growing in all the three districts surveyed. The incidence, however, varied from location to location and with period of survey.Under severe conditions most of the plant leaves were almost damaged by the beetle due to feeding on chlorophyll from epidermal layer (Plate-1), checking further growth of the plant.The pest was found most active during September-October and during February-March while climatic extremes did not favour the pest activity.

Plate-1

Ash Weevil (*Myllocerus viridanus*: Order-Coleoptera; Family-Curculionidae)

This pest was found damaging leaves of the plant at two locations in Bikaner district and one location in Sikar districts. Damage was observed in the month of August in the form of irregular notching of leaf margins (plate-2). Random counting of 50 leaves from four plants each revealed that only 5% leaves were damaged. The damage was also limited to margins thus the pest appeared to be of minor importance.

Grasshopper (*Trilophida annulata*: Order-Orthoptera; Family-Acrididae)

Few ashwagandha plants growing on field boundaries in Churu district were found infested with the grasshopper. Both nymphs and adults of pest feed on leaves from margins to inward or making holes on leaf lamina (Plate-3).The pest population was more in the months of July-August. The plant damage was not found economically significant.

Aphid (*Aphis craccivora*: Order- Hemiptera; Family-Aphididae)

The plants growing at several locations in all three districts were found infested with black coloured aphids. The aphid population was more severe on undersurface of leaves (Plate-4). Infested leaves start drying due to sucking of cell sap by the pest. Infestation was also observed on tender shoots, flowers and developing fruits. The pest remains active from July to March causing severe damage to foliage.

Leaf Miner

This minor pest was observed at one location in Churu and two locations in Sikar district. The pest damages the leaf by making serpentine tunnels (Plate-5) due to lack of all the life stages of the pest, its identity could not be confirmed.

Scale Insect

The plants at several locations in Sikar (Fatehpur and kudan) and Churu (Ratangarh, Rajaldesar, Sardarshahar and Ratannagar) were found infested with a white coloured scale insect. The infestation starts from lower surface of the leaves along the midrib (Plate-6) with times the infestation extends on the upper surface of the leaves and shoot also. The infested leaves become weak and start shedding. Identity of the pest could not be established.

Mites (Tetranychus urticae: Order-Trombidiformes; Family- Tetranichidae)

Beside insect pests, *W.somnifera* was also found infested with a mite. The pest was most active in December. The infested leaves became pale yellow, curled and twisted showing webs and the fine dust particle (Plate-7). Photosynthesis of plant is adversely affected. Fully chlorotic leaves drop down.

Plate 2

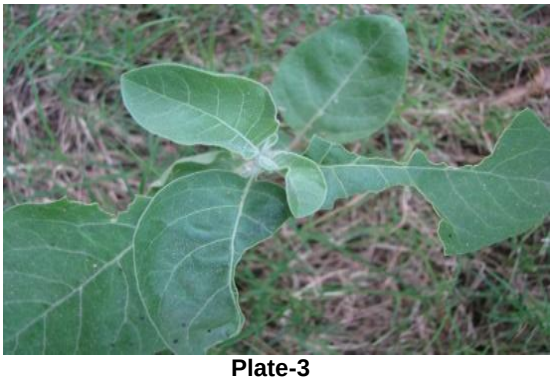


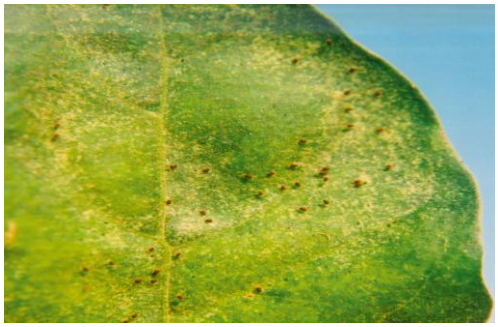
Plate-3

Plate-4

Plate-5

Plate 6

Plate 7



Solanum nigrum* and *S. surattense

Following insect pests were recorded on these plants.

Hada beetle (*Epilachna vigintioctopunctata*: Order-Coleoptera; Family-Coccinellidae)

It was found to be an important pest of both *S. nigrum* and *S. surattense*. Infestation on *S. nigaum* was observed at three locations in Sikar (Fatehpur, Khudi and Kudan) and one location in Churu (near Ramgarh). While infestation of *S. surattense* was frequently observed in all the three districts. The leaves of infested host were damaged due to feeding on chlorophyll from the epidermal layer.

Aphid (*Aphis gossypii*: Order- Hemiptera; Family-Aphididae)

Black coloured aphids were found infesting most frequently in Sikar and Churu districts. The pest population was more on lower surface of the leaves (plate-8). Under severe conditions, the pest also developed on tenders shoots, flowers and fruits. Though, *S. surttense* was found in all the three districts but aphid infestation on this host was observed only at two locations (Fatehpur and Laxmangarh) in Sikar district.

Leaf miner (*Laryomyza* sp.)

A group of 5-6 plants of *S. nigrum* growing on road side of highway near Reengus were found badly infested with leaf minor. The pest formed supentine tunnels on the leaves (plate-9). The affected leaves dry and drop down. Infestation of this pest was not observed on *S. surattense*.

Plate-8

Plate-9

Datura innoxia

Following insect pests have been observed on this plant.

White fly (*Bemisia tabaci:* Order-Hemiptera; Family- Aleyrodidae)

This sap sucking pest was seen on leaves and other tendor parts of the plant. Beside direct effect on plant health, the pest also known to act as vector of some virus diseases. The pest secrets honey like substance. As a result, leaves become sticky and promote development of molds which interferes with process of photosynthesis. The pest was found occurring on Datura, growing in all the three districts surveyed.

Leaf Miner (*Lariomyza bryoniae:* Order- Diptera; Family- Agromyzidae)

This leaf pest of Datura was observed at several locations in the three districts but incidence of the pest was very low. To assess the incidence of the damage, 50 leaves randomly selected from 5 plants at one location were observed with total of 12 locations in three districts. It was found that 4.5%, 3.0% and 5.5% leaves were infested in Churu, Bikaner and Sikar districts, respectively.

Hawk moth (*Acherontia styx:* Order- Lepidoptera; Family- Sphingidae)

In Sikar district Datura plants found infested with large sized larvae measuring more than 5 cm. The larvae have horn like structure. The adult moth is red brown in colour with large wings. The pest was not observed at any loacation in Churu and Bikaner districts.

Calotropis Procera

Following insect pests have been observed on this plant.

Aphid (*Aphis nerii:* Order-Hemiptera; Family- Aphididae)

C. procera growing in waste lands in almost all the three districts was frequently observed infested with yellow coloured aphid. The aphid developed on both the leaf surfaces and on tendor shoots and fruits of the *C. procera.* The leaves become dull coloured and weak. Due to secretion from the pest, the affected plant part becomes sticky (plate-10).

***Danus Chrysippus*: (Order-Lepidoptera; Family- Nymphalidae)**

Larvae of the pest feeding on the leaves were recorded in Sikar (Sargoth, Rewasa and Bai) and Churu (Ghanghu) districts. Pest was more active during monsoon (July-August) when 10-16 larvae per plant were recorded. Damage caused by these larvae was not significant.

Conclusion

Though, association of aphids, mites, scale, mealy bugs and hadda beetles with medicinal plants have been recorded from other parts of India (Mathur and Srivastava,1964; Singh *et al*., 1988; Purushothama, 1985; Sachan and Srivastava, 1965 and Prasadkumar, 2007; Syed *et al*.,2018; Nirmal *et al*., 2017), the present study records these pests for the first time in the arid part of Rajasthan. Further study is however needed to pinpoint reduction the medicinal value of the plant/ plant part due to insect infestation and control of these pests preferably by organic pesticides or bioagents.

Reference

1. *Bhandari,M.M. (1995): Flora of Indian Desert. Jodhpur, India: MPS Repros Publishar.*
2. *Chatterjee, A, and Pakrashi,S. C. (2001): The treatise of Indian medicinal plants. Vol. 1-6 National Institute of Science Communication.CSIR,New Delhi.*
3. *Jain. S. K. (2010): Medicinal plants. National book trust of India. pp 216.*
4. *Sen, D. N. (1965): Ecology of Indian Desert. Proc. Indian Science Cong.III pp 418.*
5. *Jain, S. K. (1991): Dictionary of Indian folk medicine. Ethano botany Deep publication, New Delhi.*
6. *Kaushik, P. and Dhiman (2000): Medicinal plants and raw of drugs of India. Bishen Singh Mahendra Pal Singh, Dehradun, India.*
7. *Mathur, A. C. and Srivastava, J. B. (1964): Henosepilachna vigitiooctopunctata (F.) Coleoptera: Coccinellidae), as a defoliator of some Solanaceous medicinal plants. Indian J. Ent., 26: 246.*

8. *Singh, D., Tripathi, A.K. and Rao, S.M. (1988): Phenology and chemicalcontrol of aphid Myzus persicae on henbane Hyoscyamus nigerand H.muticus. Indian J. Agric. Sci., 58: 292-296.*
9. *Purushothama, C.R. (1985): Faunistic study of phytophagous mites on ornamental and medicinal plants around Bangalore. M.Sc. (Agri) Thesis, Univ. Agric. Sci., Bangalore (India).*
10. *Sachan, J.N. and Srivastava, B.P. (1965): Biology of the lily moth Polytela gloriosae (Fab.) (Lepidoptera: Noctuidae). Indian J. Ent., 1:137-139.*
11. *Prasadkumar (2007): Pest complex and their status on medicinal and aromatic plants. National seminar on production, processing & marketing of medicinal, aromatic and dye yielding crops. 22-23 Feb., 2007, KRCCH, Arabhavi.*
12. *Syed Khadeeru Rehaman, Pradeep S, Dhanapal R and Chandrashekara GV (2018): Survey studies on insect-pests associated with important medicinal plants in Shivamogga, Karnataka. Journal of Entomology and Zoology Studies 2018; 6(1): 848-857.*
13. *Akash Nirmal, Yogesh Kumar Sidar, Rupesh Gajbhiye, And Jaya Laxmi Ganguli(2017): A Review On Insect Pests Of Medicinal Plants With Special Reference On The Pest Management Of Ashwagandha, Withania Somnifera (Linn.). Bull. Env. Pharmacol. Life Sci., Vol 6 Special issue [1] 2017:206-208*