SURVEY STUDIES ON INSECT-PESTS ASSOCIATED WITH IMPORTANT MEDICINAL PLANTS IN HIMACHAL PRADESH

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ABSTRACT

Indian Himalayan region is one of the richest sources of biodiversity in the world, having a wide range of medicinal and aromatic plants. The present studies were undertaken to record the insect-pest complex of some important medicinal plants. In all fifteen insect species belonging to four orders were observed to be associated with ten medicinal plants in different parts of Himachal Pradesh. All these insect-pests were recorded in low to medium numbers causing moderate damage. Seven insect species viz., Henosepilachna vigintioctopunctata (Fabr.), Nezara viridula (Linn.), Dysdercus cingulatus (Fabr.), Helicoverpa armigera (Hübner), Drosicha mangiferae (Green), chrysomelid, Podagrica bowringi Baly and one unidentified pentatomid bug were recorded feeding on Withania somnifera. On Saussurea costus, Thysanoplusia orichalcea, Condcia conducta (Walker), C. albigutta (Wileman) and Alcidodes crinalifer (Marshall) were found associated at different locations in Himachal Pradesh. Papilio sp. was recorded damaging Aegle marmelos at Shimla. Digitalis lanata, Rauwolfia serpentina, Celastrus paniculatus and Bacopa monerii showed low degree of damage by a scale insect, Drosicha, Pyrrhocorid bug and Spodoptera litura.

Key Words: Insect-pests, Medicinal and Aromatic Plants, Himachal Pradesh

INTRODUCTION

Human beings have been utilizing plants for basic preventive and curative health care since time immemorial.

Indian Himalayan region is one of the richest sources of biodiversity in the world, having a wide range of medicinal and aromatic plants. Out of 17,500 flowering plants known to occur in India, about 3000 are recognized for the medicinal uses (Sharma and Mudgal, 1997). According to the World Health Organization, 80 per cent of the population of developing countries relies on traditional plant-based systems of medicine to provide them with primary health care needs (Agarwal and Upadhyaya, 2006). In Himachal Pradesh, richest diversity areas are found in sub-tropical, sub mountainous low hills and valleys where 136 plant species occur. Due to rapid expansion of drug industry during recent past, large scale cultivation of these plants is being taken up. Even the state government is giving emphasis on the cultivation of the medicinal plants. National Medicinal Plant Board, Department of AYUSH, Ministry of Health, Government of India is also providing liberal financial assistance to State Governments to open Herbal Gardens in different parts of the state, which give better alternative for the conservation of these medicinal plants.

Before exploring the potential of these plants in the farmer’s field or for the commercial exploitation of these plants, it is mandatory to know about different aspects related to their cultivation like agronomical practices, diseases and insect-pests. The large scale cultivation of these plants in the state may face the problem of sudden appearance of large populations of variety of insect pests in a single crop. Like other plants, medicinal plants too have to bear the devastating effects of injurious insect-pests, which are not only harmful for the plant but also, deteriorate the quality of the produce, thus hampering its medicinal value. The information regarding the occurrence of insect-pests on medicinal and aromatic plants of the state is scanty. Hence the present studies were undertaken to record the insect-pests associated with important medicinal plants in the state.

MATERIALS AND METHODS

In order to record the insect species associated with different medicinal plants and also to study their incidence and nature of damage, the surveys were conducted at:

a) Herbal Garden, Jogindernagar (Distt. Mandi), 1220m amsl
b) Himalayan Forests Research Institute, Panthaghati (Shimla), 2130m amsl
c) Himalayan Forest Research Institute, Nursery, Shilly (Solan), 1350m amsl
d) Farmer’s Field, Berthin (Bilaspur), 760 m amsl
e) Farmer’s Field (Hamirpur), 758m amsl
f) Himalayan Forest Research Institute, Nursery, Brundhar (Kullu), 1230m amsl.
g) Herbal Garden, Department of Agro forestry and Environment, Palampur.

Depending upon the availability of plants, 10-20 plants were randomly selected and data pertaining to insect-pests were recorded. The sampling of insects at each location was carried out at regular intervals. The per cent plant infestation at each sampling date was recorded as follows:
Seven insect species were collected from *Withania somnifera* in different locations of Himachal Pradesh. The leaf feeding beetle (*hadda* beetle), *Henosepilachna vigintioctopunctata* (Fabr.) was recorded at Baldook (Hamirpur) with a population of 2.3 beetles per plant (Fig. 1a). The beetles and grubs were observed feeding on the epidermal layer of leaves, which presented a web-like appearance. *H. vigintioctopunctata* in general is reported to be a pest of Solanaceae and Cucurbitaceae in South Asia (Shirai and Katakura, 1999). The occurrence of *H. vigintioctopunctata* on *W. somnifera* has also been reported by Parjhar et al., (1997).

Three sap sucking bugs *viz.*, green potato bug, *Nezara viridula* (Linn.), red cotton bug, *Dysdercus cingulatus* (Fabr.) and one unidentified pentatomid bug were recorded feeding on *W. somnifera* at Baldook (Hamirpur) with population of 1.3, 1.2 and 1.4 adults per plant, respectively. The nymphs as well as adults of *N. viridula* and *D. cingulatus* were observed damaging leaves and inflorescence by sucking the cell sap. Some of the leaves on the plant were observed drying up gradually. The unidentified pentatomid was also recorded on *W. somnifera* at Shilly (Solan) with the comparative high population (3.2 adults/plant). This species, however, was recorded feeding on leaves and the developing seeds of the plant. There is no report on the occurrence of these three bugs on *W. somnifera* in literature. The green potato bug *N. viridula* is, however, reported to be regular pest of cotton, soybean, potato (Willrich et al., 2004; Panizzi, 2002; Vivan and Panizzi, 2002).

The larvae of polyphagous pest, gram pod borer, *Helicoverpa armigera* (Hübner) were recorded on *W. somnifera* in farmer’s field at Berthin (Bilaspur) with population of 1.4 larvae per plant. The pod borer, *H. armigera* was found to cause low degree of damage to *W. somnifera* leaves and flower buds. *H. armigera* is an established serious pest of cotton, chickpea, pigeonpea, groundnut, cowpea, *Vigna* sp., okra, tomato, castor, sunflower, maize, sorghum and many more crops in the entire South Asian region (Fitt, 1991). At Palampur, a chrysomelid beetle, *Podagrica bowringi* Baly was also observed to be associated with this plant for short period of time (Fig. 1b). The adults (3 beetles/plant) were observed damaging the leaves by biting round holes.

The mango mealy bug, *Drosicha mangiferae* was observed on *Withania somnifera* plants at Jogindernagar with a population of 68 nymphs per plant during April to May. These were observed damaging the tender leaves and the apical twigs (Fig. 1c). The pinkish nymphs and adults were found sucking sap from twigs and leaves along the midrib. The mango mealy bug is widely distributed in the Indo-Gangetic plains from Punjab to Assam. Besides mango, it also attacks 62 other plants including such trees as the jack fruit, the banyan, guava, papaya, citrus, *jamun* etc. (Atwal and Dhaliwal, 2005). Bhagat (2004) also reported the association of *D. mangiferae* with *W. somnifera* in different locations of Jammu region during February to May with a population as high as 487 nymphs per shoot.

*Saussurea costus* (C.B. Clarke)

On *Saussurea costus*, four species of insect pests were found to be associated at different locations in Himachal Pradesh. Among these, semilooper, *Thysanoplusia orichalcea* was recorded at three locations i.e. Pantthaghati (Shimla), Shilly (Solan), Brundhar (Kullu) with a population of 1.33, 0.8 and 1.6 larvae per plant, respectively (Fig.1d). The different instars of the pests were observed feeding on leaves by biting round holes. *T. orichalcea* was found associated with Kuth at four different locations in the state damaging the leaves of the plants in low intensity. The occurrence of this pest has not been reported on this plant so far and hence appears to be a new record. However, *T. orichalcea* has been observed to feed on large number of crops *viz.*, cole crops (Bhatia et al., 1995), potato (Dharpure, 2002), exotic vegetables (Sharma and Sharma, 1999) and Kalazira (Sharma, 1998). The larvae of other Lepidopterans *viz.*, *Conidia constricta* (Walker) and *C. albipalata* (Wileman) were recorded on the lower surface of plants at Shilly (Solan) with a population of 0.6 and 0.4 larvae per plant, respectively. The larvae were observed feeding on the leaves by cutting the leaves towards the midrib. *C. constricta* has already been recorded as a pest of *Niger* in Karnataka, Andhra Pradesh, Madhya Pradesh, Orissa and Bihar. Besides niger, it has been observed feeding on safflower, jute and weeds like *Kakronda* and *Coreopsis* (Men et al., 2002).
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*Low: up to 10 per cent leaf infestation; Medium: 11-30% leaf infestation; ** based on visual observations
Figure 1: Insect-pests associated with medicinal plants
One Coleopteran, *Alcidodes crinalifer* (Marshall) (Curculionidae) was also recorded feeding on the midrib of leaves at Shilly (Solan) with a population of 0.6 beetles per plant. The adults of *A. crinalifer* were found associated with kuth with an intensity of 0.6 beetles per plant. A large number of weevils belonging to genus *Alcidodes* were reported to be pests of different crops viz. *A. affaber* (Auxin) on cotton and lady’s finger, *A. babo* F. on *Sesbania speciosa* and *S. hispinoasa, A. collaris* on lab-lab niger and *A. leopardus* Oliv. on sunflower (David, 2001).

*Angelica glauca* Edgew

The semilooper, *T. orichalcea* was found damaging the leaves of *Chura* plant at Panthaghati (Shimla) with a population of 1.20 larvae per plant. The early instar larvae were observed feeding on nibbling, while late instar larvae were observed bitting round holes in leaves.

*Aegle marmelos* (Correa Ex. Roxb.)

The *bael* plants at Panthaghati (Shimla) were found infested with *Papilio* sp. (2 larvae/plant). The larvae damaged the leaves from the margins and move towards midrib.

The larvae of *Papilio* sp. were recorded feeding on leaves of *A. marmelos* in medium intensity. The citrus caterpillar has been reported all over India and cause very severe damage in all varieties of cultivated and wild citrus (Atwal and Dhaliwal, 2005). Its other food plants include curry leaf, *A. marmelos* and *Psoralea clyrifolia* (David, 2001).

*Digitalis lanata* (Ehrh.)

An unidentified species of scale was found associated with foxglove, *D. lanata* plants at Panthaghati (Shimla) with a population of 25.4 nymphs per plant. The insects were recorded on lower surface of leaves causing damage by sucking the cell sap. The leaves of the plants were observed to be brownish and reflected gradual drying. The association of scale, *Coccus* sp. on *Digitalis* has already been reported (www.fao.org). *Aphis nerri* was also found associated with this plant in some localities (Fig.1h).

*Picrorhiza kurooa* Royle ex Benth

Semilooper, *T. orichalcea* was found to be associated with *P. kurooa* at Shilly (Solan). The larvae (1.33 larvae/plant) were observed in low intensity feeding on leaves by cutting round holes. The pest, being polyphagous, feeds on large number of hosts.

*Rauwolfia serpentina* Benth. ex Kurz

At Herbal garden, Jogindernagar, mango mealy bug, *Drosicha mangiferae* (Green) (with a population of 35.8/plant) were found damaging leaves and apical twigs of the plants. The adults/nymphs were recorded on inflorescence, apical stem and leaves. The population of mealy bugs was concentrated on apical portion of the plant, covering the plant with cottony mass and gradually resulted in drying up of the plant. The mango mealy bug is widely distributed in the Indo-Gangetic plains from Punjab to Assam. Besides mango, it also attacks 62 other host plants including trees like jack fruit, the banyan, guava, papaya, citrus, jamun etc. (Atwal and Dhaliwal, 2005).

*Celastrus paniculatus* (Wild)

An unidentified Pyrrhocorid bug was observed damaging this plant at Jogindernagar. The eggs were observed to be laid in groups and nymphs on hatching started feeding on plants gregariously (Fig. 1f). Later instar nymphs and adults damaged leaves and developing seeds. The pest population was observed to be 2.0 adults per plant.

*Aegle marmelos* (Linn.)

On brahmi, *Bacopa monerii*, the larvae of tobacco caterpillar, *Spodoptera litura* (Fabr.) were observed damaging the leaves at Jogindernagar with a population of 1.6 larvae per plant (Fig.1g). *S. litura* is a polyphagous pest occurring throughout the country. It is mainly a pest of tobacco but it also attacks tomato, potato, gram, legumes, groundnut, jute, castor, jowar, maize, cabbage, sweet potato etc. A total of 112 cultivated crop plants in tropical and temperate zones (Mousa et al., 1960) and 40 species of cultivated and wild plants (Kumar et al., 1993) have been reported as hosts of *S. litura*.

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