J. Insect Sci. **16** (1-2) : 1-8 (2003)

INSECT AND MITE PEST STATUS OF SUBTROPICAL HORTICULTURAL CROPS IN HIMACHAL PRADESH

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Survey conducted for nine years (1991-1999) in six districts of Himachal Pradesh revealed that there were 39 and 30 species of insect, mite and nematode pests associated with subtropical fruit and vegetable crops, respectively. Hoppers (*Idioscopus clypealis* Leth. and *Ameritodus atkinsoni* Leth.) and psylla (*Apsylla cistellata* Buckton) on mango; red rust mite (*Aceria litchi* Keifer) and fruit borer (*Conopomorpha cramerella* Snellen) on litchi and on citrus, psylla (*Diaphorina citri* Kuwayama) and leaf miner (*Phyllocnistis citrella* Stainton) were the major problems. Similarly, shoot and fruit borer (*Leucinodes orbonalis* Guen.) on brinjal; cotton leafhopper (*Amrasca biguttula biguttula* (Ishida) on okra; fruit fly (*Bactrocera cucurbitae* Coquillett) on cucurbits; leaf miner (*Phytomyza horticola* Meigen) on pea and cabbage butterfly (*Pieris brassicae* Lin.) on cole crops were the most serious pests in different parts of the state.

KEY WORDS Himachal Pradesh, horticultural crops, insect, mite, pest status.

INTRODUCTION

Himachal Pradesh is situated in the northwest of India between 30.3 to 33.3 N latitude and 75.3 to 79 E longitude at elevation between 300 to 7000 metres above mean sea level. The state is having a total land area of 55.7 lakh ha out of which, 21.4 lakh ha area is under forests and only 6.1 lakh ha is under cultivation (Anonymous, 1995).

On the basis of climatic conditions and elevation, the state has been divided into four agro climatic zones falling within an altitude range of 300-914 metres (Zone-I) to more than 2482 metres (Zone-IV). Zone-I (submontane low hill subtropical) is suitable for the cultivation of fruits like mango, citrus, loquat, aonla, ber, pomegranate, pear, guava, papaya, low chilling peaches and plum. Besides, almost all types of vegetable crops including leafy vegetables, cole crops, cucurbits, pulse vegetables, bulb crops etc. are grown in this zone (Anonymous, 1992). Many insect pests attack all these crops and their intensity varies in time and space. In Himachal Pradesh, the government is laying great emphasis on extending the area under different fruit and vegetable crops but the information about insect and non-insect pests associated with these crops especially in the lower hills is scanty. Therefore, the present investigations were conducted to ascertain the occurrence and status of different insects and mite pests on horticultural crops of submontane low hill subtropical zone so that appropriate strategies can be formulated.

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MATERIAL AND METHODS

The studies were undertaken over a period of 9 years i.e. from 1991 to 1999 in six districts (Chamba, Kangra, Hamirpur, Una, Bilaspur and Sirmur) falling in submontane low hill (Zone-I) region of the state. The surveys were conducted in different areas of these districts. The insect and mite pests of major growing subtropical crops were recorded. The intensity of pest was based as per the method adopted by Sood and Kakar (1990). The immature stages of insects were collected and reared in the laboratory on the host from which they were collected for the adult emergence. The adults were got identified from the Department of Entomology and Apiculture, Dr Y.S. Parmar University of Horticulture and Forestry, Nauni-Solan; Department of Entomology, PAU, Ludhiana and from the Division of Entomology, IARI, New Delhi.

RESULTS AND DISCUSSION

The information on the occurrence and incidence of various insect and mite pests is given in Table 1. The observations showed that there were 39 and

30 species of insect/mite pests associated with fruit and vegetable crops, respectively. Six species viz; *Drosicha mangiferae* Green *Bactrocera dorsalis* Hendel, *Bactocera zonata* Saunders, *Deudorix isocrates* F., *Indarbela quadrinotata* Walk., *I. tetraonis* (Moore) were recorded to infest more than two fruit crops. One species each of ant, *Oecophylla smaragdina* (F.) and termite, *Odontotermes obesus* (Rambur) were also found to infest mango and citrus plantations. Among nematodes, *Heterodera* sp. and *Helicotylenchus* sp. were recorded on litchi and sapota crops.

In India, mango is grown on an area of about 9781.8 thousand ha with a production of 1401.2 thousand metric tonnes (Anonymous, 2000). In Himachal Pradesh, the area under this crop is about 33,684 ha and production of 26,744 metric tones (Anonymous, 2000). In the present survey, sixteen species of insects were recorded to infest mango in the state. Their intensity however, varied at different places. Tandon and Verghese (1985) reported 400 pest species on this crop, however, Singh (1993) reported only two dozen species as major pests of mango. In the present study, four species (hopper, shoot borer, leaf webber and psylla) were observed to be as major pests while eight species (*Idioscopus clypealis* Leth., *Amritodus atkinsoni* Leth., *Apsylla cistellata* Buckton, *Amraemyia* sp., *Procontarinia matteiana* K.G., *Deporaus marginatus* Fasc., *Chlumetia transversa* Walk., *Orthaga euadrusalis* Walk.) were recorded to feed on mango.

Seven insects namely, *Diaphorina citri* R & H., *Planococcus citri* Risso, *Dialeurodes citri* Kuwayama, *Aonidiella aurantii* Mask., *Phyllocnistis citrella* Stainton, *Papilio demoleus* L., *Ophederes* spp. and one nematode, *Tylenchulus semipenetrans* Cobb.were observed to feed on citrus. In contrast, there were 250 species of insect and mite pests in India (Pruthi and Mani, 1945; Wadhi and Batra, 1964 and Nayar *et al.,* 1976). Leaf miner, psylla, whiteflies, scales and mealy bugs were found to cause serious losses to the crop. Tandon (1993) also reported that stem borers, bark eating caterpillars fruit sucking moths, fruit flies etc. as serious pests of citrus though all these occur occasionally but cause substantial losses to the crop. In the present survey out of 14 species, 12 were observed as regular pests in different areas of the state but three species namely psylla, leaf miner and citrus nematode were serious. Likewise, in the neighbouring state of Punjab, out of 20 pest species reported by Batra *et al.* (1990), psylla, leaf miner, mite, whitefly and blackfly were found serious on the crop.

Fifteen pests were found to attack the litchi crop and out of these, leaf curl mite and stalk/pedicel end borer were the most serious. Six insects (*Kerria* sp., *Conopomorpha cramerella* Snell., *Tortrix epicyrta* Mey., *Vespa auraria* Smith, *V. orientalis* Smith *V. cincta* F.); a mite (*Aceria litchi* Keifer) and two nematode (*Hoplolaimus* sp., *Xiphinema* sp.) species were reported to be of monophagous nature in the state. Earlier workers (Singh & Singh, 1954; Wadhi & Batra, 1964; Vevai, 1971 and Butani, 1977) reported about 40 insect pest species infesting litchi in different parts of the country.

Fruitfly, *Carpomyia vesuviana* Costa and an unidentified bud worm were recorded to feed on ber and loquat, respectively. Two insect pest species (mealy bug and fruit fly) were recorded to attack ber in the state, which is in contrast to Butani (1979) who reported more than 80 pests attacking ber. Three insect pest species were recorded to attack loquat in the present survey, whereas, Singh (1993) reported fruitfly, bark eating caterpillar and scales as the pests of loquat. Six polyphagous insect species were recorded to occur and inflict varying degrees of damage to guava crop as compared to earlier reports (Butani 1979; Atwal and Dhaliwal, 2002). In the present work only fruit flies (*B dorsalis* and *B. zonata* and bark eating caterpillar were found as serious pests (Table 1) in neglected orchards.

Pomegranate and aonla are also attacked by fruit borer (*D. isocrates)* and bark eating caterpillars (*I. quadrinotata* and *I. tetraonis*). Wadhi and Batra (1964) reported over 40 insect species damaging pomegranates while half a dozen insect pests were reported on aonla (Wadhi & Batra, 1964 and Nayar *et al.,* 1976). A nematode species (*Tylenchorrhynchus* sp.) was recorded to feed on sapota only while two other nematode species (*Heterodera* sp. and *Helicotylenchus* sp.) were observed to infect litchi roots. Fruit fly (*B. dorsalis*) was also recorded on litchi. Tandon (1993), however, reported 33 species of insects and mites attacking this crop in India, of which, fruit flies were regarded as the major pests. However, in the present case, it was of minor importance.

Gram pod borer (*Helicoverpa armigera* Hubner) was recorded to infest tomato, onion and peas. The hadda beetle (*Epilachna vigintioctopunctata* F.) was found to infest brinjal and all the cucurbits. However, among cucurbits its incidence was most serious on bitter gourd. On okra, six species of insect pests (*Earias vittella* Stall, *Sylepta derogata* F., *Amrasca*

Table 1 Incidence and intensity of insect pests and nematodes in sub-tropical fruit and vegetable crops

Name of Crop	Family (order)	Common, Scientific Name	Occurrence	Incidence	Remarks

Insect

Table 1 Incidence and intensity of insect pests and nematodes in sub-tropical fruit and vegetable crops

Name of Crop	Family (order)	Common, Scientific Name	Occurrence	Incidence	Remarks
FRUITS					
Mango	Cicadellidae (Hemiptera)	Hopper, *Idioscopus clypealis* Lethiery	Regular	High	Prevalent throughout the zone
	Psyllidae	*Amritodus atkinsoni*	regular	high	-do-
		Psylla, *Apsylla cistellata* (Buckton)	regular	high	Common throughout major growing areas of the state
	Margarodidae	Mealy bug, *Drosicha mangiferae* (Green)	regular	low	Present in all areas
	Formicidae (Hymenoptera)	Red tree ant, *Oecophylla smaragdina* (Fabricius)	regular	low	Present in all districts
	Noctuidae (Lepidoptera)	Shoot borer, *Chlumetia transversa* Walker	regular	low	Attacks new flush mainly during Aug.-Sept.
	Pyralidae	Leaf webber, *Orthaga euadrusalis*	regular	low	Prevalent in Kangra District
	Metarbelidae	Bark eating caterpillars *Indarbella quadrinotata* (Walker)	occasional	low	Found in neglected orchards only
		I. tetraonis Moore	occasional	low	-do-
	Curculionidae (Coleoptera)	Leaf cutting weevil, *Deporaus marginatus* Fasc.	regular	low	Present in all the districts
		Stone weevil, *Sternochaetus mangiferae* (Fabricius)	occasional	low	Mainly on seedling mango stones
	Tephritidae (Diptera)	Fruit flies, *Bactrocera dorsalis* (Hendel)	regular	low	Generally the fruit is harvested before population reaches its peak
		B. zonata (Saunders)	regular	low	-do-
	Cecidomyiidae	Leaf gall makers, *Amraemyia* sp.	regular	low	Common in most of the areas
		Procontarinia matteiana K.G.	regular	low	-do-
	Termitidae (Isoptera)	Termite, *Odontotermes obesus* (Rambur)	regular	low	-do-
Citrus	Psyllidae (Hemiptera)	Psylla, *Diaphorina citri* Kuwayana	regular	low	New growth is attacked the most
		Mealy bug, *Planococcus citri* Risso	regular	low	Common during July-August
		Red scale, *Aonidiella aurantii* (Maskell)	occasional	low	Prevalent on *malta*
	Aleyrodidae	Whitefly, *Dialeurodes citri* (Ashmead)	occasional	low	Present in all districts

Guava	Margarodidae (Hemiptera)	Mealy bug, *Drosicha mangiferae* Green	occasional	low	Present in few orchards only
	Tephritidae (Diptera)	Oriental fruit fly, *Bactrocera dorsalis* (Hendel)	regular	low	Present in all orchards
		B. zonata (Saunders)	regular	low	Present in all orchards
	Lycaenidae (Lepidotpera)	Fruit borer, *Deudorix isocrates* (Farbricius)	regular	low	Infests winter crop only
	Metarbelidae (Lepidotpera)	Bark eating, caterpillars, *Indarbela quadrinotata* Walker	regular	low	Present throughout the zone
		I. tetraonis Moore	regular	low	Present throughout the zone
Pomegrenate	Lycaenidae (Lepidotpera)	Anar butterfly, *Deudorix isocrates* (Farbricius)	regular	low	Common throughout the zone
	Metarbelidae (Lepidotpera)	Bark eating caterpillars, *Indarbela quadrinotata*	regular	low	Present in low numbers
		I. tetraonis Moore	regular	low	-do-
Aonla	Lycaenidae (Lepidotpera)	Fruit borer, *Deudorix isocrates* (Farbricius)	occasional	low	Not very common
	Metarbelidae (Lepidotpera)	Bark eating caterpillars, *Indarbela quadrinotata* walker	regular	Low	Common throughout the zone
		I. tetraonis Moore	regular	low	-do-
Loquat	Metarbelidae (Lepidotpera)	Bark eating caterpillars, *Indarbela quadrinotata*	regular	low	Common throughout the zone
		I. tetraonis Moore	regular	low	-do-
		Bud borer, Unidentified	regular	low	Common in Indora area of district Kangra
Ber	Margaroidae (Hemiptera)	Mealy bug, *Drosicha mangiferae* Green	occasional	low	Not very common
	Tephritide (Diptera)	Fruit Fly, *Carpomyia vesuviana* Costa	regular	low	Common in areas where ber is present
Sapota	Tephritide (Diptera)	Oriental fruit fly, *Bactrocera dorsalis* (Hendel)	occasional	low	Very rare in scanty plantations
	Tylenchidae (Tylenchida)	Nematode, *Helicotylenchus* sp.	occasional	low	Found in root zone of declining trees
	Heteroderidae	Nematode, *Tylenchorrhynchus* sp.	occasional	low	-do-
		Nematode, *Heterodera* sp.	occasional	low	-do-
	Formicidae (Hymenoptera)	Red tree ant, *Oecophylla smaragdina* (Fabricius)	occasional	low	Recorded in Kangra only
	Phyllocnistidae (Lepidoptera)	Leaf miner, *Phyllocnisitis citrella* Stainton	regular	low	Young orchards are more prone to attack
	Noctuidae	Fruit sucking moths, *Ophederes* spp.	regular	low	Prevalent in Una and Sirmur districts
	Papilionidae	Lemon butterfly, *Papilio demoleus* Linnaeus	regular	low	Very serious in nurseries
	Metarbelidae	Bark eating caterpillars, *Indarbela quadrinotata* Walker	regular	low	Serious in neglected orchards
		I. tetraonis Moore	regular	low	Present in neglected orchards
	Tephritidae (Diptera)	Oriental fruit fly, *Bactrocera dorsalis*	regular	low	Generally attacks kinnow mandarin and occasionally sangtra and malta
		B. zonata (Saunders)	regular	low	-do-
	Termitidae (Isoptera)	Termite, *Odontotermes obesus* (Rambur)	regular	low	Common in less airy orchards and infestation more on neglected trees
	Tylenchidae (Tylenchida)	Nematode, *Tylenchulus semipenetrans*	regular	high	Population high in declining trees
Litchi	Gracillariidae (Lepidoptera)	Stalk/pedicel end borer, *Conopomorpha cramerella* Snellen	regular	high	Serious in district Kangra
		Nut borer, *Deudorix isocrates* Farbricius	occasional	low	Low incidence
	Metarbelidae	Bark eating caterpillars, *Indarbela quadrinotata* Walker	regular	high	Present in all districts
		I. tetraonis Moore	occasional	low	-do-
	Tortricidae	Leaf roller, *Tortrix epicyrta* Meysick	regular	low	Present in all districts

	Noctuidae	Fruit sucking moths, *Ophederes* spp.	regular	low	Prevalent in Una and Sirmur districts
	Papilionidae	Lemon butterfly, *Papilio demoleus* Linnaeus	regular	low	Very serious in nurseries
	Metarbelidae	Bark eating caterpillars, *Indarbela quadrinotata* Walker	regular	low	Serious in neglected orchards
		I. tetraonis Moore	regular	low	Present in neglected orchards
	Tephritidae (Diptera)	Oriental fruit fly, *Bactrocera dorsalis*	regular	low	Generally attacks kinnow mandarin and occasionally sangtra and malta
		B. zonata (Saunders)	regular	low	-do-
	Termitidae (Isoptera)	Termite, *Odontotermes obesus* (Rambur)	regular	low	Common in less airy orchards and infestation more on neglected trees
	Tylenchidae (Tylenchida)	Nematode, *Tylenchulus semipenetrans*	regular	high	Population high in declining trees
Litchi	Gracillariidae (Lepidoptera)	Stalk/pedicel end borer, *Conopomorpha cramerella* Snellen	regular	high	Serious in district Kangra
		Nut borer, *Deudorix isocrates* Farbricius	occasional	low	Low incidence
	Metarbelidae	Bark eating caterpillars, *Indarbela quadrinotata* Walker	regular	high	Present in all districts
		I. tetraonis Moore	occasional	low	-do-
	Tortricidae	Leaf roller, *Tortrix epicyrta* Meysick	regular	low	Present in all districts
	Laciferidae (Hemiptera)	Lac insect, *Kerria* sp.	occasional	low	Confined to few orchards only
	Margarodidae	Mealy bug, *Drosicha mangiferae* (?)	regular	low	Incidence slowly spreading to new areas
	Vespidae (Hymenoptera)	Fruit eating wasps, *Vespa auraria* Smith	regular	low	Serious only during ripening stage
		V. orientalis Linnaeus	regular	low	-do-
		V. cincta Fab.	regular	low	-do-
	Eriophidae (Acarina)	Red rust mite, *Aceria litchi* (Keifer)	regular	low	Very serious in mid elevation areas of the zone
	Dorylaimidae (Dorylaimida)	Nematodes, *Xiphinema* sp.	occasional	low	Extracted from root zone of declining trees
	Tylenchidae (Tylenchida)	Nematodes, *Heterodera* sp.	occasional	low	-do-
		Helicotylenchus sp.	occasional	low	-do-
		Hoplolaimus sp.	occasional	low	-do-
Vegetables					
Okra	Noctuidae (Lepidoptera)	Fruit borer, *Earias vittella* Stall	regular	low	Serious on rainy season crop
	Pyralidae	Leaf roller, *Sylepta derogata* Fab.	occasional	low	Common in the plains
	Aleyrodidae	Whtiefly, *Bemisia tabaci* Gennadius	regular	high	Present in all districts
	Jassidae (Hemiptera)	Cotton jassid, *Amrasca bigutulla biguttula* Ishida	regular	high	Serious on rainy season crop
	Pyrrhocoridae	Red cotton bug, *Dysdercus cingulatus* (Fabricius)	regular	high	Serious from rainy season crop onwards
Brinjal	Coccinellidae (Coleoptera)	Hadda beetle, *Epilachna vigintioctopunctata* (Fabricius)	regular	high	Present throughout the zone
	Pyralidae (Lepidoptera)	Fruit and shoot borer, *Leucinodes orbonalis* Guenee	regular	high	Present throughout the zone
	Phycitidae	Stem borer, *Euzophera perticella* Ragonot	regular	high	-do-
Cole crops	Aphididae (Hemiptera)	Cabbage aphid, *Brevicoryne brassicae* (Linnaeus)	regular	low	Serious on mustard crop
		Mustard aphid, *Lipaphis erysimi* (Kaltenbach)	regular	low	Serious on mustard crop
		Peach aphid, *Myzus persicae* (Sulzer)	occasional	low	Low on all cole crops
	Pieridae (Lepidoptera)	Cabbage butterfly, *Pieris brassicae* (Linnaeus)	regular	high	Mainly serious on cauliflower and brinjal
		Cabbage worm, *Pieris rapae* Linn.	occasional	low	Very low in intensity
	Plutellidae	Diamondback moth, *Plutella xylostella* (Linnaeus)	regular	low	Common on cabbage and cauliflower
	Noctuidae	Cabbage semilooper, *Thysanoplusia orichalcea* (Fabricius)	regular	low	Common on cabbage
		Cut worm, *Agrotis ipsilon* (Hufnagel)	regular	low	More serious on radish and mustard

		A. segetum (Dennisk Schiffer-Muller)	regular	low	-do-
	Arctiidae	Bihar hairy caterpillar, *Spilosoma obliqua* Walker	occasional	low	More serious on cauliflower
	Coccinellidae (Coleoptera)	Hadda beetle, *Epilachna vigintioctopunctata* (Fabricius)	regular	high	Most serious on bittergourd
Cucurbits	Chrysomelidae	Red pumpkin beetle, *Aulacophora foveicollis* (Lucas)	regular	high	Serious on cucumber at three leaf stages
	Tephritidae (Diptera)	Fruit fly, *Bactrocera cucurbitae* (Coquillett)	regular	high	Very serious on bittergourd
		B. tau (Walker)	regular	low	Common on bittergourd
	Diaspididae (Hemiptera)	Scale, *Quadraspidiotus perniciosus* (Comstock)	occasional	low	Very low in numbers on pumpkin
	Tetranychidae (Acarina)	Mite, *Tetranychus cucurbitae* R & S	occasional	low	Present on cucumber but rarely
Peas	Aphididae (Hemiptera)	Aphid, *Macrosiphum pisi* Kalt.	occasional	low	Present throughout the zone
	Phycitidae (Lepidoptera)	Pod borer, *Etiella zinckenella* (Treitschke)	regular	low	Present in late varieties
	Noctuidae	Pod borer, *Helicopverpa armigera* (Hubner)	occasional	low	Present in low numbers
	Agromyzidae (Diptera)	Leaf miner, *Phytomyza horticola* (Goureau)	regular	high	Observed throughout the state
		Stem fly, *Melanagromyza phaseoli* (Tryon)	regular	low	Serious on early sown crops mainly
Tomato	Noctuidae (Lepidoptera)	Fruit borer, *Helicoverpa amigera* (Hubner)	regular	low	Present in all parts
Chilli	Aphidae (Hemiptera)	Aphid, *Aphis gossypii* Glover	occasional	low	Present in low numbers
Onion	Agromyzidae (Diptera)	Leaf miner, *Liriomyza trifolii* (Burgess)	regular	low	Present throughout the zone
	Noctuidae (Lepidoptera)	Umbel borer, *Helicoverpa armigera* (Hubner)	occasional	low	Attacks at flowering stage

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Pieris brassicae L., *P. rapae*
Linn., *Thysanoplusia orichalc*
Hufn., *A. segetum* Schiff. an
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ACKNOWLEDGEMENTS

Authors are grateful to late Dr
YSP UHF, Nauni, Solan for hi
during his stay at the station
Heads, Divisions/Departments
rendering help in identificatio

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biguttula biguttula Ishida; *Bemisia tabaci* Genn. and *Dysdercus cingulatus* F.) were recorded. Out of these, jassid was the most serious and was present on the crop throughout the growing period while red cotton bug, *D. cingulatus* infested the crop at ripening stage, which is in agreement with Nair (1986).

Borers namely, *Leucinodes orbonalis* Guenee and *Euzophera perticella* Ragonot and hadda beetle, *E. vigintioctopunctata* F., were recorded to infest brinjal crop, but *L. orbonalis* was found to be the most serious species. Nair (1986) reported *L. orbonalis* and *E. perticella* as the major pests and hadda beetle as the important pest of the crop in the grub stage.

Ten insect species viz. *Brevicoryne brassicae* L., *Lipaphis erysimi* Kalt., *Myzus persicae* Sulzer, *Pieris brassicae* L., *P. rapae* L., *Plutella xylostella* Linn., *Thysanoplusia orichalcea* F., *Agrotis ipsilon* Hufn., *A. segetum* Schiff. and *Spilosoma obliqua* Walk.) were recorded to infest cole crops but *P. brassicae* was the most common and serious. Butani and Jotwani (1984) reported seven insect species as serious pests on these crops in India. Bhatia *et al.* (1995) reported six species as regular pests on cole crops from the foothills of Himachal Pradesh whereas Bhatia and Verma (1993) reported 27 insect species on cabbage alone in the state.

Besides hadda beetle, four more species of insect pests (*Aulacophora foveicollis* Lucas, *Bactrocera tau* Walker, *B. cucurbitae* Coquillett and *Tetranychus cucurbitae* R &S) were recorded infesting cucurbits of which, red pumpkin beetle, *A. foveicollis* at three leaf stage and fruit flies throughout the fruit development stage were most serious. Butani and Jotwani (1984) and Nair (1986) were also having similar observations. Gupta and Verma (1992) reported fruit flies as the serious pests of these crops from Himachal Pradesh. Four pest species viz; *Macrosiphum pisi* Kalt., *Etiella zinckenella* Treit.; *Phytomyza horticola* Meigen and *Melanagromyza phaseoli* Tryon along with pod borer were recorded to cause varying degree of damage on peas. Leaf miner and pod borer, however, were recorded as the most serious. Four insect species namely; pod borers, stem fly, leaf miner and aphids were reported as major pests of this crop in India (Prasad *et al.*, 1984 and Mahobe, 1986) Butani and Jotwani (1984) also reported more than a dozen insect pests on this crop in India.

Aphis gossypii Glover was observed as the only pest on chilli as compared to earlier reports, which indicated over 25 insect species to infest the leaves and fruits of this crop in South east Asia (Butani and Jotwani, 1984). A leaf miner, *Liriomyza trifolii* was also recorded on onion beside gram pod borer.

It can be concluded from above study that though, a variety of pests have been found to associate with different horticultural crops in the zone, yet the number of important pests (which included *I. clypealis, A. atkinsoni, P. citrella, B. dorsalis, C. cramerella, L. orbonalis* and *P. horticola* which cause serious economic loss were not very serious on individual crops. Further, control strategies have to be formulated keeping in view the time of severity of the pest. It was also found that severity of different pests depends largely upon favorable climatic conditions and suitable control measures should be adopted accordingly.

ACKNOWLEDGEMENTS

Authors are grateful to late Dr N.K. Sharma, Professor and Head, Department of Entomology and Apiculture, YSP UHF, Nauni, Solan for his help in identification of the nematode species and constant encouragement during his stay at the station as Associate Director (R & E). Authors are also grateful to Professors and Heads, Divisions/Departments of Entomology, IARI, New Delhi; PAU, Ludhiana and UHF, Nauni, Solan for rendering help in identification of insect specimens.

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