



## SURVEILLANCE OF INSECT PESTS AND THEIR EFFECTS ON THE PRODUCTIVITY OF PEACH CROP IN KUMAUN HIMALAYA

FASUIL FAROOQ\* AND MANOJ KUMAR ARYA

Insect Biodiversity Laboratory, Department of Zoology  
D.S.B. Campus, Kumaun University, Nainital- 263002, Uttarakhand  
\*Email: [faisalmalik.jk@gmail.com](mailto:faisalmalik.jk@gmail.com) (corresponding author)

### ABSTRACT

Peach is one of the temperate stone fruits and this study explores the major insect pests and their impact on productivity. The study was done in the fruit orchard of Dhanachuli village of Nainital district, Uttarakhand. The results revealed that bugs, aphid and beetles were the most prevalent pests. Maximum diversity of insect pests was observed during the rainy season followed by spring season, autumn seasons, and dropped to minimum in the winter season. The infestation rate depicting the maximum emergence of insect pests and the productivity status of peach fruits had been evaluated.

**Key words:** Peach, Kumaun, Uttarakhand, field surveys, diversity analysis, infestation rate, emergence, seasonal incidence

Peach *Prunus persica* L. belongs to the family Rosaceae with its origin being China (Hickey and King, 1981). Peach is one of the Kumaun Himalaya's most important stone fruits and insect pests are serious problems affecting its productivity and quality of fruit (Ahmed and Ahmed, 2013). To develop remedial measures and enable the fruit growers to monitor pest incidence regularly, data on incidence and on their diversity is required, and the present study explores this aspect in Uttarakhand.

### MATERIALS AND METHODS

The study was conducted in four kanal orchard having 57 peach trees located in Nainital district of village Dhanachuli (29°23.802' N, 79°39.443'E, 2115 masl). The area's agriculture consists mainly of potato fields mixed with vegetables and fruit orchards on terraces. The observations were made during 2017-18 in April to July. Light traps (Mathew, 1996) with slight modifications were used for the survey of insect pests and catches obtained at interval of 15 days. A 20w bulb was set up in the verandah of the house located near the fruit trees. A set of 5 enameled trays filled with water and Teepol (10 ml) were kept on the floor below the light, and these operated whole nights and the insect catches were collected and preserved in 70% ethyl alcohol. Surveys were also made with hand-picking/ or forceps. The incidence and productivity data was obtained presented in **Figure 1**. The rate of infestation was calculated in % (Bandey et al., 2012). Insect specimens

obtained were classified in families and an inventory prepared. The composition and distribution of insect pests were obtained from these. Based on the nature of the damage, insect pests observed were grouped as major and minor pests. The diversity indices viz. Shannon Weiner Index, Evenness index and Margalef's index were calculated following the standard formulae.

### RESULTS AND DISCUSSION

The study led to collection of 538 specimens of insect pests of peach, belonging to 12 species under six families of three orders (Table 1). Pentatomidae was found to be the most dominant family with six species (50%), followed by Scarabaeidae with two species (16.66%), Aphididae, Coreidae, Chrysomelidae and Noctuidae were represented by one species each. *Cletus punctiger* (Dallas) was observed to be most dominant species constituting 12.45%, followed by *Myzus persicae* (Sulzer) (11.89%), *Bagrada hilaris* (Burmeister) (11.52%) and *Helicoverpa armigera* (Hubner) (10.03%). *Tetroda transversalis* Westwood (3.90%), *T. histeroides* (F.) (5.94%), *Eysarcoris guttiger* (Thunberg) (6.13%) and *Andrallus spinidens* (F.) (6.31%) were the less abundant.

The Shannon diversity index indicated that maximum number of species were observed in rainy season (2.47) followed by spring (2.29), autumn (1.78) and winter seasons (1.09). The calculated value of evenness across seasons was again found to be maximum with the rainy season (0.996), followed by

Table 1. Diversity of insect pests of peach (Dhanachuli village, Nainital)

S. No.	Species	Relative abundance (%)	Status
Hemiptera - Pentatomidae			
1.	<i>Andrallus spinidens</i> (Fabricius)	6.31	Minor
2.	<i>Bagrada hilaris</i> (Burmeister)	11.52	Major
3.	<i>Eysarcoris guttiger</i> (Thunberg)	6.13	Minor
4.	<i>Halyomorpha halys</i> Stal	7.43	Major
5.	<i>Tetroda histeroides</i> (Fabricius)	5.94	Minor
6.	<i>Tetroda transversalis</i> Westwood	3.90	Minor
Family: Aphididae			
7.	<i>Myzus persicae</i> (Sulzer)	11.89	Major
Family: Coreidae			
8.	<i>Cletus punctiger</i> (Dallas)	12.45	Major
Coleoptera- Scarabaeidae			
9.	<i>Brahmina coriacea</i> (Hope)	7.99	Minor
10.	<i>Cotinis nitida</i> Linnaeus	7.80	Minor
Family: Chrysomelidae			
11.	<i>Dicladispa</i> sp.	8.55	Minor
Lepidoptera- Noctundae			
12.	<i>Helicoverpa armigera</i> (Hubner)	10.03	Major

spring (0.989), autumn (0.988) and winter seasons (0.985). Likewise, species richness observed with Margalef's index, revealed maximum values in the rainy season (1.93), followed by spring (1.86), autumn (1.22) and winter seasons (0.58) (Table 2). Based on the nature of damage, five species were observed as major pests (41.66%), and seven species were minor pests (58.33%).

The population buildup of these pests found revealed that many of these remain dormant during the winter. Their emergence started emerging with spring season, with maximum incidence being in April- July. The incidence in April was 33.33% (23.2°C, 62% RH), and May- 43.85% (17°C, 72%RH), and June- 49.12% (17°C, 89%RH), with the maximum being in July- 56.14% (21.2°C, 89%RH). (Fig. 1). In the four kanal of fruit orchards observed the mean fruit yield was 500 kg if infestation was observed, and 900kg without infestation, when growers used pesticides rather than biocontrol.

Joshi and Joshi (1980) in survey on the insect diversity of fruit trees in Kumaun Hills, observed many insect pests. These include *Dorystenes hugelii* Redtenbacher, *Quadraspidiotus perniciosus* Comstock and *Pseudaulacaspis pentagona* (Targioni). In the present study, Hemiptera: Pentatomidae were the most abundant. Leskey and Hogmire (2005) monitored the Pentatomidae in Mid-Atlantic, Kearneysville. Literature reveals aphids, tent caterpillars, codling moths, leaf rollers, and leaf hoppers causing damage to the orchards of apple, pear and peach (Simon et al., 2010). Leskey et al. (2012) studied the pest status of the brown marmorated stink bug (*Halyomorpha halys* Stal) and found it as serious. Kamminga et al. (2012) assessed the biology and management of the green stink bug in the

Table 2. Diversity indices of insect pests of peach

	Rainy	Autumn	Winter	Spring	Total
Taxa_S	12	6	3	10	12
Individuals	297	86	30	125	538
Dominance_D	0.08581	0.1706	0.3356	0.1022	0.09115
Simpson_1-D	0.9142	0.8294	0.6644	0.8978	0.9088
Shannon_H	2.47	1.78	1.095	2.291	2.437
Evenness_e^H/S	0.9967	0.9882	0.9854	0.989	0.9534
Brillouin	2.381	1.659	0.975	2.144	2.382
Menhinick	0.6963	0.647	0.5477	0.8944	0.5174
Margalef	1.932	1.122	0.588	1.864	1.749
Berger-Parker	0.1077	0.2093	0.3667	0.12	0.1245
Chao-1	12	6	3	10	12

United States. Bhagat and Qureshi (2016) reported 26 species of scale insects/ mealy bugs under 21 genera and spread over 5 families on temperate fruit trees including peach. Blaauw et al. (2016) studied the invasive brown marmorated stink bug and Hahn et al. (2017) analysed its spatial distribution in the mid-Atlantic.

#### ACKNOWLEDGEMENTS

The authors thank the Head, Department of Zoology, D.S.B. Campus, Kumaun University, Nainital for providing facilities, and the orchard owners and local public for enabling field work.

#### REFERENCES

- Ahmed N, Ahmed T. 2013. Fruits related problems and their management in Rajouri district of Jammu and Kashmir. *IOSR Journal of Humanities and Social Sciences* 12(2): 65-75.
- Bandey S A, Sharma R, Singh A. 2012. Diversity of apple pests and their effects on the productivity of apple crops in Jammu region of J&K State. *International Journal of Advanced Biological Research* 2(2): 367-369.
- Bhagat R C, Qureshi AA. 2016. Biodiversity and annotated checklist of Scale-Insects, and Mealybugs (Hemiptera: Coccidea) of Jammu, Kashmir and Ladakh (North-west Himalaya), India. *International Journal of Current Research and Academic Review* 4(3): 56-62.
- Blaauw B R, Jones V P, Nielsen A L. 2016. Utilizing immunomarking techniques to track *Halyomorpha halys* (Hemiptera: Pentatomidae) movement and distribution within a peach orchard. *PeerJ* 1-17 pp.
- Hahn N G, Saona C R, Hamilton G C. 2017. Characterizing the spatial distribution of brown marmorated stink bug, *Halyomorpha halys* Stal (Hemiptera: Pentatomidae), populations in peach orchards. *Plos One* 1-20.
- Hickey M, King C J. 1981. *Rosaceae, 100 families of flowering plants.* Cambridge Univeristy Press 180 pp.
- Joshi K C, Joshi R. 1980. Insect pests of fruit trees in Kumaon Hills. *Indian Horticulture* 25(1): 21-24.
- Kamminga K L, Koppel A L, Herbert D A, Kuhar T P. 2012. Biology and management of the green stink bug. *Journal of Intergrated Pest Management* 3(3): 1-8.
- Leskey T C, Hamilton G C, Nielsen A L, Polk D F, Saona C R, Bergh J C, Hervert D A, Kuhar T P, Pfeiffer D, Dively G P, Hooks C R R, Raupp M J, Shrewsbury P M, Krawczyk G, Shearer P W, Whalen J, Loehr C K, Myers E, Inkley D, Hoelmer K A, Lee D H, Wright S E. 2012. Pest status of the brown marmorated stink bug, *Halyomorpha halys* in the USA. *Outlooks on Pest Management* 218-226 pp.
- Leskey T C, Hogmire H W. 2005. Monitoring stink bugs (Hemiptera: Pentatomidae) in Mid-Atlantic apple and peach orchards. *Horticultural Entomology* 98(1): 143-153.
- Mathew G. 1996. Insect diversity in the Nilgiri Biosphere Reserve- An Overview. *Zoos' Print Journal* 11(3): 11-13.
- Simon S, Bouvier J C, Debras J F, Sauphanor B. 2010. Biodiversity and pest management in orchard systems: a review. *Agronomy for Sustainable Development* 30: 139-152.

(Manuscript Received: May, 2019; Revised: October, 2019;  
: October, 2019; Online Published: October, 2019)

Preprint