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Research Article

Insect pollinators diversity on plum in Dobhi village of Kullu district of Himachal Pradesh

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Abstract

Pollen grains are transferred from the male anther to the female stigma of blooming plants during pollination. Fruit/seed setting and fertilization depend on pollination. Plums need cross-pollination to bear fruit since they are self-incompatible. In order to improve the quality of fruit and seeds and increase crop yield, cross-pollination is crucial. There are many animal pollinators involved in the pollination process, but insect pollinators are crucial. The present investigation on "Insect pollinators diversity on plum in Dobhi village of Kullu district of Himachal Pradesh" was conducting in the Department of Biosciences, M.L.S.M. College, Sundernagar and Dobhi (Kullu), Himachal Pradesh during Feburary- March, 2025. Insect pollinators collected by using hand picking, fluorescent pan traps and sweep net capture during February-March, 2025 revealed that 36 insects belonging to 22 genera under 13 families and 5 orders. Out of which 15 species belonged to Hymenoptera, 12 from Diptera, 5 from Lepidoptera, 3 from Coleoptera and 1 to order Thysanoptera. Among the insects collected from different sampling methods, honey bees were most abundant and frequent visitor. Beside Hymenopterans, Dipterans also constituted an important group of insect pollinators. For plum trees to successfully reproduce, pollinators are essential. Future plum generations may be more resilient as a result of pollinators' promotion of genetic variation. In plum orchards, pollination services directly affect the quality and stability of production. Healthy landscapes, low pollution levels, and excellent habitat connectivity are often reflected in a rich and stable pollinator population.

Key words: Pollination, pollinators, diversity, honey bees, Kullu, Himachal Pradesh

Introduction

One of the most significant ecosystem services is pollination, which directly affects angiosperm (flowering plant) reproduction [31]. The movement of pollen grains from the male anther to the female stigma of flowering plants is known as pollination [1]. The blooms draw a wide range of visitors, and in return, the latter give the former nectar and pollen [37]. In exchange, the flowers receive pollination services from the visitors. Depending on their numbers, feeding strategies, rates, duration of activity, and the quantity of pollen grains they carry on their bodies, their function as pollinators varies [32,3,21-27,12,13,20,6,7,37]. The orders Coleoptera, Lepidoptera, Diptera, Thysanoptera, and Hymenoptera comprise the majority of insect pollinators [14]. Insects pollinate 80 percent of crops, with bees playing a significant role in this process [15,16]. It has been established that the honey bee is the main pollinator of plums (Waugh, 1900). In addition to bees, a variety of non-bee pollinators, including flies, wasps, moths, butterflies, beetles, ants, birds, and bats, are essential to pollination, accounting for 39 per cent of visits [28,29].

The two species of plums that are grown for commercial purposes are *Prunus domestica* and *P. salicana*, which are referred to as the European and Japanese plums, respectively [21]. Plums are grown mostly in the northern hemisphere of India, coming in fourth place after apples, pears, and peaches [36]. Following insect cross-pollination, fruit crop yields rise dramatically [38,39], e.g. following bee cross-pollination, production rates rose two to four and a half times [30-32,40]. The most significant pollinators of these plants are honey bees because of their high nectar and pollen requirements as well as their hairy bodies, which gather and distribute pollen [19,11,4,33,10,34,35].

Material and Methods

Studies on diversity of various insect visitors to plum crop was made by collecting the flower visitors in different orchards located at Dobhi (Kullu). These plum orchard had different varieties of plum trees such as Frontier, Mariposa and Santa Rosa. These collections were conducting during the Feburary-March, 2025 from Dobhi (Kullu), Himachal Pradesh. For collection, the insect pollinators were collected by different sampling methods (Fluorescent pan trap, Sweeping methods and Aerial netting methods) (Figure 1). Insect visitors were got identified morphologically and also by available literature.

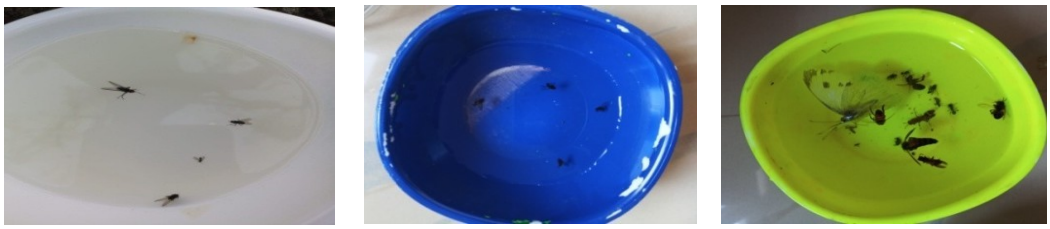


Fig. 1 Insects caught in Fluorescent pan traps (White, Blue and Yellow)

Results and discussion

The diversity of insects pollinators visiting plum flower from Dobhi (Kullu), Himachal Pradesh during 2025 were collected by different sampling mathods (Fluorescent pan trap, Sweeping methods and Aerial netting methods). Total 36 insects belonging to 22 genera under 13 families and 5 orders of class insect. Of these, 15 species belonged to Hymenoptera,12 from Diptera, 5 from Lepidoptera, 3 from Coleoptera and 1 to order Thysanoptera. Hymenopterans visitors belonged to 5 families namely Apidae, Andrenidae, Halictidae, Vespidae and formicidae. Hymenopterans were represented by species like *Apis cerana, A. mellifera, A. dorsata, Bombus* sp., *Ceratina binghami, Xylocopa* sp., *Andrena* sp., *Halictus* sp., *Vespa* sp., *Polistes* sp. and *Formica* sp. Of the dipterans species like *Episyrphus balteatus, Eristalis tenax, Melanostoma* sp., *Eupeodes* sp., *Paragus* sp., *Musca* sp. and *Bombylius* sp. spread over families Syrphidae, Muscidae and Bombyliidae. Moreover, 5 species of lepidopterans were spread over families like Pieridae, Nymphalidae and Papilionidae. Order Coleoptera was represented by 1 family i.e. Coccinelidae. In addition, a single species of

thrips belonging to order Thysanoptera was also recorded as pollinators of plum crops (Table 1). Among the insects sampled by different methods honey bees were most abundant and frequent visitor on plum bloom (Figure 2).

Table 1: Diversity of insects pollinators visiting plum flowers from Dobhi (Kullu) during February-March, 2025

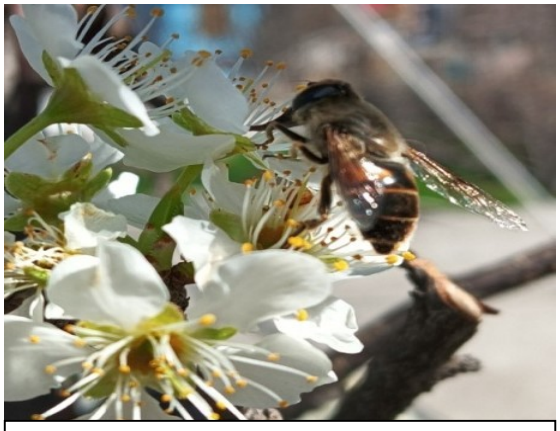
Order	Family	Scientific Name
Hymenoptera	Apidae	*Apis cerana*
		Apis mellifera
		Apis dorsata
		Bombus sp.
		Ceratina binghami
		Xylocopa sp.
	Andrenidae	*Andrena* sp.1
		Andrena sp.2
		Andrena sp.3
	Halictidae	*Halictus* sp.1
		Halictus sp.2
	Vespidae	*Vespa* sp.1
		Vespa sp.2
		Polistes sp.
	Formicidae	*Formica* sp.
Diptera	Syrphidae	*Episyrphus balteatus*
		Eristalis tenax
		Eristalis sp.1
		Eristalis sp.2
		Melanostoma sp.1
		Melanostoma sp.2
		Eupeodes sp.1
		Eupeodes sp.2
		Paragus sp.
	Muscidae	*Musca sp.*
	Bombyliidae	*Bombylius* sp.1
		Bombylius sp.2
Lepidoptera	Pieridae	*Pieris canidia*
		Pieris sp.
	Nymphalidae	*Vanessa cardui*
		Vanessa cashmirensis
	Papilionidae	*Papilio polytes*
Coleoptera	Coccinelidae	*Coccinella septempunctata*
		Coccinella sp.
		Hippodamia variegate
Thysanoptera	Thripidae	*Thrips* sp.

Apis cerana

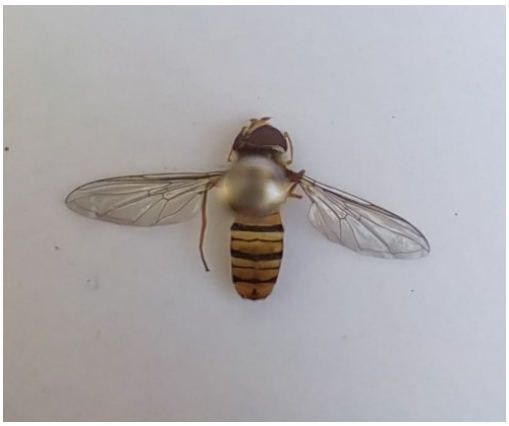
Apis mellifera

***Bombus* Sp.**

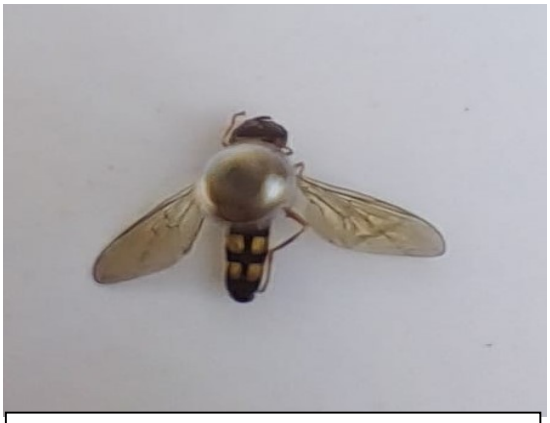
***Xylocopa* Sp.**



***Eristalis* Sp.**



Episyrphus balteatus



***Melanostoma* Sp.**

***Eupeodes* Sp.**

Fig. 2 Important Hymenopterans and Dipterans insects visitors of plum flower

Different investigators on different temperate fruit crops have reported different number of pollinators. For example, In Ludhiana, India, Mann *et al*. [18] noted the insect pollinators of plum trees that were in bloom. They discovered that the main pollinators were honey bees. In Himachal Pradesh, India, Bhalla *et al*. [5] noted insect visitation to blossoming almond, peach, and plum trees. They identified ten species, with *A. cerana* being the most prevalent. Other species were *Vespa* sp., *Eristalis* sp., and *E. balteatus*. Similarly, at Gyeongsang National University in Jinju, Gyeongnam, Choo *et al*. [8]investigated insects that visited peach and plum flowers. On plums, they gathered 20 species from 4 orders, 14 families, and 20 genera. Peach and plum blooms are highly dependent on insect pollinators for fruit development, according to Abrol *et al*. [1,2]. The flowers attracted insects from four orders, fourteen families, twenty-two genera, and twenty-seven species. The main visitors were honey bees. Dar *et al*. [9] identified 41 insect pollinator species on plum blossoms, representing 5 orders, 19 families, and 28 genera, with the order Hymenoptera being the most prevalent among all pollinators. Current research suggests that the most prevalent insect pollinators during plum bloom were Dipterans and Hymenopterans. The findings of Khan *et al*. [17] corroborate this finding.

Conclusion

In conclusion, it is evident from the studies that pollinators play a major role in boosting plum flower fruit production. Since wild honey bee populations can vary by location, introducing hive bees to fruit orchards will guarantee that plum crops produce more fruit.

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Conflicts of interest

The author declares no conflicts of interest.

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