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Insect Pollinators Associated with Sunflower (*Helianthus annuus L.*)

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ABSTRACT:

Forest fire is a type of natural ecological disturbance that affects ecosystem composition, structure, and function on varying scales at both the landscape and regional levels. Based on the findings of the current paper, it is concluded that fire has a significant impact on nutritional position in Garhwal forests by reducing soil composition along an altitudinal gradient at any level and regardless of understory vegetation. Preserving these minerals can be achieved through better management methods, such as early controlled burning and educating the local villagers about the harmful effects of disastrous forest fires. Despite this, the majority of forest fires are caused by non-woody forest products and the growth of cultivable land, which have detrimental effects on biodiversity, nitrogen levels, and regeneration potential. Moreover, forest fires also contribute to warming of the climate and greenhouse effect. Uttarakhand, an Indian state in the Western Himalayas, experiences a significant difficulty with forest fires during summer season, which have repercussions for entire forest ecosystems of the region.

Keywords: Fire Effect, Soil Nutrients, Garhwal Himalayas, Forest

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INTRODUCTION:

Pollinators can be of any means of transferors such as bees, butterflies, birds, bats, and other insects that play a crucial role in ecosystems and agriculture by facilitating the transmission of pollen from the male to the female parts of flowers and this phenomenon is

known as pollination. The diversity of pollinators refers to the wide variety of animal species that participate in the pollination which leads to fertilization and subsequent seed and fruit production. This process is essential for the reproduction and survival of many plant species.

Insect pollination contributes 9.5 per cent

of the total economic value of agricultural production used directly for human food (Gallai et al. 2009). The western honeybee have been widely used as pollinators since the application of pollination services began (Valido et al. 2019). Honeybees are considered as the excellent pollen vectors as majority of the foragers land on the outer ring of the florets and then move to inner rings where fresh pollen is available, before flying to next head.

Sunflower, *Helianthus annuus* L. is an important oilseed valuable crop because of its economic, ecological and ornamental benefits. It is a diploid having chromosome number, $2n=34$ belong to the family Asteraceae (Compositae). Sunflowers have bright and showy flowers that produce large amounts of nectar and pollen, making them highly attractive to pollinators, particularly bees and butterflies. Apart from this, the sunflower's inflorescence, which is made up of multiple tiny flowers arranged in a large disk, provides a generous landing platform for pollinators. Therefore, an investigation has been made on diversity of different pollinating agents associated with the crop sunflower.

MATERIALS & METHODS:

The present study have been undertaken in the Gajapati district of Odisha. Data has been collected on composition and abundance of pollinators from different agro ecosystems of Gajapati district through visual observation at 05 days interval during the cropping seasons falling

during 2021-23. The identification of the pollinators was done from a large number of samples by following fixed plot survey in selected experimental sites. The collected adult insects were killed by using chloroform and dry preserved through pinning/pointing in the laboratory of Department of Entomology, MSSSoA. The specimens were identified referring the identified specimen maintained in collections of AICRP on Honeybees and pollinators, OUAT, Bhubaneswar. The common name, scientific name, family, order, habitat of the specimens were recorded with their foraging behavior.

RESULTS & DISCUSSION:

Pollinators' Diversity:

Results recorded revealed that the crop sunflower is visited by an array of 18 different pollinators belonging to order Hymenoptera and Lepidoptera. Those pollinators were Indian honeybee (*Apis cerana indica*), Rock bees (*Apis dorsata*), European bee (*Apis mellifera*), Little bees (*Apis florea*), Stingless bee (*Tetragonula iridipennis*), Digger bee (*Amegilla zonata*), two species of leaf cutter bees (*Xylocopa latipes* D. and *Xylocopa aestuans* L.), two species of wasps (Oriental hornet, *Vespa orientalis* and *Vespa tropica*), Tawny Coster (*Acraea terpsicore*), Common Crow (*Euploea core*), Grey pansy (*Junonia atlites*), Blue glassy tiger (*Idiopsis vulgaris*), Plain tiger (*Danaus chrysippus*), Lemon pansy (*Junonia lemonias*), Common/Lemon emigrant (*Catopsilia 729omona*) and Cucumber moth/Cotton

caterpillar (*Diaphania indica*).

Sl. No	Common Name	Scientific Name	Family	Order
1	Indian hive bee	<i>Apis cerana indica</i> Fabricius	Apidae	Hymenoptera
2	Rock bee	<i>Apis dorsata</i> Fabricius	Apidae	Hymenoptera
3	European bee	<i>Apis mellifera</i> Fabricius	Apidae	Hymenoptera
4	Little bees	<i>Apis florea</i> Fabricius	Apidae	Hymenoptera
5	Stingless bee	<i>Tetragonula iridipennis</i> Smith	Apidae	Hymenoptera
6	Carpenter bee	<i>Xylocopa latipes</i> Drury	Apidae	Hymenoptera
7	Carpenter bee	<i>Xylocopa aestuans</i> Linnaeus	Apidae	Hymenoptera
8	Digger bee	<i>Amegilla zonata</i> Linnaeus	Apidae	Hymenoptera
9	Tawny Coster	<i>Acraea terpsicore</i> Linnaeus	Nymphalidae	Lepidoptera
10	Common Crow	<i>Euploea core</i> Cramer	Nymphalidae	Lepidoptera
11	Grey pansy	<i>Junonia atlites</i> Linnaeus	Nymphalidae	Lepidoptera
12	Blue glassy tiger	<i>Idiopsis vulgaris</i> Butler	Nymphalidae	Lepidoptera
13	African Monarch	<i>Danaus chrysippus</i> Linnaeus	Nymphalidae	Lepidoptera
14	Lemon pansy	<i>Junonia lemonias</i> Linnaeus	Nymphalidae	Lepidoptera
15	Common/Lemon emigrant	<i>Catopsilia pomona</i> Fabricius	Pieridae	Lepidoptera
16	Cucumber moth	<i>Diaphania indica</i> Saunders	Crambidae	Lepidoptera
17	Oriental hornet	<i>Vespa orientalis</i> Linnaeus	Vespidae	Hymenoptera
18	Wasp	<i>Vespa tropica</i> Linnaeus	Vespidae	Hymenoptera

Brewer et al. in 2023 found 16 number of pollinators visiting sunflower in United States where mostly were belonging to family apidae. 24 insect species found visiting on sunflower in Jammu and Kashmir (Thakur et al. 2023). Nayak et al. in 2022 also observed *A. dorsata*, *A. c. indica* and *Xylocopa* sp visiting sunflower. A total of eight species of pollinators were associated with sunflower where *A. mellifera*, *A. dorsata*, *A. c. indica*, *T. iridipennis*, *V. tropica* and *Hesperidae* sp were the major visitors (Yasmeen et al. 2021). 14 different pollinators were found associated with sunflower in Nigeria (Adeoye and Pitan, 2020). 18 different insect pollinators found visiting sunflower in Pakistan (Mehmood et al. 2018). Similarly 7, 17, 15, 12, 12, 20, 14, 14, 33, 41 and 15 numbers of pollinators were observed by Basak and Mandal

in 2018, Bhowmik and Bhadra in 2015, Hussain et al. in 2015, Rasheed et al. in 2015, Goswami et al. in 2013, Jadhav et al. in 2011, Nderitu et al. in 2008, Kasina et al. in 2007, Greenleaf and Claire in 2006, Singh et al. in 2000, Mahavir et al. in 1999. The current findings are corroborating with all of the previous recors.

Similar observations were also recorded by Swaminathan and Bhardwaj in 1998 in Rajasthan, Arya et al. in 1994 in Haryana, Panda et al. in 1991 in Odisha, Satya narayan et al. in 1982 in Karnataka, Swaminathan and Bharadwaj in 1982 in Rajasthan and Panchabhavi et al. in 1978 which signifies the current investigation.

CONCLUSION:

The current research makes evident that

different Hymenopterans are extremely attracted to sunflower capitulum notably those belonging to the family Apidae. The findings showed that a variety of insect pollinators' particular honeybees are the major one. *Apis cerana indica* F. was the dominant one among all. These findings can conclude and suggest to cultivate the crops like sunflower and other having similar morphological traits which can attract and help in conserving diversified type of pollinators in the environment.

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