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Relative preference of wood by *Polistes flavus* L. for Nest building

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Abstract

Wasps are distributed throughout the world, but in tropical regions great diversity of wasps is exist. Yellow paper wasps are common social wasp present in houses or near the houses. Wasps build the nests in hollow trees, in barns, sheds and hollow areas of the house walls. Yellow paper wasps especially build their nests in homes and sting very badly on disturbing. In present study five different species of woody trees were selected to test the preference of wood against *Polistes flavus*. *Polistes flavus* was attracted towards the different types of wood for nest building. Results showed that *Populus deltoid* was the most attractive and *Dilbergia sisso* was least attractive for the *Polistes flavus*. So output of this study will be provided clear message to wood user in homes for building *Populus deltoid* shall be avoided especially in houses.

Keywords: Types of wood, Poles, *Polistes Flavus*.

1. Introduction

Wasps are winged insects belong to order Hymenoptera, sub order Apocrita which also includes ants and bees [1]. Large numbers of the wasps are carnivorous feed on other insects, spiders and grubs. All the wasps have biting mouthparts; while the sting is used for paralyzing the prey to eat. Unlike the bees the sting of wasp is capable of repeated use. Thorax of wasp is attached with the abdomen by means of narrow stalk. Wasp have large number of colour patterns, colour may vary from solid black or dark blue, but most have red, orange or yellow wings marking and stripes are common on the body. Large number of wasps are solitary while the wasps belong to family Vespidae includes both social (Hornet wasps, paper wasps and yellow jacket wasp) and solitary wasps i.e. potter wasps [1].

Wasps are distributed throughout the world, but in tropical regions huge diversity of wasp is present. About 100,000 species of order hymenoptera have been recorded and their prospective number is near about 300,000 [2].

Wasps used sting for defence against different enemies. Sting of wasp is protein venom that causes pain and other allergic reaction. Most people have only local reactions to wasp stings, although a few may experience more serious allergic reactions. Local, non-allergic reactions range from burning, itching, redness, and tenderness to massive swelling and itching that may last up to a week [3].

Wasps belongs to social colonies have three differentiating castes, the egg laying Queen it may be one or more in one colony, workers and the sexually undeveloped females and the drones or males. Social wasps build their nests by means of papery material, made by masticating wood fiber. Queen lays the eggs in compartments or cells of the nests after hatching larvae emerged they transferred into pupae into the same cells and after few days adult wasps will emerge. All adult social wasps mainly feed on plant nectar and sugar material but they feed their young ones on crushed animal feed. In temperate zones where winters are harsh colonies live only for one season the workers and drones die in the winter. Before the winters queens mates with male wasp and lays eggs after the winter with the start of spring. But in tropical zones where the winters are not so harsh the colonies divides again and again for the proper size of colony and new colony starts nesting anywhere [4].

Wasps made their nests in hollow trees, in barns, sheds and hollow areas of the house walls. Rarely wasps build their nests hanging freely in unprotected areas such as trees and houses. Wasps use masticated wood for the build of nests or a shell around their nest for protection.

When the winter comes worker and drone bee die off and queen will leave the nests and search for the hibernating places like sheltered spot to pass the winter. Worker wasps' uses also bark of trees to build the nests. Most of the wasps have ability to sting again and again without breaking of sting unlike the honey bees. Sometime sting of wasps have allergic reaction that makes the sting hurt, itching and swelling of the area [5].

Common paper wasp (*Polistes flavus*) is the most common type of wasp, it is cosmopolitan in distribution. They build nests mostly near the human houses and trees. *Polistes* is the single largest genus of the family Vespidae having over three hundred recorded species and sub species. Their instinct preference for the nest building sites is commonly near the human habitation, where they can be unwelcome, although they are generally non - aggressive [6]. Genus *Polistes* have all species predatory and they consume very large number of larvae so they are considered as beneficial insects. Genus *Polistes* wasp can be identified by means of their characteristic flight they move their legs backward during flight (Turillazzi *et al.*, 1992). Paper wasp completes their life cycle in four stages, pre- emergence phase, worker phase, reproductive phase and intermediate phase [7].

P. flavus have highly sclerotized sting which guaranteed the penetration into the body of victim they also have specialized glands present around the sting which delivers the powerful venom to muscles or victim body. For the regulation of these glands well developed muscles are present around the venomous glands [8]. Muscle contractions are helpful to force the secretion into venom gland duct it moves straight through the sting and injected into the victim body. In wasps of South East Asia *Stenogastrinae* is the most important secretion of the Dufour gland is used for the larval nutrition and defence. Wasps show the aggressive behaviour, the main reason of this behaviour is to protect their nests from human beings. Wasps develop this behaviour against removal of nests from human houses and cutting of tree branches where they build nests [9].

2. Material and Method

A study was conducted at District Chakwal, Punjab Pakistan in 2014. An experiment was conducted to check the relative preference of wasp (*Polistes flavus*) towards the different woods required for the nest building. Five different types of woody trees, namely poplar (*Populus deltoides*), Shireen (*Albizia lebbek*), eucalyptus (*Eucalyptus camaldulensis*), Sheesham (*Dilbergia sisso*) and Sumbal (*Bombex ceiba*) were used in the experiment and each wood type was replicated thrice. Nine poles of each wood type were selected (three poles for each replication) from the market of about 7 feet height so the total numbers of poles used in the experiment were 45. About 3ft of all the poles were buried in soil in new builded house having high moisture content and cool environment. Poles were buried in three groups and each group has fifteen poles three poles of each plant, the distance between the poles was about twenty feet. Data was collected daily on simple observation basis and the number of total *Polistes flavus* was counted from each pole. We measured (counted) the insect population on different wood types as the insect represents the count data. So for the data analysis linear regression model (lm) was used in the statistical software "R" version (2.15.3).

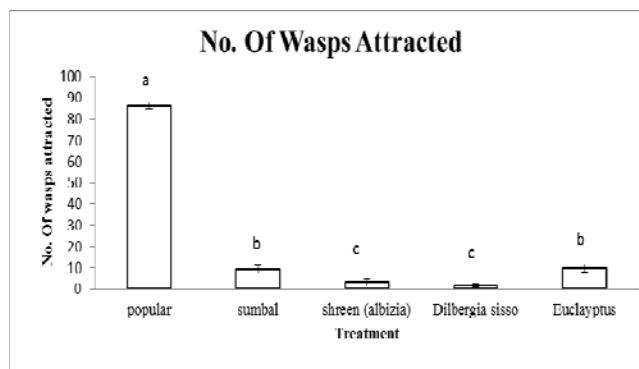
3. Result

Result showed that yellow paper wasps (*Polistes flavus*) were more attracted towards the poplar (*Populus deltoides*). So the total number of *Polistes* wasps attracted towards the Poplar (*Populus deltoides*) were 86.333 on an average of three replication second most attracted wood towards the *P. flavus*

was eucalyptus (*Eucalyptus camaldulensis*) and the total numbers of attracted wasps towards the *Eucalyptus* were 9.666. Wood that was 3rdly most attractive towards the *P. flavus* was Sumbal (*Bombex ceiba*) total number of wasps attracted towards the Sumbal were 9.333 which was very lower than the *P. deltoides*, followed by the shreen (*Albizia lebbek*) So the total number of *P. flavus* attracted towards the shreen was 3.333. While *Polistes flavus* shows least attraction towards the *Dilbergia sisso*. Total numbers of *P. flavus* were attracted towards the *Dilbergia sisso* was 1.66666667.

Table: Mean values of attracted wasps

| Wood name | 2 | Means | Total |
|--------------------------|---|--------|---------|
| <i>Populus deltoides</i> | * | 86.333 | 259.000 |
| <i>Bombex ceiba</i> | * | 9.333 | 28.000 |
| <i>Albizia lebbek</i> | * | 3.333 | 10.000 |
| <i>Dilbergia sisso</i> | * | 1.000 | 3.000 |
| <i>Eu. Camaldulensis</i> | * | 9.667 | 29.000 |



LSD value at alpha 0.05% is 2.897 and the LSD value is 4.215 when the alpha is 0.01%

Fig 1: Total no. of *polistes flavus* attracted towards the wood type.

4. Discussion

P. flavus shows different pattern of nest building and from other nest building wasps [10]. Wasps collect their food from fields of different crops like rice, cotton and wheat. Material collected from the cotton field used for the nest building [11]. Yellow paper wasp also uses fruit as a source of food and for building of their nests. These materials are easily available around the nest building areas of the wasps [12].

No one study was conducted on this type of topic so the data was not present about the topic. Above mentioned scientists indicated that *Polistes flavus* must require wood and different fibrous things to build their nests. Above mentioned results indicated that yellow paper wasp was most attracted towards the *Populus deltoides* because its softness and become very just like paste on chewing and grinding in presence of saliva of the wasp.

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