INTERNATIONAL JOURNAL OF RESEARCHES IN BIOSCIENCES, AGRICULTURE AND TECHNOLOGY
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www.ijrbat.in

ASSOCIATION OF BUTTERFLIES AND *ADELOCARYUM COELESTINUM* (LINDL.) C.B.CLARKE)

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ABSTRACT:
The present study was carried out to make available association of butterflies with *Adelocaryum coelestinum* (Lindl.) C.B.Clarke) belonging to the family Boraginaceae. The flowers are borne in raceme inflorescence. The flowers are large showy with attractive blue colour in the centre. Flower attracts bees and butterflies to pollinate the plants. During present investigation, Family Nymphalidae of butterflies was represented by Glassy tiger (Para*n*tica *aglea*), Common crow (*Euploea core*), Choclate pansy (*Junonia iphita*). Common emigrant (*Catopsilia pomana*) and) Common Jezebel *Delias eucharis* from the family pieridae and Blue Mormon (*Papilio polymnestor* from the family papillinidae. We have observed the group of butterflies visiting racemes of the plants during 9.30 hrs to 11.30 hrs and visiting 3-4 flowers in short time. All flower visiting butterflies are nectar feeders. The butterflies feed on nectar exhibited probing movement of the proboscis in peculiar pattern. Butterflies land on inflorescence and exhibit fast movement of proboscis. Bending movement of proboscis vary from species to species of butterflies. The butterflies approach to new flower, when the nectar content of the flowers gets reduced. In this way, butterflies can visit the flowers of raceme inflorescences of *Adelocaryum coelestinum* (Lindl.) C.B.Clarke) , after deriving nectar from one flower after another at very short distances. The flowers, leaves and roots of plants of this family contains pyrrolizidine, L-ornithine alkaloids. These alkaloids attract male butterflies. These alkaloids are poisonous secondary metabolites. Male butterflies synthesize pheromones with the help of this alkaloids to attract females during courtship display.

Keywords*: Adelocaryum coelestinum, butterflies, association.*

INTRODUCTION:

Butterflies are at significant position in the ecosystem. They have their role in the food chain of the ecosystem. Due to their role in pollination, they maintain genetic diversity. Their beauty imparts aesthetic sense to the environment. (Subba Reddi et al. 2002). Butterflies are dependent on plants for their nectar sources. They are very specific in their floral nectars with chemical composition. Several factors influence the association of butterflies and their host plants. (Ehrlich and Raven (1964), Kunte, 2000). Due to eye catching colour, physical beauty and behavioral display, they are recognized as "Insects of the sun" (NRCSB 2000). The chemical content of the plants are served to be very important factor controlling the evolution of butterfly host plant associations.(Feeny 1915, 1976, l99l ; Jermy 1916, 1984, Scr iber and Slansky 1981: Berenbaum 1983; Zanger l and Berenbaum 1993; Fiedler 1995b). Morphological characters, positioning of flowers and shape of inflorescence, calyx and corolla, beautiful striations of calyx, corolla, colour of the flowers attract the butterflies to visit the plants. Some butterflies visit the flowers of their caterpillar hosts and have their role in pollination of plants as they eat at another life stage (Opler and Krizek 1984; Solomon Raju et al. 2003). Butterflies probe for nectar, their flight fuel, and typically favor the flat, clustered flowers that provide a landing pad and abundant rewards. Butterflies have good vision but a weak sense of smell

Floral nectar is the source of food for the adult butterflies. Nectar is enriched with carbohydrates, amino acids, lipids, antioxidants, alkaloids, protiens, vitamins, salts etc. (Dafni 1992). Butterfly nectars are normally rich in amino acids (Baker and Baker, 1975 and Baker 1978). Kunte in 2007 was of opinion that butterflies are in need of appropriate quantities of nutrients like carbohydrates, proteins,

salts, vitamins etc. for large number of production of eggs.

The butterflies insert its proboscis in the flower to search for nectar and pollen grains. The flowers are exploited by the butterflies for nectar, the only source of carbohydrates for them (Subba Reddi and Meera Bai, 1984). Subba Reddi and Meera Bai (1984) also worked out on the length of time spent by different butterflies at the flowers of different plant species.

METHOD AND MATERIAL:

Study area- we have visited Amboli to see the association of butterflies with *Adelocarum coelestinum*. Field observations were made on the flower-visiting activity of butterflies in the study areas. Amboli is situated at 15.9647° N, 74.0036° E. The forest of Amboli is semi evergreen type with few scattered evergreen patches. The vegetation shows great plant diversity. During rainy season the vegetation is very compact due to trees, shrubs, climbers and herbs. The compact nature of vegetation become less with response to change in seasons Arboreal flora includes abundant growth of trees, shrubs, woody climbers in the form of lianas, herbs and epiphytes. The vegetation invites different insects such as beetles, bees, flies, wasps, butterflies, moths, ants etc. These insects use the plant flowers or fruits for food and the plant material for nesting. The vegetation at Amboli includes flora and fauna of Western Ghats. According to Myers & Et.al. (2000), Western Ghats is considered as one of the biodiversity hotspots rich in flaura and fauna. The vegetation of Amboli gives shelter to different species of butterflies.

Butterflies can also be used as umbrella species (the species whose protection serves to protect many co-occurring species) for conservation planning and management (Fleishman et al. 2000; 2001; Betrus et al. 2005). The behavior of the butterflies during floral nectar feeding was observed on the inflorescences of *Adelocaryum coelestinum* (Lindl.) C.B.Clarke) from family Boraginaceae, Commonly known as common hill borage. The flowers were frequently visited by butterflies. The proboscis of butterflies have role in feeding habit.

RESULTS AND DISCUSSION

The flowers of *Adelocaryum coelestinum* (Lindl.) C.B.Clarke are white coloured with blue shaded centre. It is an erect perennial herb, 1-2m tall. The colour of the stem and branches is red. Leaves at the basal portion are ovate to heart shaped supported with long red stalks. Basal leaves are 25cm long and smaller leaves on upper part of stem and branches are 5cm long with short stalks. Inflorescence is raceme with forked branches. The blue shaded centre of the flower attracts bees and butterflies to pollinate the plant. The number of butterflies visits the flowers very frequently. We have observed that groups of butterflies visit the plants at a time. It is matter of curiosity, how do pollinators divide their time between the flowers on one spike inflorescence of one plant? The raceme inflorescence is beneficial in geitonogamy (fertilization of a flower on a spike by pollen from another flower of the same spike).

We have observed the following butterflies visited *Adelocaryum coelestinum* (Lindl.) C.B.Clarke - Family Nymphalidae of butterflies was represented by Glassy tiger (*Parantica aglea*), Common crow (*Euploea* core), Choclate pansy (*Junonia iphita*).

Common emigrant (*Catopsilia pomana*) Common Jezebel *Delias eucharis* from the family pieridae and Blue Mormon (*Papilio polymnestor* from the family papillinidae.

Glassy tiger (*Parantica aglea*), Common crow (*Euploea core*), Choclate pansy (*Junonia iphita*) from the Family Nymphalidae are also known as Brush footed butterflies or four footed butterflies because in both sexes, the forelegs are very small and covered with hair, obscurely look like a brush material. The forelegs are used to improve signaling of communication between the species. The proboscis morphology of family nymphalidae is

specific; show a certain feeding habits referring to get some clue for their food preferences. The members of this family seem to play their role in accumulation of fluid and uptake of fluid from wet surfaces like rotten fruits or tree sap.

Common emigrant (*Catopsilia pomana*) Common Jezebel *Delias eucharis* from the Family pieridae include the predominance of white and yellow color butterflies; hence they are called as white and yellow. Another reason why butterflies might be used as model organisms, especially in the WG, is the recent search in the literature on the diversity, habitat usage and conservation of butterflies (Gaonkar 1996; Kunte 2000b; Kehimkar 2008; Kunte 2008b; Kunte, in press).

Blue Mormon (*Papilio polymnestor* from the family papillinidae are swallowtail butterflies. They are large, colorful butterflies. The forked appearance of the swallowtails' hindwings, which can be seen when the butterfly is resting with its wings spread, gave rise to the common name swallowtail.

We have observed the group of butterflies visiting racemes of the plants during 9.30 hrs to 11.30 hrs and visiting 3-4 flowers in short time. The blue colour of flowers attracts butterflies. Ilse and Vaidya (1956) observed that some butterflies show a preference for blue colour.

The nectary is in the form of disc surrounding the ovary. The ovary is lined by stomata through which nectar is secreted.

All flower visiting butterflies are nectar feeders. The butterflies feed on nectar exhibited probing movement of the proboscis in peculiar pattern. Butterflies land on inflorescence and exhibit fast movement of proboscis. Bending movement of proboscis vary from species to species of butterflies. It depends upon the length of the proboscis. How much proboscis inserted into the flower is related with length of the proboscis and depth of corolla

The butterflies approach to new flower, when the nectar content of the flowers gets reduced. In this way, butterflies can visit the flowers of raceme inflorescences of *Adelocaryum coelestinum* (Lindl.) C.B.Clarke) , after deriving nectar from one flower after another at very short distances.

This plant is from family Boraginaceae. The flowers, leaves and roots of plants of this family contains pyrrolizidine, L-ornithine alkaloids. This alkaloid attract male butterflies. These alkaloids are poisonous secondary metabolites. Male butterflies synthesize pheromones with the help of these alkaloids to attract females during courtship display. The secondary metabolites act as a protector against predators (Boppre, 1983, 1984, 1990). The butterflies those have long flexible proboscis can collect the nectar at high speed from variety of flowers. (Krenn, 19990, 1998).

Butterflies act as good biological indicator to indicate the type of habitat, quality of habitat and in general, how the environment is. (Larsen 1988; Kocher and Williams 2000; Sawchik et al. 2005). Kunte in 1997 observed that varieties of butterflies are seasonal and they have choice of their particular set of habitat. Butterflies have their great role to disturbance and change in habitat in the environment. (Mac Nally and Fleishman 2004; Fleishman et al. 2004). Butterlies are dependent on plants, any change or disturbances in the plant diversity, habitat may bring migration or local extinction of species of butterflies. (Blair 1999; Kunte 2000b; Mennechez, Schtickzelle and Baguette 2003) Diversity of butterflies is linked to plant diversity of that given area as butterflies' derived food from plants (Padhye et al. 2006).

Butterflies are valuable pollinators when they move from plant to plant, gathering nectars and important food for the birds, reptiles, spiders and predatory insects they are also good indicators of environment. (Joshi P.C. 2009)

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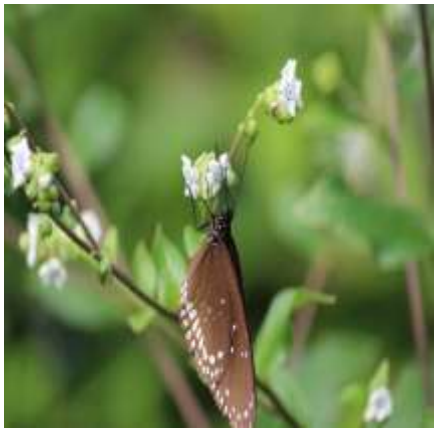

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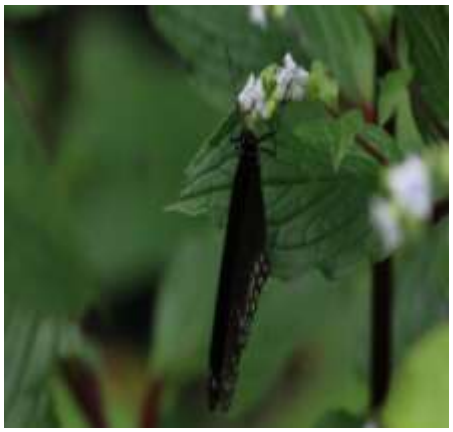

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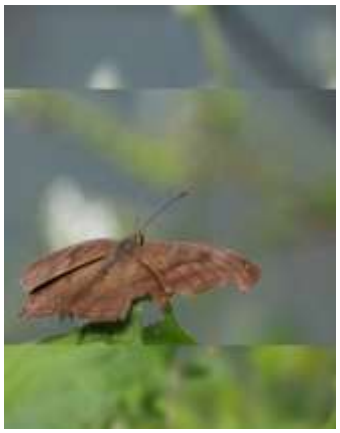

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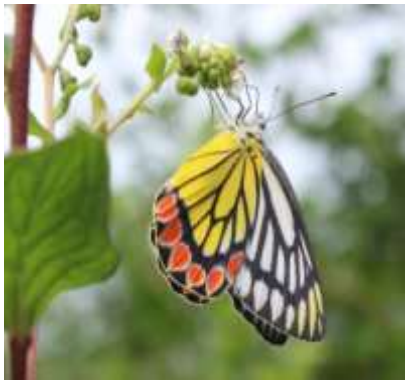

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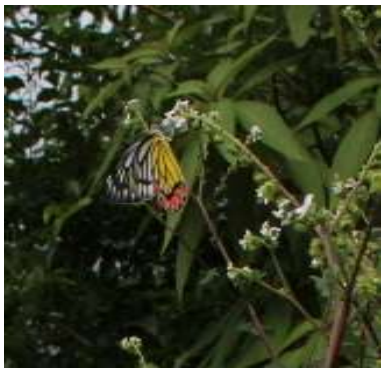

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1. Glassy tiger (*Parantica aglea*) Family Nymphalidae, 2. Common crow (*Euploea core*), Family Nymphalidae, 3. Choclate pansy (*Junonia iphita*). Family Nymphalidae, 4. Common emigrant (*Catopsilia pomana*) family pieridae, 5. Common Jezebel (*Delias eucharis*) from the family pieridae, 6. Common Jezebel on *Adelocaryum coelestinum* (Lindl.) C.B.Clarke, 7. Blue Mormon (*Papilio polymnestor*) family papillinidae.