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A short term observation on butterfly diversity at College of Forestry, Ranichauri

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Abstract

Thirty-nine species of butterflies belonging to six families were recorded from the College of Forestry, Ranichauri. The survey was carried out at three sites from March 2022 to July 2022. Out of total butterfly diversity, five species are protected under different schedules of the Wildlife Protection Act 1972. The maximum species recorded belongs to the family Nymphalidae. Common Sailer, Indian Tortoiseshell, Large Cabbage White, Blue Pansy and Chocolate Pansy account for the most common butterflies in the study area. Minimum species were recorded from Site 3 (Agriculture Block of College of Forestry, Ranichauri) probably due to high anthropogenic pressure which includes heavy agriculture machinery, use of fertilizers and low diversity of nectar plants.

Key words: Biodiversity, butterfly, Ranichauri, Tehri Garhwal.

Introduction: Butterflies play a vital role in the terrestrial ecosystem chiefly as a pollinator of flowering plants, food to various insectivorous animals in different metamorphic forms such as larvae and adults, and as an indicator of a healthy ecosystem. Kunte *et al.* (2012) reported 1504 species of butterflies from Indian subcontinent. Singh and Sondhi (2016) reported 407 species of butterflies Garhwal region of Uttarakhand. Butterflies are sensitive arthropods and climate change can highly impact their breeding phenology which involves reproduction, egg-laying, caterpillar development and emergence of adults (Radchuk *et al.* 2013).Various anthropogenic factors such as deforestation, habitat fragmentation, extensive use of pesticides and climate change are resulting in the decline of butterfly populations around the world. According to IUCN 35 species of butterflies are critically endangered in India. The present observations were undertaken in College of Forestry, Ranichauri (30.3111° N, 78.4096° E) situated in Tehri Garhwal district at a distance of 9.1km from nearby town Chamba (30.3455° N, 78.3947° E). It has an elevation of 1875m from MSL, forest type consists of montane temperate forest

(Champion Seth, 1968) which accounts for oak, rhododendron, pine, deodar, and toon species. The temperature of Ranichauri varies between 9.4 to 27.20°C (Negi *et al.* 2015).

Material and Methods

Survey method: The survey for butterfly diversity was conducted from March 2022 to July 2022 at three different sites to document diversity of butterflies which were considered on basis of different elevations and vegetation types. Rainy days were excluded from study period. The survey was carried out during early morning and afternoon weekly. Photographic identification method was used for identifying specimens, gear used was Sony point-and-shoot camera and GPS points for recorded species were also taken from different sites.

Survey site: Three sites based on vegetation type, anthropogenic pressure and elevation were selected for the study in the College of forestry campus (Map 1). These were Site 1: Dandachili Forest Block, Site 2: D-Block and Site 3: Agriculture Block.

Site 1: - Dandachili Forest Block. (30°18'26.11"N 78°24'34.16"E)

Elevation: 2006m

Vegetation type: Area dominated by *Cedrus deodara*, *Quercus leucotricophora*, *Quercus serrata*, along with individual trees of *Rhododendron arboreum*, *Pinus wallichiana* and *Myrica esculenta*.

Anthropogenic pressure: Low

Site 2: - D Block, College of Forestry, Ranichauri. (30°18'49.34"N 78°24'47.01"E)

Elevation: 1725m

Vegetation type: Region dominated by pure stands of *Pinus roxburghii* along with individual trees of *Cupressus torulosa*, *Aesculus indica*, *Castanea sativa*. The nearby area consists of a horticulture block where various horticulture crops are planted.

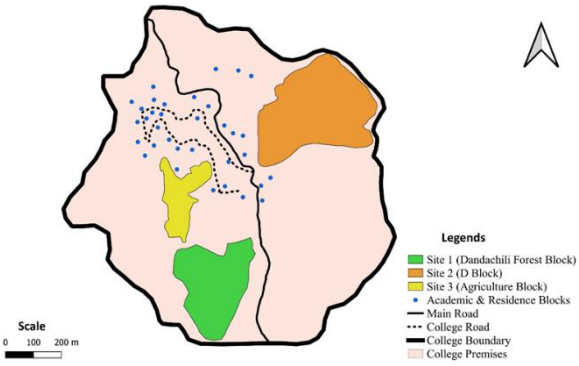
Anthropogenic pressure: Low

Site 3: - Agriculture Block, College of Forestry, Ranichauri. (30°18'40.13"N 78°24'28.47"E)

Elevation: 1927m

Vegetation type: region dominated by various arable crops along with *Quercus leucotricophora* and *Rhododendron arboreum* in agroforestry system.

Anthropogenic pressure: High



Map 1. Study sites in the selected area

Identification of species: The coloured photographs of specimens were used for identification. Morphological features like colour, wing design, wing span, wing pattern were compared for identification using available literature (Smetacek, 2017; Kehimkar, 2008; Singh and Sondhi, 2016).

Results and Discussion: A total of thirty-nine species belonging to six families were recorded from three sites during study period (Table 1) of five months study duration. Four species belonged to Papilionidae (10.26%), seven species belonged to Pieridae (17.95%), one species belonged to Riodinidae (2.56%), seven species belonged to Lycaenidae (17.95%), nineteen species belonged to Nymphalidae (48.72%) and one species belonged to Hesperiidae (2.56%) among these five species are protected under the Wildlife Protection Act (1972) (Figure 1)**.** Six representative species photographed are presented (Figures 2-7)

Maximum species were recorded in April accounting for thirty-four species and minimum species were recorded in July which accounted for sixteen species. Highest specie diversity was recorded from Site 2 i.e., twenty-five species in April and lowest specie diversity was recorded from Site 3 i.e., three species in July. Minimum species diversity was recorded from Site 3 due to high levels of anthropogenic pressure which includes daily agricultural practices involving use of heavy machinery, use of fertilizers and low diversity of nectar plants. Whereas, the maximum species diversity was observed from Site 2 due to low anthropogenic pressure and high diversity of host and nectar plants (Figure 8). Short term pilot studies on butterfly diversity are pivotal for long term assessments (Alexander *et al.*, 2016). However, a long-term study is required to document species diversity of the Ranichauri region of district Tehri Garhwal to understand the eco-behaviour of butterflies with reference to changing climate and increasing anthropogenic pressure.

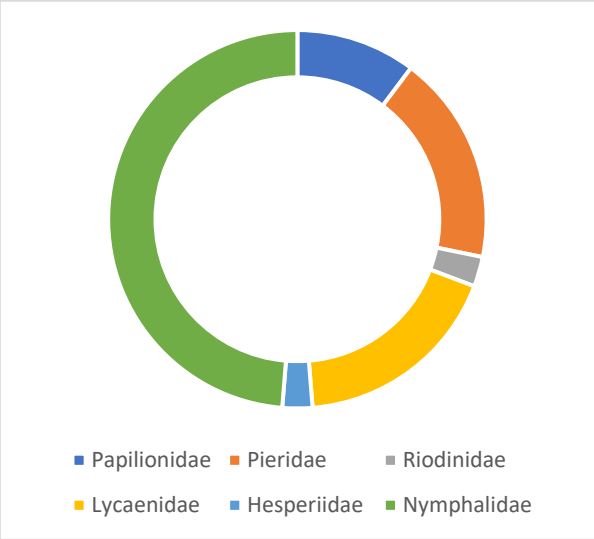


Figure 1. Representation of butterfly species belonging different families observed during fieldwork

Table 1. Checklist of butterfly species recorded from three study sites at College of Forestry, Ranichauri

S.No.	Common name	Scientific name	WPA Status	March			April			May			June			July		
				Site 1	Site 2	Site 3	Site 1	Site 2	Site 3	Site 1	Site 2	Site 3	Site 1	Site 2	Site 3	Site 1	Site 2	Site 3
	Papilionidae																	
1	Golden Birdwing	*Troides aeacus*	-				*	*		*	*			*				
2	Spangle	*Papilio protenor*	-	*			*	*		*	*		*			*		
3	Common Yellow Swallowtail	*Papilio machaon*	-					*										
4	Common Bluebottle	*Graphium sarpedon*	-					*										
	Pieridae																	
5	Common Brimstone	*Gonepteryx rhamni*	-				*		*	*		*	*			*	*	
6	Spotless Grass Yellow	*Eurema laeta*	-		*	*			*		*	*						
7	Dark Clouded Yellow	*Colias fieldii*	-					*	*		*			*				
8	Great blackvein	*Aporia agathon*	WPA-IV				*	*		*	*		*	*		*		
9	Large Cabbage White	*Pieris brassicae*	-		*	*		*	*		*	*		*			*	*
10	Indian Cabbage White	*Pieris canidia*	-		*	*			*		*	*		*	*		*	
11	Hill Jezebel	*Delias belladonna*	-				*			*				*				
	Riodinidae																	
12	Common Punch	*Dodona durga*	-		*		*	*		*	*		*	*		*		
	Lycaenidae																	
13	Common Copper	*Lycaena phlaeas*	-		*		*	*		*			*	*			*	
14	Sorrel Sapphire	*Heliophorus sena*	-		*			*			*			*				
15	Eastern Blue Sapphire	*Heliophorus oda*	-	*			*											
16	Tailless Bushblue	*Arhopala ganesa*	WPA-II	*	*		*	*										
17	Pea Blue	*Lampides boeticus*	WPA-II					*			*							
18	Red Pierrot	*Talicada nyseus*	-							*	*		*	*				
19	Tailed Cupid	*Everes argiades*	-		*		*	*		*	*							
	Hesperiidae																	
20	Small Branded Swift	*Pelopidas mathias*	-						*	*		*			*			
	Nymphalidae																	
21	Western Courtier	*Sephisa dichroa*	-				*		*	*	*		*	*		*		
22	Northern Common Jester	*Symbrenthia lilaea*	-				*			*								
23	Indian Tortoiseshell	*Aglais caschmirensis*	-	*	*	*	*	*	*	*	*		*	*	*	*	*	
24	Blue Admiral	*Kaniska canace*	-	*	*		*	*		*		*	*					
25	Painted Lady	*Vanessa cardui*	-					*			*			*				
26	Indian Red Admiral	*Vanessa indica*	-		*			*			*			*			*	
27	Blue Pansy	*Junonia orithya*	-		*	*		*	*		*	*		*	*		*	
28	Chocolate Pansy	*Junonia iphita*	-	*		*	*		*	*			*		*	*		
29	Tropical Fritillary	*Argynnis hyperbius*	-					*										
30	Himalayan Queen Fritillary	*Issoria issaea*	-					*		*	*		*	*				
31	Common Sailer	*Neptis hylas*	-	*	*		*	*	*	*	*	*	*	*	*	*		*
32	Hill Sergent	*Athyma opalina*	-													*		
33	Grand Duchess	*Euthalia patala*	WPA-II										*					*
34	Banded Treebrown	*Lethe confusa*	-	*	*			*		*			*					
35	Common Treebrown	*Lethe rohria*	-							*								
36	Common Wall	*Lasiommata schakra*	-				*	*			*			*			*	
37	Ringed Argus	*Callerebia annada*	WPA-I					*		*	*		*					
38	Common Four-ring	*Ypthima huebneri*	-					*			*			*				
39	West Himalayan Five-ring	*Ypthima nikaea*	-							*		*	*		*			

Figure 2. Blue Admiral

Figure 3. Common Brimstone

Figure 4. Ringed Argus

Figure 5. Great Blackvein

Figure 6. Hill sergent

Figure 7. Grand Duchess

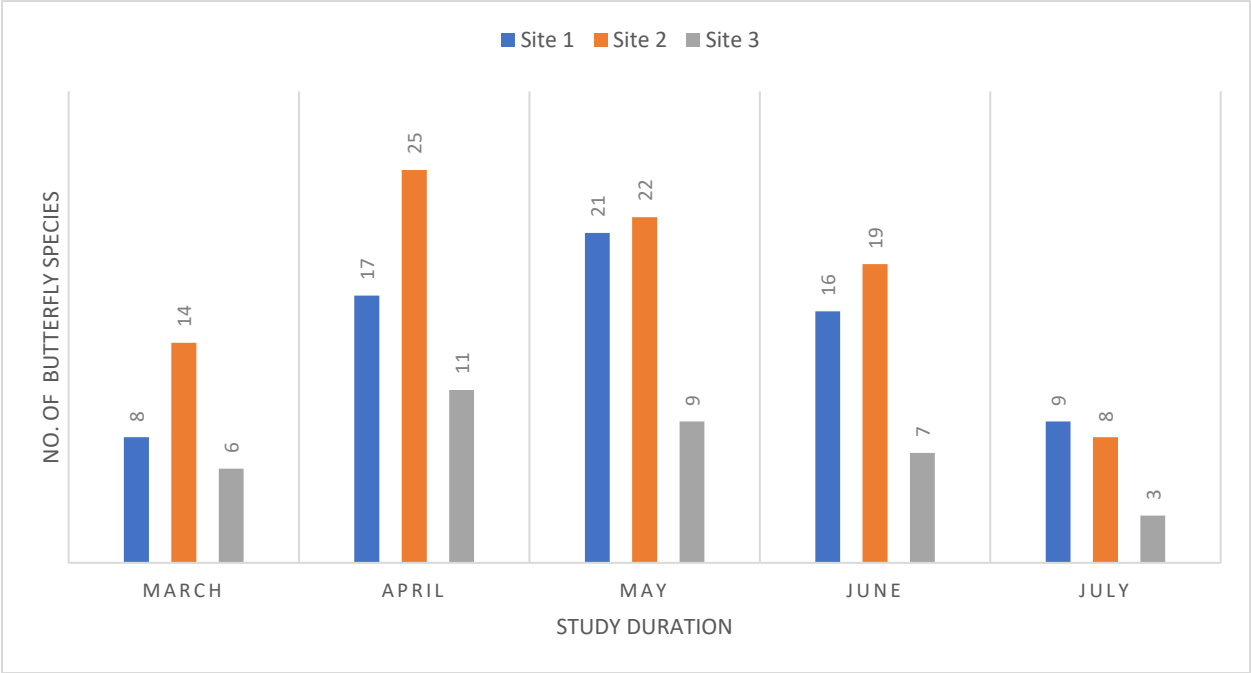


Figure 8. Butterfly diversity observed at different study sites

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Report of Egyptian cottony cushion scale, *Icerya aegyptiaca* (Douglas) (Monophlebidae: Hemiptera) on *Casuarina equisetifolia* from Gujarat (India)

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Abstract

During *kharif* season of the year 2022, survey was carried to document the activity of insect pests and bio-agents under biodiversity research trial of All India Co-ordinated Research Project on Biological Control of Crop Pests (AICRP-BC), Anand Agricultural University (AAU), Anand (Gujarat). During the survey period the infestation of Egyptian cottony cushion scale, *Icerya aegyptiaca* was observed on *Casuarina equisetifolia*. The die back of seedlings was observed and it was primarily attributed to sap sucking by the pest. The mature parthenogenetic females were orange-red, oval to pyriform shaped body partially or entirely covered with white wax and long white waxy fringe around the body. The present study appears to be the first report of Egyptian cottony cushion scale, *I. aegyptiaca* on *C. equisetifolia* from Gujarat, India.

Keywords: *Icerya aegyptiaca*, Egyptian cottony cushion scale, *Casuarina equisetifolia*, Gujarat

Introduction:

In the 19th century, *Casuarina equisetifolia* L. (Casuarinaceae) was introduced to India from Australia (Warrier *et al*., 2014). It thrives on sandy shores and is salt-tolerant. It is widely planted to minimise coastal erosion and serve as a windbreak. The wood is sturdy and durable and is mostly used for fuel, scaffolding and poles. Additionally, a tree that fixes atmospheric nitrogen. Though, it is considered to be a hardy woody tree, 70 species of insects have been recorded to infest this tree in India (Sasidharan, 2004). The genus *Icerya* includes about 35 species in the world that are commonly known as fluted scales because of the fluted appearance of the ovisac (El-Sobky, 2020). *Icerya aegyptiaca* Douglas (Hemiptera: Monophlebidae) is commonly known as Egyptian cottony cushion scale, Egyptian fluted scale or breadfruit mealybug. It is a highly polyphagous sucking pest known to feed on about 123 species of plants belonging to 49 plant families (Ben-Dov *et al*., 2009).

Monophlebidae, often known as giant scales or monophlebids, is a family of scale insects. Giant scales can be found on various host plants, although the majority of them are

trees or woody shrubs. They can be found all over the world, but the tropics have more genera than anywhere else. (Anon, 2018). A study was conducted to document the diversity of insect pests and their natural enemies in research fields of AAU, Anand, Gujarat during *kharif* season of the year 2022. Here we have described Egyptian cottony cushion scale, *I. aegyptiaca* Douglas, that was observed during the survey.

Materials and Methods

A biodiversity research trial is being carried out under the ambit of the All India Co-ordinated Research Project on Biological Control of Crop Pests. Regular surveys were carried out in *kharif* 2022 to record the activity of several pests and their natural enemies in diverse crop environments. During the survey the tree *C. equisetifolia* was found infested with scale insects. The scale insects collected and preserved in 70% ethyl alcohol and sent to Division of Germplasm Collection and Characterization, ICAR–NBAIR (National Bureau of Agricultural Insect Resources), Bengaluru, India for identification.

Results

During the study period (May-June 2022), we reported the infestation of *C. equisetifolia* by scale insects. The scale insects were identified as Egyptian cottony cushion scale, *I. aegyptiaca*.

Nature of damage

It was observed that Egyptian cottony cushion scale, *I. aegyptiaca* found congregated on needles and feeding the trees by sap sucking. The severely infested seedlings were stunted with die back symptoms. It was also excreting honeydew, promoting the growth of sooty mold fungus that block photosynthesis.

Morphological description

Egyptian cottony cushion scale, *I. aegyptiaca* can be identified by its prominent, thick fluted egg sac, which is often more than twice as long as the adult body (Figure 1). Adults were orange or reddish in colour ranging from pyriform to oval shape. The body was partially or completely covered with white wax and around 20 long white waxy fringes (Beshr, 2015). On the tip of the abdomen, an ovisac was observed that contained between 70 and 200 oval-shaped, orange-yellow eggs. The newly emerged nymphs known as "crawlers" were orange brownish to black coloured legs and antennae. They settle down on a tree needles after a day and became covered with white wax.

Host

Tomato, capsicum, grapes, sapota, apple, banana, guava, jack, mango, custard apple, citrus, hibiscus, lantana, casuarina, *Ficus* spp., teak, cocoa, arhar, papaya and castor etc (Anon, 2013, CPCI 2005; Akintola and Ande, 2009)).

Conclusion

Infestation of this scale insect was recorded on casuarina grown along the research fields of Anand Agricultural University Anand (Gujarat). The present investigation appears to be the first report documenting the infestation of Egyptian cottony cushion scale, *I. aegyptiaca* on *C. equisetifolia* from Gujarat, India.

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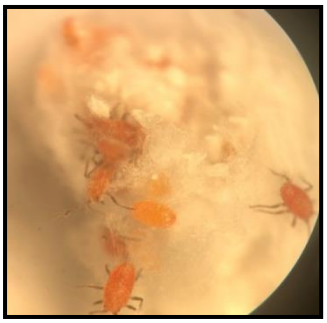
<tr><td>  </td><td>  </td></tr>
<tr><td>Eggs</td><td>Nymphs</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Mature females of Egyptian cottony cushion scale, I. aegyptiaca</td><td>Egyptian cottony cushion scale, I. aegyptiaca on the C. equisetifolia</td></tr>
<tr><td colspan="2">Figure 1. Life stages of Egyptian cottony cushion scale, I. aegyptiaca</td></tr>
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