Cirsium wallichii DC. (Asteraceae): a key nectar source of butterflies

Bitupan Boruah, Amit Kumar & Abhijit Das

26 October 2020 | Vol. 12 | No. 14 | Pages: 17049–17056
DOI: 10.11609/jott.6008.12.14.17049-17056
In general, both larvae and adult butterflies depend on plant resources (Kitahara et al. 2008; Nimbalkar et al. 2011). Adult butterflies forage on a wide variety of plant species for floral nectar (Courtney 1986; Raju et al. 2004). Butterflies, however, do not collect nectar extensively from all the available flowers (Kunte 2000). Thus, the diversity of the butterfly community of a region is associated with the availability of host plants (Murphy & Wilcox 1986; Kitahara et al. 2008). Also, the diversity and abundance of pollinators such as butterflies are crucial for the reproductive success of flowering plants (Mukherjee et al. 2015). Several wild plants considered as weeds serve as important nectar sources for butterflies (Mukherjee et al. 2015; Kapkoti et al. 2016). One such wild weed, *Cirsium* Mill. (Thistle) of the family Asteraceae has been well recognized as a nectar source of butterflies (Robertson 1928; Tooker et al. 2002; Kapkoti et al. 2016). *Cirsium* is a speciose genus of Asteraceae, with about 200 species distributed in Europe, Asia, North & Central America, and northern Africa (Mabberley 2008; Sahli et al. 2017). Among the species of this genus known from India, *Cirsium wallichii* DC. has been extensively used as a traditional medicinal plant in the Himalaya (Uniyal et al. 2011). Interestingly, owing to a lack of information on *Cirsium wallichii* DC. as a nectar source of butterflies, the current communication aims to address the value of Wallichii’s Thistle not only as a weed, but also as a nectar source of butterflies.

The present study was conducted from May to August, 2019 in Benog Wildlife Sanctuary (30.467°N & 78.027°E), Mussoorie, Uttarakhand, India. The sanctuary is characterized by Banj Oak *Quercus leucotrichophora* forests, Chirpine *Pinus roxburghii* forests and grasslands (Champion & Seth 1968) which harbour at least 335 species of vascular plants (Kumar et al. 2012). The survey was done between 08.00h and 11.00h to record the butterfly species visiting *Cirsium wallichii*. We photographed representatives of each butterfly species from the area. Based on the photographs, identification of the species was carried out using Evans (1932) and Kehimkar (2016).

*Cirsium wallichii* grows along open and modified stream habitats in the sanctuary as well as near human settlements and agricultural lands at the peripheral area (Image 1A). Leaves are stalkless and pinnately lobed with long spines at the margin. The plant blooms from May–July. Capitula are many-flowered, solitary or clustered and borne on leafless stalks. They are 2–3.4cm
### Table 1. List of butterfly species foraging on *Cirsium wallichii*

| Scientific name                | Common name                      |
|-------------------------------|----------------------------------|
| **A. Family: Papilionidae**    |                                  |
| 1. Graphium sarpedon (Linnaeus, 1758) | Common Bluebottle               |
| 2. GraphiumAnthocharis (Westwood, 1841) | Glassy Bluebottle              |
| 3. Graphium agamemnon (Linnaeus, 1758) | Tailed Jay                     |
| 4. Papilio protenor Cramer, [1775] | Spangle                        |
| 5. Papilio bianor Cramer, [1777] | Common Peacock                 |
| 6. Papilio polytes Linnaeus, 1758 | Common Mormon                  |
| **B. Family: Pieridae**        |                                  |
| 7. Aporia agathon agathon (Moore, 1831) | Garwhal Great Blackvein        |
| 8. Aporia agathon agathon (Gray, 1863) | Nepalese Great Blackvein       |
| 9. Aporia leucodice (Eversmann, 1843) | Himalayan Blackvein            |
| 10. Colias erate (Esper, 1805) | Pale Clouded Yellow            |
| 11. Colias fieldilinis (Laennec, 1829) | Dark Clouded Yellow         |
| 12. Pieris brassicae (Linnaeus, 1758) | Large Cabbage White           |
| 13. Pieris canidia (Linnaeus, 1768) | Indian Cabbage White           |
| 14. Gonepteryx rhamni Linnaeus, 1758 | Common Brimstone             |
| 15. Pontia daplidice (Linnaeus, 1758) | Bath White                     |
| 16. Belenois aurata (Fabricius, 1773) | Pioneer                      |
| **C. Family: Lycaenidae**      |                                  |
| 17. Helioptilus seno (Kollar, 1844) | Sorrel Sapphire                |
| 18. Spindasis nipalicus (Moore, 1884) | Silver grey Silverline       |
| 19. Rapala selina (Moore, 1874) | Himalayan Red Flash           |
| 20. Rapala varuna (Horsfield, [1829]) | Indigo Flash                  |
| 21. Rapala manee (Hewitson, 1863) | Slate Flash                    |
| 22. Arcia agestis (Denis & Schiffermüller, 1775) | Orange-bordered Argus      |
| 23. Lycoctena phileas (Linnaeus, 1761) | Common Copper                 |
| 24. Lampides boeticus (Linnaeus, 1767) | Pea Blue                      |
| 25. Chilades pandava (Horsfield, [1829]) | Plains Cupid                 |
| 26. Celastrina huregelli (Moore, 1822) | Large Hedge Blue             |
| 27. Deudorix epijarbas (Moore, [1858]) | Cornelian                     |
| **D. Family: Nymphalidae**     |                                  |
| 28. Vanessa indica Herbst, 1794 | Red Admiral                    |
| 29. Vanessa cardui Linnaeus, 1758 | Painted Lady                   |
| 30. Kaniska canacea Linnaeus, 1763 | Blue Admiral                  |

**Scientific name**  
**Common name**  
31. Aglais caschmirensis Kollar, 1844  
Indian Tortoiseshell  
32. Callerebia anna anna caeca Moore, 1857  
Ringed Argus  
33. Callerebia hibrida Butler, 1880  
Hybrid Argus  
34. Callerebia nirmala Moore, 1865  
Common Argus  
35. Argynnis hyperbius (Linnaeus, 1763)  
Indian Fritillary  
36. Ypthima nareda Kollar, 1844  
Large Three-Ring  
37. Ypthima nicidea Moore, 1874  
Moore's Five-Ring  
38. Parantica aglea (Stoll, [1782])  
Glassy Tiger  
39. Tirumala limniace (Cramer, [1775])  
Blue Tiger  
40. Tirumala septentrionsis (Butler, 1874)  
Dark Blue Tiger  
41. Danaus genutia (Cramer, [1779])  
Striped Tiger  
42. Danaus chrysippus (Linnaeus, 1758)  
Plain Tiger  
43. Euplaeula mulciber (Cramer, [1777])  
Striped Blue Crow  
44. Argynnis childreni Gray, 1831  
Large Silver stripe  
45. Libythea lepita Moore, [1858]  
Common Beak  
46. Issonommata schakra Kollar, 1844  
Common Wall  
47. Acarea issoria (Hübner, [1819])  
Yellow Coster  
48. Cyrestis thyodamas Doyère, [1840]  
Common Map  
49. Junonia aricia Cramer, 1779  
Chocolate Pansy  
**E. Family: Hesperiidae**  
50. Seseria dohertyi Watson, 1893  
Himalayan White Flat  
51. Potanthus doro (Kollar, [1844])  
Himalayan Dart  
52. Colias argus (Kollar, [1844])  
Common Spotted Flat  
53. Lobobia illiana Atkinson, 1871  
Marbled Flat  
54. Colias argus danae (Moore, [1866])  
Himalayan Yellow-banded Flat  
55. Pseudocallodanis danae (Fabricius, 1787)  
Fulvous Pied Flat  
56. Tagiades menela Moore, 1865  
Spotted Snow Flat  
57. Colias argus danae (Moore, 1865)  
Himalayan Spotted Flat  
58. Aeromachus stigmatomorpha Moore, 1878  
Veined Scrub Hopper  
59. Notocrypta festivamorphila Boisduval, 1832  
Spotted Demon  
60. Pedesta masurii Moore, 1878  
Mussoorie Bush Bob  
61. Polyptychus diserta (Elwes & Edwards, 1897)  
Himalayan Swift  
62. Parnara sp.  
Swift sp.
across, homogamous, bisexual, discoid, and clustered in corymbose racemes (Image 1B). Florets are about 2cm long, pale-white, corolla tube long, limb five-toothed and pappus hair pale-white. Outer involucre bracts are lanceolate with spreading erect or recurved spines; inner bracts dilated, lanceolate-ovate and incurved near the apex (Image 1C).

During recent field explorations in the Benog Wildlife Sanctuary, a total of 62 species and subspecies of butterflies belonging to 45 genera and five families foraging on Cirsium wallichii for nectar were documented (Table 1 and Images 2–5). The species assemblage includes Nymphalidae (35.5%), Hesperiidae (22.6%), Lycaenidae (17.7%), Pieridae (16.1%) and Papilionidae (9.7%). Among the recorded butterflies, five species such as Aporia agathon, Gonepteryx rhamni, Celaenorrhinus munda, Vanessa cardui, and Vanessa indica frequently visited the flowers for nectar while Pontia daplidice and Callerebia nirmala were recorded only once visiting the flowers. We also observed Vanessa cardui (Nymphalidae) utilizing C. wallichii as a larval host plant. During the study period, C. wallichii was the only species that attracted diverse butterfly species.

Cirsium has been studied in terms of nectar source by several workers such as Robertson (1928) who reported 14 species of Lepidoptera foraging on C. vulgare, eight species on C. altissimum and nine species each on C. discolor and C. pumilum. Thirty-three pollinators including 15 species of butterflies visiting C. verutum have been reported from the western Himalaya (Kapkoti et al. 2016). Although, it is used as a medicinal plant by the tribal people of the Himalaya (Uniyal et al. 2011), C. wallichii has never been reported as an important forage. The present communication highlights the importance of C. wallichii as a key nectar source for a large number of butterfly species though the plant is considered as a weed. The visits of several species of butterflies to C. wallichii could be attributed to the
Image 2. Butterfly species visiting Cirsium wallichii: A—Celaenorrhinus dhanada | B—Seseria dohertyi | C—Lobocla lillana | D—Celaenorrhinus mundu | E—Aeromachus stigmata | F—Pedesta masuriensis | G—Potanthus dara | H—Notocrypta feisthamelli | I—Polytremis discrete | J—Parnara sp. | K—Celastrina huegelli | L—Chilades pandava. © Bitupan Boruah.
Image 3. Butterfly species visiting *Cirsium wallichii*. A—Rapala manea | B—Lycaena phlaeas | C—Heliophorus sena | D—Spindasis nipalicus | E—Deudorix epijarbas | F—Lampides boeticus | G—Belenois aurota | H—Pontia daplidice | I—Gonepteryx rhamni | J—Pieris brassicae | K—Aporia leucodice | L—Colias fieldii. © Bitupan Boruah.
Image 4. Butterfly species visiting *Cirsium wallichii*: A—*Colias erate* | B—*Aporia agathon caphusa* | C—*Aporia agathon agathon* | D—*Papilio bianor* | E—*Graphium agamemon* | F—*Graphium sarpedon* | G—*Graphium cloanthus* | H—*Papilio protenor* | I—*Danaus genutia* | J—*Parantica aglea* | K—*Argynnis childreni* | L—*Lasionmata schakra*. © Bitupan Boruah.
Image 5. Butterfly species visiting Cirsium wallichii: A & B—Vanessa cardui | C—Ypthima nareda | D & E—Argynnis hyperbius | F—Aglais caschmirensis | G & H—Vanessa indica | I—Callerebia annada caeca | J—Callerebia nirmala | K & L—Euploea mulciber. © Bitupan Boruah.
Cirsium wallichii - key nectar source of butterflies

Boruah et al.

C. wallichii indicates that there is a need for further studies to understand the role of C. wallichii in sustaining butterfly diversity at landscape level during summer season.

References

Baker, H.G. & I. Baker (1983). Floral nectar sugar constituents in relation to pollinator type, pp. 117–141. In: Jones, C.E. & R.J. Little (eds.). Handbook of Experimental Pollination Biology: Scientific and Academic Editions, New York, 558pp.

Champion, H.G. & S.K. Seth (1968). A Revised Survey of Forest Types of India. Govt. of India Press, Delhi, 404pp.

Courtney, S.P. (1986). The ecology of pierid butterflies: dynamics and interactions. Advances in Ecological Research 15: 51–131.

Evans, W.H. (1932). Identification of Indian Butterflies 2nd edition. Bombay Natural History Society, Bombay, 464pp.

Kapkoti, B., R.K. Joshi & R.S. Rawal (2016). Thistle (Cirsium verutum): An important forage for pollinators in Kumaun, West Himalaya. National Academy Science Letters 39(5): 395–399. https://doi.org/10.1007/s10745-016-0501-x

Kehimkar, I. (2016). Butterflies of India. Bombay Natural History Society, Mumbai, 528pp.

Kitahara, M., M. Yamoto & T. Kobayashi (2008). Relationship of butterfly diversity with nectar plant species richness in and around the Aokigahara primary woodland of Mount Fuji, Central Japan. Biodiversity and Conservation 17(11): 2713–2734. https://doi.org/10.1007/s10531-007-9265-4

Kumar, A., M. Mitra, G. Singh & G.S. Rawat (2012). An inventory of the flora of Binog Wildlife Sanctuary, Mussoorie, Garhwal Himalaya. Indian Journal of Fundamental and Applied Life Sciences 2(1): 281–299.

Kunte, K. (2000). India – A Lifescape: Butterflies of Peninsular India. Universities Press, Hyderabad, 254pp.

Mabberley, J.D. (2008). Mabberley’s Plant Book: A Portable Dictionary of Plants, their Classification and Uses 3rd edition. Cambridge University Press, UK, 1102pp.

Mukherjee, S., S. Banerjee, P. Basu, G. Saha & G. Aditya (2015). Lantana camara and butterfly abundance in an urban landscape: benefits for conservation or species invasion? Ekológia (Bratislava) 34(4): 309–328. https://doi.org/10.1515/eko-2015-0029

Murphy, D. & B.A. Wilcox (1986). Butterfly diversity in natural habitat fragments: a test of the validity of vertebrate-based management, pp. 287–292. In: Verner, J., M. Morrison & C.I. Ralph (eds.). Wildlife 2000, Modelling Habitat Relationships of Terrestrial Vertebrates. University of Wisconsin Press, Madison, 470pp.

Nimbalkar, R.K., S.K. Chandekar & S.P. Khunte (2011). Butterfly diversity in relation to nectar food plants from Bhor Tahsil, Pune District, Maharashtra, India. Journal of Threatened Taxa 3(3): 1601–1609. https://doi.org/10.11609/JoTT.o2612.1601-9

Raju, A.J.S., A. Bhattacharya & S.P. Rao (2004). Nectar host plants of some butterfly species at Visakhapatnam. Scientific and Culture 70 (4–5): 187–190.

Raju, A.J.S., K.V. Ramana & P.V. Lakshmi (2011). Wendlandia tinctoria (Roxb.) DC. (Rubiaceae), a key nectar source for butterflies during the summer season in the southern Eastern Ghats, Andhra Pradesh, India. Journal of Threatened Taxa 3(3): 1594–1600. https://doi.org/10.11609/JoTT.o2503.1594-600

Robertson, C. (1928). Flowers and insects: Lists of Visitors of Four Hundred and Fifty-Three Flowers. The Science Press Printing Company, Lancaster, PA, 221pp. https://doi.org/10.5962/bhl.title.11538

Sahli, R., C. Rivière, C. Dulfoer, C. Beauflay, C. Neut, J. Ber, T. Hennebelle, V. Roumy, R. Ksouri, J. Quetin-Leclercq & S. Sahpaz (2017). Antiproliferative and antibacterial activities of Cirsium scabrum from Tunisia. Evidence-Based Complementary and Alternative Medicine 2017: 1–9. https://doi.org/10.1155/2017/7247016

Touker, J.F., P.F. Reagel & L.M. Hanks (2002). Nectar sources of day-flying Lepidoptera of central Illinois. Annals of Entomological Society of America 95(1): 84–96.

Uniyal, S.K., V. Sharma & P. Jamwal (2011). Folk medicinal practices in Kangra District of Himachal Pradesh, Western Himalaya. Human Ecology 39(4): 479–488. https://doi.org/10.1007/s10745-011-9396-9
Elevational pattern and seasonality of avian diversity in Kaligandaki River Basin, central Himalaya

Species diversity and feeding guilds of birds in Malaysian agarwood plantations

Evaluating performance of four species distribution models using Blue-tailed Green Damner Anax guttatus (Insecta: Odonata) as model organism from the Gangetic riparian zone

Butterfly species richness and diversity in rural and urban areas of Sirajganj, Bangladesh

Chroococcalean blue green algae from the paddy fields of Satara District, Maharashtra, India

A highway to hell: a proposed, inessential, 6-lane highway (NH173) that threatens the forest and wildlife corridors of the Western Ghats, India

First distributional record of the Lesser Adjutant Leptoptilos javanicus Horsfield, 1821 (Ciconiiformes: Ciconiidae) from Sindhuli District, Nepal

First record of African Sailfin Flying Fish Parexocoetus mento (Valenciennes, 1847) (Beloniformes: Exocoetidae), from the waters off Andaman Islands, India

A rare camera trap record of the Hispid Hare Caprolagus hispidus from Dudhwa Tiger Reserve, Terai Arc Landscape, India

First distributional record of two endemic plant species, Euphorbia kadapensis DC. (Asteraceae): a new record for the flora of Haryana, India

New distribution record of the Lesser Adjutant Leptoptilos javanicus (1847) (Ciconiiformes: Ciconiidae) from Sindhuli District, Nepal

A frog that eats foam: predation on the nest of Polypedates sp. (Rhacophoridae) by Euphlyctis sp. (Dicroglossidae)

First distribution record of the Indian Peacock Softshell Turtle Nilssonia hurum (Gray, 1830) (Testudines: Trionychidae) from Mizoram, India

Caprolagus hispidus – A rare camera trap record of the Hispid Hare

Contribution to the macromycetes of West Bengal, India: 63–68

Notes

Review on the macromycetes of West Bengal, India: 63–68

New distribution record of two endemic plant species, Euphorbia kadapensis DC. (Asteraceae): a new record for the flora of Haryana, India

Addendum

Erratum and addenda to the article ‘A history of primatology in India’