

## Forage plants and resources of solitary bee *Icteranthidium saltatore* (Nurse) [Hymenoptera, Apoidea, Megachilidae, Anthidiini] in the thar desert of Rajasthan, India

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### Abstract

A study was conducted from February 2018 to March 2023 in the five districts of the Western Rajasthan to explore the foraging plants of solitary bee *Icteranthidium saltatore* (Nurse) in the Thar desert of Rajasthan, India. A total 16 plant species were recorded belonging to 8 different families of which maximum visitation was found on Fabaceae (5) followed by Amaranthaceae (2), Asclepiadaceae (2), Asteraceae (2), Compositae (2), Acanthaceae (1), Boraginaceae (1) and Capparidaceae (1). In our survey we found that was maximum foraging activity of *Icteranthidium saltatore* (Nurse) was in the month of September. The study also details the type of forage collected (Nectar and pollen). The study provides first-time information of Polylectic nature of wild solitary bee *Icteranthidium saltatore* (Nurse) from the Great Indian desert of Thar.

**Keywords:** foraging plants, Thar desert, solitary Bee, polylectic, *Icteranthidium saltatore*, nectar, pollen

### Introduction

*Icteranthidium saltatore* (Nurse) has been included in the tribe Anthidiini under family Megachilidae, superfamily Apoidea of order Hymenoptera. There are species of the genus *Icteranthidium* that are heavily or predominantly yellow, form similar to *Dianthidium*, and size variable. *Icteranthidium* is found in a variety of places, including northern Kenya, southern Europe (north to Hungary), northern Africa (south in the Sahel to Senegal, Mali, and Chad), Morocco, Portugal and southeast to Baluchistan in Pakistan. Approximately 25 species are found worldwide (Michener, 2007; Niu, Yuan and Zhu, 2020) [6, 7]. In India the genus of *Icteranthidium* Michener (1948) [7] has only two representative species *Icteranthidium sinapinum* (Cockll.) and *Icteranthidium saltatore* (Nurse). The Thar Desert has an arid and semi-arid ecosystem and has a diversified xeric endemic flora of great economical and medicinal importance. The blooming of flowers creates a favourable condition for Bees to forage on these plants for pollen, nectar and other forage resources. Earlier the potential role of *Icteranthidium saltatore* (Nurse) as an effective pollinator of *Prosopis cineraria* was reported on by Gorain *et al.* (2013) [3]. More ever similar such observation has been found in weed *Trichodesma amplexicaule* Roth, in the Thar desert of western Rajasthan by Kachhawa *et al.*, (2021) [5]. The Intensive study has been conducted from the beginning of 2018 to winter 2023 in the selected sites of the Thar desert to observe the flowering plants foraged by *Icteranthidium saltatore* (Nurse).

### Materials and methods

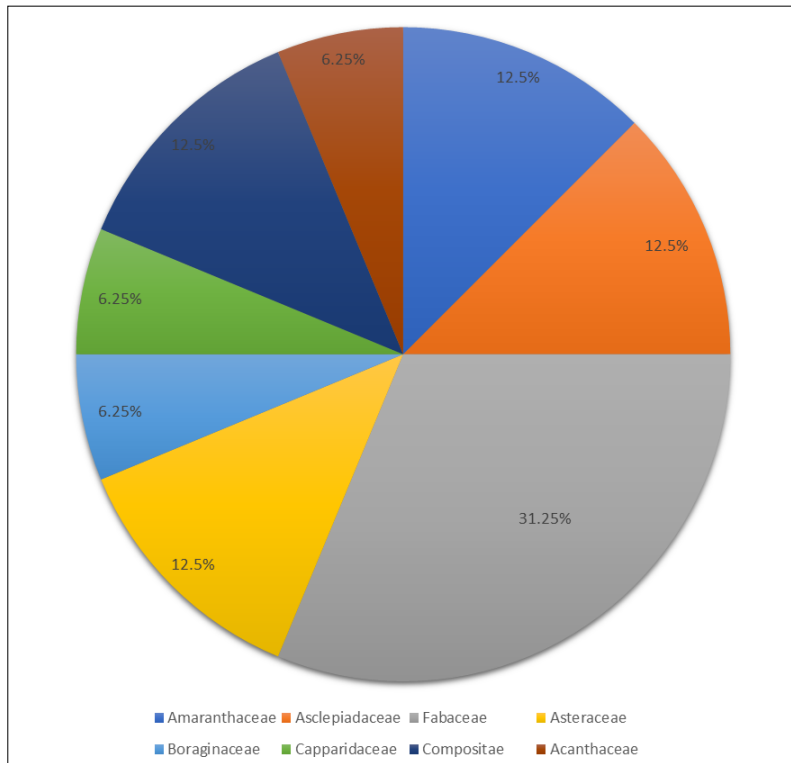
The study was conducted in the Thar desert which spreads to Jodhpur, Bikaner, Barmer and Jaisalmer districts. Its northern and eastern ranges extend upto Sriganganagar, Hanumangarh, Churu, Sikar, Jhunjhnoo, Jalore and Pali districts of Rajasthan, which is located in the Northwestern part of India with a Latitude of 27.469489 and the longitude is 70.621679 at an altitude of 481m above from sea level. The annual rainfall is 100 to 500 mm and the average temperature in the desert ranges between 45-50 degrees Celsius in summers. The biome of The Thar desert is Desert

and xeric shrublands. Due to the harsh xeric environments, it has lower angiosperm diversity than other places.

Field observations were conducted to record the foraging plants visited by *Icteranthidium saltatore* (Nurse) in different flowering periods. Observation were taken twice a week, in the morning 7:00 AM to evening 6:00 PM from February 03, 2018 to December 26, 2023. Bees were collected from different flowerings by the hand-sweeping net. Forage collections were determined by making direct observations on the flowerings of various plants. The collected Bees were trapped, immediately stored in an ethyl acetate insect-killing bottle in the field and were brought to the laboratory where they were carefully examined under the stereo-zoom microscope to confirm the forage collection. Frequently, the pollen loads were carefully separated using water dropped on a slide and the isolated pollen was compared with that of different flowers to confirm the species of the plant.

### Result

Present study observes on the forage plants of *Icteranthidium saltatore* (Nurse) in the Thar desert of Rajasthan. A total of 16 bee foraging plant species were identified. The identified plant species belonged to 8 different families like Fabaceae (5), Amaranthaceae (2), Asclepiadaceae (2), Asteraceae (2), Compositae (2), Acanthaceae (1), Boraginaceae (1) and Capparidaceae (1) (Table 1). Foraging plant species contributed maximum in Fabaceae (31.25%), Followed by Amaranthaceae (12.5%), Asclepiadaceae (12.5%), Asteraceae (12.5), Compositae (12.5), Acanthaceae (6.25%), Boraginaceae (6.25%), and Capparidaceae (6.25%) (Fig.1). Present studies reveal *Icteranthidium saltatore* (Nurse) prefers vegetable crops like *Capparis decidua* (Forsk.) Edgew, wild crop like *Digera muricata* (L.) Mart., weed crops like *Calotropis procera* (Ait.) R. Br, *Crotolaria burhia* Buch-Ham, *Cleome viscosa* L., *Prosopis cineraria* (L.) Druce etc. and flower crops like *Tagetes cult*, *Tagetes patula* L. as its floral resources. According to the present study, bee sources of forage included 14 plant species that provided pollen and nectar, while only 2 plant species provided nectar (Table 1).



**Fig 1:** Percent wise contribution of Foraging Plants of *Icteranthisdium saltatore* (Nurse)

**Table 1:** Forage Plants of *Icteranthisdium saltatore* (Nurse).

S.N.	Plant species	Local name	Family	Habit	Flowering period	Flower colour	Forage collected
							P / N
1	<i>Boerhavia diffusa</i> Linn.	Biskhapara	Amaranthaceae	Perennial Herb	January -April	Pinkish	P+N
2	<i>Calotropis procera</i> (Ait.) R. Br	Aakda	Asclepiadaceae	Shrub	Almost throughout the year	Whitish outside; inside purplish tips	N
3	<i>Cleome viscosa</i> L.	Bagra	Fabaceae	Annual herb	July-Oct.	Yellow	P+N
4	<i>Crotolaria burhia</i> Buch-Ham.	Saniya	Fabaceae	Under - Shrub	December-April	Yellow	P+N
5	<i>Dactyliandra welwitschii</i> Hook	Ankphu - tamani	Acanthaceae	Perennial	August-November	White	P+N
6	<i>Digera muricata</i> (L.) Mart	Chanchali	Amaranthaceae	Annual Herb	August -September	Pink to carmine or Red	P+N
7	<i>Leptadenia pyrotechnica</i> (Forsk.) Decne	Khimp	Asclepiadaceae	Shrub	Aug-Dec.	Yellow	N
8	<i>Pulicaria angustifolia</i> DC	Soneli	Asteraceae	Annual Herb	Sept-Dec.	Dull yellowish	P+N
9	<i>Tephrosia purpurea</i> (L). Pers.	Sarphonk	Fabaceae	Herb	July-Dec.	Purple	P+N
10	<i>Verbesina encelioides</i> (Cav.) Benth.	Golden Crownbear	Asteraceae	Under - shrubs	Oct-Feb.	Yellow	P+N
11	<i>Prosopis cineraria</i> (L.) Druce	Khejri	Fabaceae	Tree	November-May	Yellow-green; Creamy-white	P+N
12	<i>Trichodesma amplexicaule</i> Roth.	Chhota kalpa	Boraginaceae	Annual herb	Aug-Dec.	Pinkish Blue	P+N
13	<i>Capparis decidua</i> (Forsk.) Edgew	Kair	Capparidaceae	Shrub	April-May.	Red or Scarlet	P+N
14	<i>Crotolaria medicaginea</i> Lamk.	Gulabi	Fabaceae	Small Perennial herb	Sept-Octo.	Yellow	P+N
15	<i>Tagetus cult</i>	Genda	Compositae	Annual Herb	Feb to April	Yellow	P+N
16	<i>Tagetus patula</i> L	Makhmali genda	Compositae	Annual Herb	July-October.	Shades of yellow, orange and brown	P+N

## Discussion

The study observed family Fabaceae was the most visited plant species followed by Asteraceae, Amaranthaceae, Asclepiadaceae and Compositae. This may be due to the small size of the flowers and quantity that are easily accessible to the bee. Also, the majority of them provides floral rewards like pollen and nectar. In plant family Asclepiadaceae bees visited only for Nectar and resins. Our study also observed that bee species are more attracted to yellow flowerings. We also found that the maximum number of visits by bees was done in the month of September (Table 1). Similar work has been done by different authors (Gupta, 2011) <sup>[2]</sup> studied 30 plant species that are a useful resource of forage in *Tetragonula iridipennis* (Smith). A study revealed that 41 plants are Nectar yielders, 31 are pollen yielders and 182 yields both Nectar and pollen (Hemalatha *et al.*, 2018) <sup>[4]</sup>. According to Gadhiya's report (2015) <sup>[15]</sup>, *Tetragonula laeviceps* visits 34 different plant species like vegetable crops, fruit crops, oil seed crops, pulse crops, weed crops, ornamental crops etc. Vamshikrishna *et al.* (2021) <sup>[8]</sup> recorded a total of 30 foraging plants species of *Tetragonula* sp.

This study is the first step ever to find out forage plants and floral resources of solitary wild bee *Icteranthidium saltatore* (Nurse) from the Great Thar desert of India.

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