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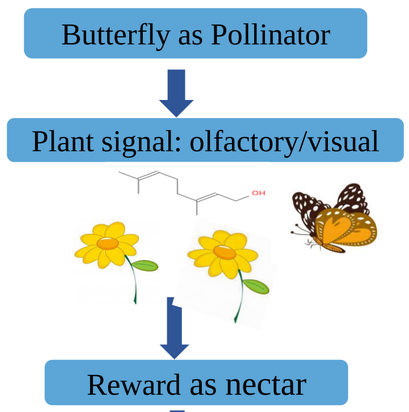
Pollination ecology of butterflies in tropical plants of Western Ghats of India

Pratiksha Mestry*[1], Shivani Kulkarni[2], Tejaswini Pachpor[3], Ankur Patwardhan[1,2]

[1]Research and Action in Natural Wealth Administration (RANWA), 16 Swastishree Society, Ganeshnagar, Kothrud, Pune - 411052, Maharashtra, India.
[2]Annasaheb Kulkarni Department of Biodiversity, M.E.S. Abasaheb Garware College, Pune-411004, Maharashtra, India
[3]Department of Bioscience and Technology, Dr Vishwanath Karad's MIT World Peace University, Pune-411038, Maharashtra, India

Introduction :

- Butterflies are good indicators of climate change, their role in pollination remains underexplored
- Pollinator visits to flowers are guided by various factors such as nectar, colour, pollen, etc.
- Nearly 90% of flowering plants – animal-pollinated, 75 % of the world's food crops – insect-pollinated
- Plant pollinators – 56% (bees and wasps), 11% (butterflies and moths), 10% (flies), 3% (beetles), 12% (birds), and 8% (wind-pollinated) (Sanchez, 2019).



Objectives :

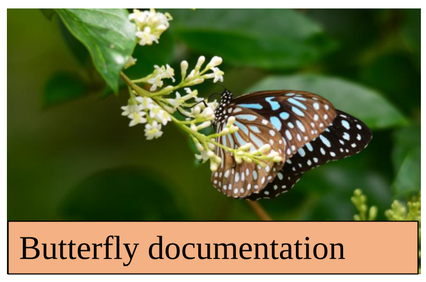
1. To document the butterfly visitors of all the plant species that are encountered
2. To study the pollen morphology of flowering species that are visited by butterflies
3. To study the Standing Nectar Crop of all the plant species

Approach :

- Baseline survey for the selection of plant species
- Documentation of floral visitors
- Identification of plants for the detailed study
- Nectar collection by specific time intervals

Methodology: Field surveys, butterfly documentation, nectar collection, pollen grain collection, Scanning Electron Microscopy (SEM).


Field surveys

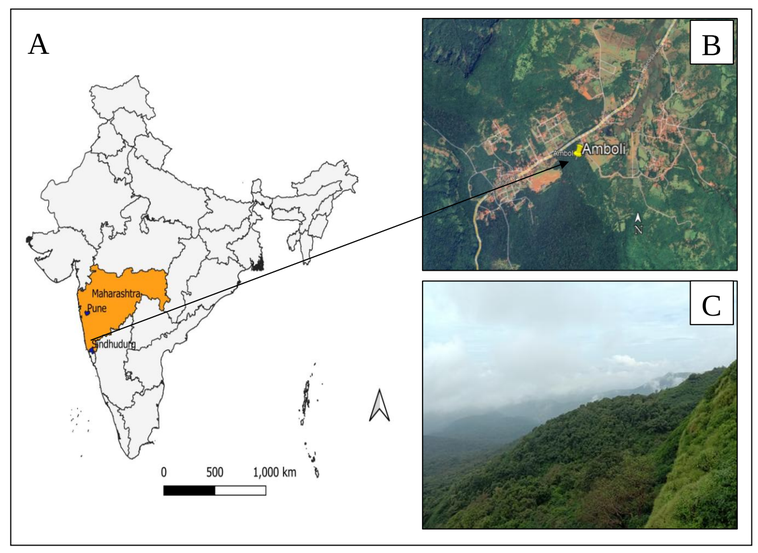

Butterfly documentation


Pollen grain collection


Nectar collection

Study Area :

Location – Northern Western Ghat (Global Biodiversity Hotspots)
Area – Amboli in Sindhudurg District, Maharashtra, India



A. India Map; B. Study Area; C. Evergreen Forests of Amboli

Findings: 23 Plant species were encountered, which recorded more than 91 butterfly visitors.

Table 1. Top 10 plant species with the highest number of butterfly visitors

Sr. No.	Plant name	No. of Butterfly Visitors
1	*Ligustrum robustum subsp. Perrottetii*	56
2	*Mappia nimmoniana*	44
3	*Leea indica*	31
4	*Wendlandia thyrsoidea*	16
5	*Persicaria chinensis*	11
6	*Clerodendrum infortunatum*	6
7	*Cynarospermum asperrimum*	4
8	*Psydrax diococcus*	4
9	*Crotalaria retusa*	4
10	*Hygrophila serpyllum*	4

Fig 1. Butterfly diversity across Families

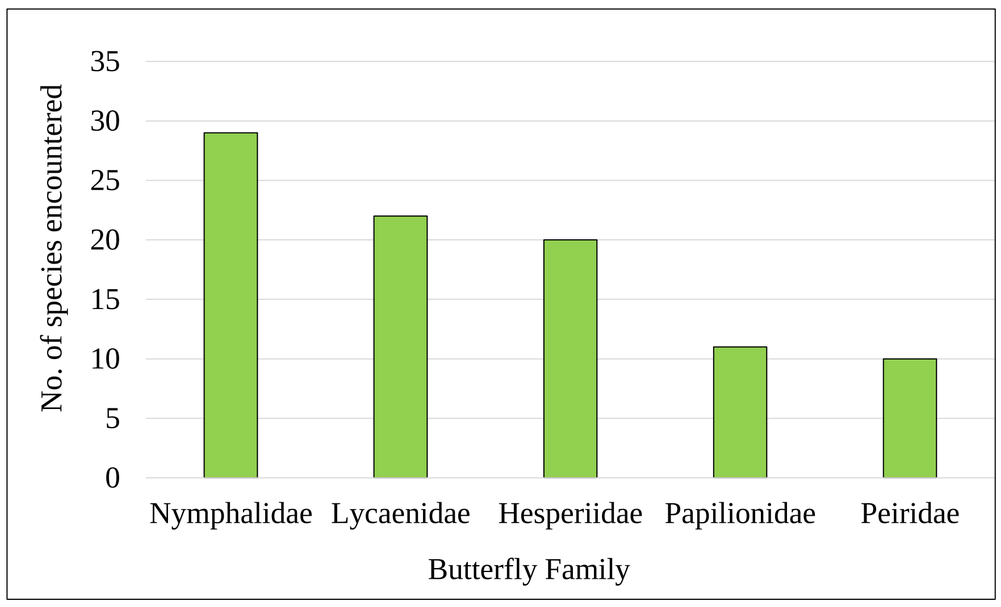


Table 2. Floral attributes of plant species studied

Flower Morphology		Total No. of species
Floral Symmetry	Actinomorphic	15
	Zygomorphic	8
Floral type	Brush or Head	4
	Dish to Bowl	6
	Flag	1
	Gullet	6
	Tube	6
Sexual Organs	Exposed	17
	Concealed	6
Flower colour	Blue	4
	Bluish white	1
	Orange	1
	Pink	1
	White	13
	White & Yellow	1
	Yellow	1
	Yellowish green	1

Fig 2. Bipartite Network for plants and butterfly visitors

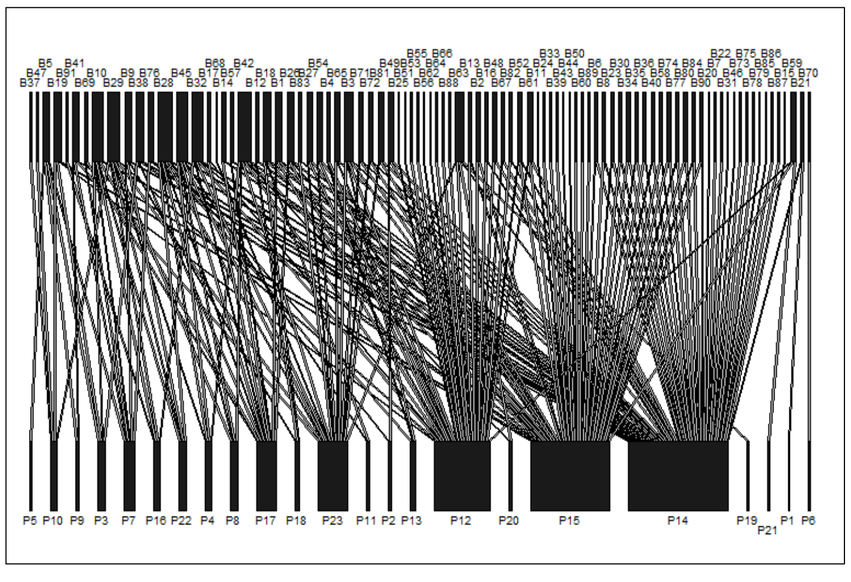
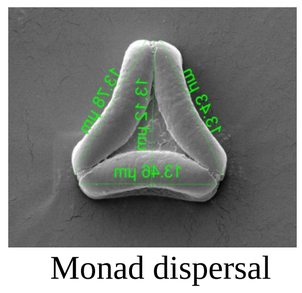


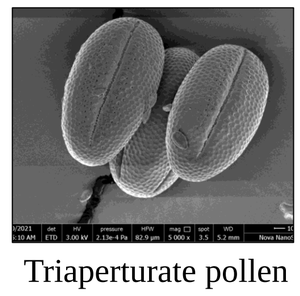
Table 3. Top 10 species with maximum nectar quantity

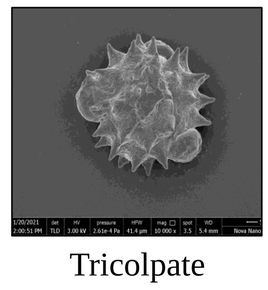
Sr. No.	Plant Species	Avg. nectar per flower (µl)
1	*Syzygium hemisphericum*	13.7
2	*Justicia santapaui*	10.06
3	*Catunaregum spinosa*	9.34
4	*Crotalaria retusa*	8.4
5	*Carissa spinarum*	4.27
6	*Syzygium zeylanicum*	2.014
7	*Eranthemum roseum*	1.87
8	*Mappia nimmoniana*	1.37
9	*Clerodendrum infortunatum*	1.36
10	*Psydrax dicoccos*	1.27

Pollen morphology: 12 species showed a monad dispersal unit. Triaperturate pollens were the most common type, with a tricolpate aperture condition

Fig 3. Representative pollen grain structure


Monad dispersal unit


Triaperturate pollen


Tricolpate condition

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