

Pollinators of Pentas Lanceolata, Kalasamala, Kerala, South India

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ABSTRACT

The host plant, *Pentaslanceolata*, constitutes 77% of complete pollinators. We observed and labored out a total of 536 visits to this host plant. *Oecophyllasmaragdina* had 218 visits with more affinity, *Papiliodemoleus* (198), *Tirumalaseptentrionis* (177), and *Euploea core* (159). We recorded the top pastimes between 8.30 hours and 12.30 hours. 75% of the traveling endeavor finished for the duration of this period. Among the found foragers, the majority were *E.core*, *P.demoleus*, *T.septentrionis*, and *P.polytes* having two top intervals of vigorous visits. (9.30 hours in the morning session and 14.30 hours in the afternoon session). *Junoniaatlites* were active all through early morning up to 9.00 hours and in the night after 17.00 hours. Among bees species, *Amegilla* sp. and *Megacampsomerisgrossa* confirmed a single height as energetic throughout the morning hours.

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Introduction

Pollination is the most vital and beneficial exercise of the insects. There is a range of insect-pollinators taking section in pollination employing without delay or indirectly. Diptera, Coleoptera, Hymenoptera, Lepidoptera, and several small insect corporations have increased variants in pollination methods. Pollinators' adversity indicated the neighborhood extinctions and restriction of pollinators. Insufficient pollination ensured the productiveness in the crop yield. In India, Kerala is unique and broadly identified as a biodiversity hotspot area. Despite the diversity in flora and fauna, the data of insect pollinators in relation to vegetation and their ecology is scanty and fragmentary. In Kerala, few tries have been made for the exploration of the insect pollinators of specific plants and to apprehend their ecological requirements. Many researchers studied the insect pollinators of Teak, the butterflies traveling flower heads of *Terminalia paniculata* in Kerala and some studied the nectar useful resource utilization of butterflies in the Palani Hills, Tamil Nadu^{1, 4 & 5}. The study is an attempt to document the insect pollinators and their foraging pattern in backyard plant *Pentas lanceolata* in Kalasamala, Thrissur District of Kerala.

Materials and Methods

Study Area

The investigation has done out at picked domestic nurseries of Kalasamala, in Thrissur District. The territory has a tropical sticky nearby climate with an abusive warm season and abundant occasional precipitation. The warm season used to be from February to May found through the southwest storm from June to September. The neighborhood affords a remarkable habitat for the insect fauna, with vegetation of flowering plants, herbs, shrubs; timber intermingled with

coconut palms, and banana plantations alongside paddy fields. We monitored the insect pollinators in many cases and recorded their traveling pattern. We captured the photographs with the help of the Canon 520 digital camera. The pollen on the physique of the insect, Magnus stereo zoom binocular microscope was focused once as soon as used. The team saved the accumulated bugs in entomological bins for similar fashion studies. For pollination studies, we chose six flower-bearing flowers of *Pentas lanceolata*. From 6.30 a.m - 6.30 p.m, we documented the pollinators traveling the inflorescence. For each visit, we noted the time spent on the inflorescence, and variety of species touring the flower. The identification and specification of the species on regular observations were recorded. We collected the samples of pollinating bugs with the use of a sweep net and examined the pollen under a microscope. The bugs collected were later preserved for confirming their identity. The gathered insect specimens and diagnosed with the aid of the capacity of referring to literature, museum specimens, and with the assistance of experts.

Results and Discussion

A whole of eight species belonging to two orders and five households had been recognized as the insect pollinators *P. lanceolata*. Of these, five species belonged to Lepidoptera and the final three species to *Hymenoptera*. Butterflies had been dominant, constituting seventy-six species of complete pollinators recorded in this study. The foraging of the pollinators labored about by visiting 1532 times on these flowers.

Foragers of *Pentas lanceolata*

We recorded about eight species of foragers in *P. lanceolata* (Figure 1 and 2). Among these, three species

belonged to the order Hymenoptera and the last five species belonged to order Lepidoptera.

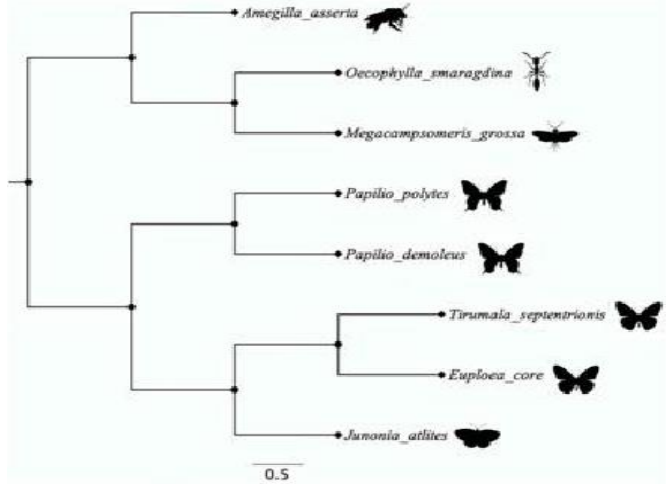


Figure 1. Foragers of pentas lanceolata.



Figure 2. Pictures of the foragers in Pentas lanceolata from study area.

Pentas lanceolata had a complete of 1084 insect visits (Figure -3). Among exclusive bugs, O. smaragdina confirmed most affinity for this flower (214 visits) observed by using Papilio demoleus (188).

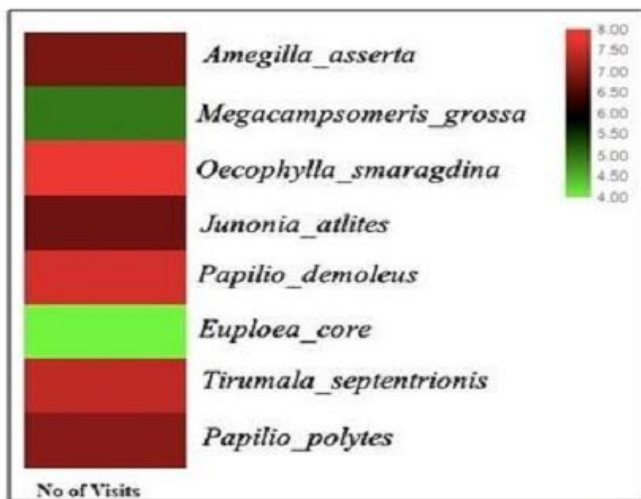


Figure 3. Graph showing the Number of Foragers visits.

The six different pollinators such as Ameigilla asserta (111), Papilio polytes (123), Junonia atlites (104), Euploea core (149), and T. septentrionis (167) had records from P. lanceolata. M. grossa established the least affinity (28 visits) for these plant lifestyles.



Figure 4. Pentas Lanceolata as Nectar Plant

Pentas lanceolata is a house plant, locally called as Egyptian starcluster, which is grown as an herbaceous perennial. It comes under family Rubiaceae, has rapid growth rate in summer. Flower size is 1- 3 inches, star shaped and tubular. Different colours of pink, lavender, red, purple, burgundy, white are observed (Figure 4).

O. smaragdina tested most affinity for this flower (218) and, the top project recorded at 9.30 hours (60 visits). During the afternoon, they have been much less active. P. demoleus (190) used to be the 2nd most sizeable pollinator of Pentas lanceolata and proven two exceptional peaks of exercising at 9.30 hours (33) and 14.30 hours (29).

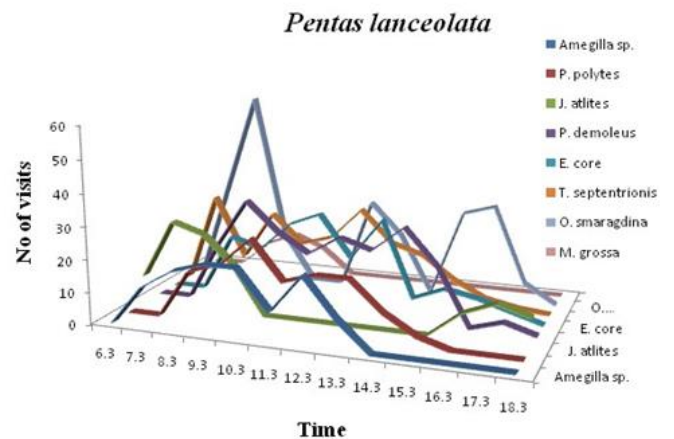


Figure 5. Insect pollinators and their foraging intensity in P. lanceolata.

Similarly, most different species like E. core, T. septentrionis, and P. polytes confirmed two peaks of activity. Ameigilla asserta positioned up to 13.30 hours with pinnacle recreation than midday while, M. grossa verified a single top and total lively at some stage in the morning hours (8.30 to 10.30 hours). J. atlites demonstrated two extremely active periods; one during early morning and the difference in the direction of evening (Figure 5). Three species of Hymenopterans together constituted about 32.6% of the complete insect foraging in this plant.

Conclusion

Based on 1532 visits carried out on the plant existence of P. lanceolata, the foraging sample of eight insect pollinators used to be as soon as recorded. For most pollinators, the most energetic time for foraging was in the course of the morning hours with, about seventy-two percent of pastime determined at some factor of this period. The pollinators perceived to parcel the valuable asset each spatially and transiently to avoid the resistance³.

The foraging sample found right here would possibly be a mechanism of aid partitioning amongst the pollinators. Among the variety of pollinators recorded here, most of the butterflies were frequent whereas, Hymenoptera exists in comparatively low numbers (23%). Besides, the vegetation of *P. lanceolata* can also be extra adaptable to butterflies than to bees. Accessibility of food assets, flower test, and botanical science are the components making sense of the dispersion and endurance of the scope of pollinators in a one of a kind plant². The findings explain the nectar and pollen utilization by using eight species of insect pollinators on *P. lanceolata*. However, we need distinct future research in aid utilization, host variations, and ecological necessities of these pollinators in the international crisis. As most species of the angiosperms rely on pollinators for their survival, the neighborhood deserves safety, and their conservation has high importance.

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Appendix
Table 1

BUTTERFLIES RECORDED IN THE DIFFERENT HABITATATS OF STUDY AREA										
SL.NO.	FAMIL Y	SCIENTIFIC NAME	COMMON NAME	IUCN WPA ACT (1972)	G1	G2	G3	G4	G5	STATU S
1	NY	<i>Acraea terpsicore</i> (Linnaeus, 1758)	Tawny Coster		√		√			R
2	NY	<i>Athyma perius</i> (Linnaeus, 1758)	Common Sergeant		√		√		√	UC
3	NY	<i>Athyma ranga</i> Moore, [1858]	Blackvein Sergeant	SCII		√	√		√	UC
4	NY	<i>Charaxes bharata</i> C. & R. Felder, [1867]	Indian Nawab		√	√	√	√	√	C
5	NY	<i>Charaxes solon</i> (Fabricius, 1793)	Black Rajah		√	√		√	√	C
6	NY	<i>Cirrochroa thais</i> (Fabricius, 1787)	Tamil Yeoman		√	√	√	√	√	C
7	NY	<i>Cupha erymanthis</i> (Drury, [1773])	Rustic		√	√	√	√	√	C
8	NY	<i>Danaus chrysippus</i> (Linnaeus, 1758)	Plain Tiger		√		√		√	UC
9	NY	<i>Danaus genutia</i> (Cramer, [1779])	Striped Tiger		√		√		√	UC
10	NY	<i>Elymnias hypermnestra</i> (Linnaeus, 1763)	Common Palmfy		√	√	√	√	√	C
11	NY	<i>Euthalia aconthea</i> (Cramer, [1777])	Common Baron	SCII	√	√	√	√		UC
12	NY	<i>Hypolimnas bolina</i> (Linnaeus, 1758)	Great Egg fly				√		√	R
13	NY	<i>Hypolimnas misippus</i> (Linnaeus, 1764)	Danaid Eggfly	SCII	√	√	√	√	√	C
14	NY	<i>Euploea core</i> Linnaeus, 1758)	Common Indian Crow	SCII		√	√	√	√	C
15	NY	<i>Idea malabarica</i> (Moore, 1877)	Malabar Tree-Nymph		√	√			√	UC
16	NY	<i>Junonia almana</i> (Linnaeus, 1758)	Peacock Pansy			√	√	√	√	UC
17	NY	<i>Junonia atlites</i> (Linnaeus, 1763)	Grey Pansy		√	√	√		√	C
18	NY	<i>Junonia hierta</i> (Fabricius, 1798)	Yellow Pansy		√		√		√	UC
19	NY	<i>Junonia iphita</i> (Cramer, [1779])	Chocolate Pansy		√		√		√	UC
20	NY	<i>Junonia lemonias</i> (Linnaeus, 1758)	Lemon Pansy			√	√		√	UC
21	NY	<i>Junonia orithya</i> (Linnaeus, 1758)	Blue Pansy			√	√	√	√	UC
22	NY	<i>Kallima horsfieldii</i> (Kollar, [1844])	Sahyadri Blue Oakleaf			√	√		√	UC
23	NY	<i>Libythea myrrha</i> Godart, 1819	Club Beak			√	√	√	√	UC
24	PAP	<i>Graphium paphus</i> (de Nicéville, 1886)	Swordtail		√	√	√	√	√	C
25	PAP	<i>Graphium agamemnon</i> (Linnaeus 1758)	Tailed ijay							
26	PAP	<i>Graphium sarpedon</i> (Linnaeus, 1758)	Common iBluebottle			√	√		√	UC
27	PAP	<i>Pachliopta aristolochiae</i> (Fabricius 1775)	Common Rose		√		√		√	UC
28	PAP	<i>Pachliopta hector</i> (Linnaeus, 1758)	Crimson Rose Threatened	Threat	√	√		√	√	C
29	PAP	<i>Papilio demoleus</i> Linnaeus, 1758)	Lime Swallowtail		√	√	√		√	C
30	PAP	<i>Papilio helenus</i> Linnaeus, 1758)	Red Helen Threatened	Threat			√		√	R
31	PAP	<i>Papilio liomedon</i> Moore, [1875]	Malabar Banded Swallowtail		√		√		√	UC
32	PAP	<i>Papilio memnon</i> Linnaeus, 1758)	Great Mormon			√	√		√	UC
33	PAP	<i>Papilio polymnestor</i> Cramer, 1775)	Blue imormone			√		√	√	UC
34	PAP	<i>Papilio polytes</i> Linnaeus, 1758	Common			√	√		√	UC

)	Mormon							
35	PAP	<i>Troides minos</i> (Cramer, [1779])	Sahyadri Birdwing			√		√	√	UC
36	PIR	<i>Appias albina</i> (Boisduval, 1836)	Common Albatross		√		√		√	UC
37	PIR	<i>Appias indra</i> (Moore, [1858])	Plain Puffin		√	√	√	√	√	C
38	PIR	<i>Appias libythea</i> (Fabricius, 1775)	Western Striped Albatross			√	√		√	UC
39	PIR	<i>Appias lyncida</i> (Cramer, [1777])	Chocolate Albatross	SCII	√		√		√	UC
40	PIR	<i>Catopsilia pyranthe</i> (Linnaeus, 1758)	Mottled Emigrant		√	√	√	√	√	C
41	PIR	<i>Delias eucharis</i> (Drury, 1773)	Indian Jezebel		√	√	√		√	C
42	PIR	<i>Eurema hecabe</i> (Linnaeus, 1758)	Common Grass Yellow	SCII	√		√	√	√	C
43	PIR	<i>Catopsilia pomona</i> (Fabricius, 1775)	Lemon Emigrant		√	√	√	√	√	C
44	PIR	<i>Eurema laeta</i> (Boisduval, 1836)	Spotless Grass Yellow		√	√	√	√		C
45	PIR	<i>Ixias pyrene</i> (Linnaeus, 1764)	Yellow Orange-tip		√		√		√	C
46	PIR	<i>Leptosia nina</i> (Fabricius, 1793)	Psyche		√	√	√	√	√	C
47	LYC	<i>Acytolepis puspa</i> (Horsfield, [1828])	Common Hedge Blue		√	√	√	√	√	C
48	LYC	<i>Arhopala centaurus</i> (Fabricius, 1775)	Centaur Oakblue		√	√		√		UC
49	LYC	<i>Caleta decidia</i> (Hewitson, 1876)	Angled Pierrot		√	√	√	√	√	C
50	LYC	<i>Catochrysops strabo</i> (Fabricius, 1793)	Forget-me-not				√		√	R
51	LYC	<i>Celastrina lavendularis</i> (Moore, 1877)	Plain Hedge Blue		√	√	√	√	√	C
52	LYC	<i>Chilades parrhasius</i> (Fabricius, 1793)	Small Cupid			√	√	√	√	C
53	LYC	<i>Cheritra freja</i> (Fabricius, 1793)	Common Imperial				√		√	R
54	LYC	<i>Chilades lajus</i> (Stoll, [1780])	Lime Blue		√		√	√	√	C
55	LYC	<i>Discolampa ethion</i> (Westwood, [1851])	Banded Blue Pierrot		√	√	√		√	C
56	LYC	<i>Euchrysops cnejus</i> (Fabricius, 1798)	Gram Blue		√		√		√	UC
57	LYC	<i>Freyeria trochylus</i> (Freyer, 1845)	Orange-spotted Grass Jewel		√	√	√	√	√	C
58	LYC	<i>Jamides alecto</i> (C. Felder, 1860)	Metallic Cerulean		√	√	√		√	C
59	HES	<i>Badamia exclamationis</i> (Fabricius, 1775)	Brown Awl			√		√	√	UC
60	HES	<i>Borbo cinnara</i> (Wallace, 1866)	Rice Swif		√	√	√	√		C
61	HES	<i>Coladenia indrani</i> (Moore, [1866])	Tricolour Pied Flat		√		√		√	UC
62	HES	<i>Gangara thyrsis</i> (Fabricius, 1775)	Giant Redeye	SCII	√	√		√	√	C
63	HES	<i>Gangara thyrsis</i> (Fabricius, 1775)	Giant Redeye		√	√	√		√	C
64	HES	<i>Hasora badra</i> (Moore, [1858])	Common Awl		√	√	√		√	C
65	HES	<i>Hasora chromus</i> (Cramer, [1780])	Common Banded Awl		√	√		√	√	C
66	HES	<i>Iambrix salsala</i> (Moore, [1866])	Chestnut Bob		√	√		√	√	C
67	HES	<i>Notocrypta curvifascia</i> (C. & R. Felder, 1862)	Restricted Demon		√	√		√	√	C
68	HES	<i>Oriens goloides</i> (Moore, [1881])	Smaller Dartlet		√	√	√		√	C
69	HES	<i>Pseudocoladenia dan</i> (Fabricius, 1787)	Fulvous Pied Flat		√		√	√	√	C
70	HES	<i>Psolos fuligo</i> (Mabille, 1876)	Dusky Partwing		√	√	√		√	C
71	HES	<i>Sarangesa purendra</i> Moore, 1882	Spotted Small Flat	SCII PT III	√		√		√	UC
72	HES	<i>Spialia galba</i> (Fabricius, 1793)	Asian Grizzled Skipper		√	√	√	√	√	C
73	HES	<i>Suastus gremius</i> (Fabricius, 1775)	Oriental Palm		√		√		√	UC

		1798)	Bob							
74	HES	<i>Tagiades gana</i> (Moore, [1866])	Suffused Snow Flat		√		√		√	UC
75	HES	<i>Taractrocera maevius</i> (Fabricius, 1793)	Grey-veined Grass Dart	SCIV	√		√		√	UC
76	HES	<i>Udaspes folus</i> (Cramer, [1775])	Grass Demon		√		√		√	UC

NY-Nymphalidae, PAP-Papilionidae, PIE- Pieridae, LYC- Lycaenidae, HES-Hesperiidae; G1-Marshy land, G2-Grass land, G3-Agricultural Land, land, G4- Perennial spring, G5-Hill Zone, SC-Schedule, WPA- Wild life Protected Act, STAT- status, C-Common, UC-Uncomon, R- Rare, Threat- Threatened species in Keala