



ECOLOGICAL DEPENDENCY ON INVASIVE SPECIES LANTANA CAMARA BY NATIVE ORGANISMS IN ECOSYSTEM OF NANDED MAHARASHTRA (INDIA)

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ABSTRACT:

The adverse effects of invasive species on local ecology remain the part of investigation due to a huge research gap. This study focused on how an invasive species such as *Lantana camara* adapted itself and showing near-native species characteristics due to the dependency of about 33 native species of organisms. Shifting of resource preference by endemic organism may result in directional selection of *Lantana* against the native plant species over a period of time. Increasing interaction of native organisms with *Lantana camara* may alter the habitat irreversibly and outcompete local plant species eventually. This research includes observations and results highlighting that, an invasive species like *Lantana camara* is contributing its role to native ecology. Generally, native organisms do not prefer to feed, or use exotic plant species as their nesting site during this study, this is concluded that total 33 species are directly or indirectly dependent on *L.camara* for their sustenance. *Lantana* helps these organism species to sustain during the food scarcity period and in return *L. camara* being preferred by native organisms for their requirements. This study was conducted around Nanded city and neighbouring villages, forest areas nearby, and nearby waterbodies. The study falls under the Marathwada region of Maharashtra (Fig. 1 to 6) where there are dry and deciduous forests with relatively less precipitation and water availability, due to which it becomes dire difficult to find greenery in the summer season. Such arid condition results in scarcity of food and shelter during the summer season when perennial shrub-like *L.camara* plays an important role and help native species for sustenance by providing enough resources.

Keywords:- Invasive, *Lantana*, Adaptation, Dependency, Resource shifting.

INTRODUCTION :

Number of different ecological impacts are shown by invasive species which are responsible for alteration in ecosystem structure, function, tropical hierarchy, resource availability and downgrade biodiversity of natural landscapes. *Lantana camara* is one of the invasive plant species which was introduced in India as an ornamental plant. After being planted in gardens and parks as an ornamental plant for years, it was being used as a border or hedge due to its beautiful inflorescence and prickly thorns. Despite being small-sized shrub, it protects or guards the area around, with its small but pointed prickles, which made this species a favourite hedge shrub among locals. The unrestricted use of such an invasive species was the main reason for the alteration and

disturbance of the native ecosystem and food chain in which *L. camara* has no natural predators that could check it's the population growth hence it is causing a havoc in many countries. *Lantana camara* has been dispersed widely across the country due to its high dispersal capacity. It has occupied almost all type of ecosystem present in India (except cold areas with below 5 degrees). Importance of *L. camara* as an invasive plant species, was assessed highlighting its role in maintenance of butterfly diversity, using Kolkata, India as study area. (Swanali Mukharjee, Dec 2015). It has been more than 200 years since *L. camara* was initially introduced in India and neighbouring countries. It introduced many major and minor changes in the native ecosystem in either positive or negative ways. Generally, invasive



species cause havoc to the environment in which they are introduced, but in the case of *L.camara* it has adapted itself in such a way that 20 butterfly species, 7 bird species, 5 other insect species and 1 Mammal species are being dependent on this *L. camara* species for food, shelter and many other requirements. High dispersion, high resistance, high adaptivity, out competed endemic plants in area where it was introduced.

MATERIALS AND METHODS :

To determine the dependency of the above-mentioned species of birds and insects on *Lantana camara*, the data were collected from different areas of Nanded city and neighboring areas (Fig. 1 to 6) by the authors^{1,2,3} and volunteers. During this study only photographic evidences were collected and no specimen were harmed or collected for study purpose. The data was collected during year 2019-2023. Different species data were collected from different parts of study area as mentioned in table number 1, and 3. Species were identified using Bird identification key and field guide 'Birds of Indian subcontinent'. Insects and other organisms were identified using respective field guides and by referring different research articles. DSLR camera with excellent zooming capacity was used during the process of data collection for accurate and sharp images. Nikon 810 with (500mm) was the main device through which images were captures, along with that Gopro Hero 10 was used to track the day time activity of birds and insects for detailed data collections.

1) Review of literature:

After reviewing literature on *L. camara* it is evident that this plant species infestation is present all around the world (including Indian pasture lands, forest borders, farm land and waste lands) and it is becoming worse year by year. It is not only changing the biodiversity and landscape ecology but also converting ecosystem services which could make places uninhabitable

for native species. Study work conducted in New South wales 1481 Australia, observed that 113 native bird species associated with *Lantana* infestations, with 24 directly threatened; 68 positively influenced (or benefited) by *Lantana* invasions; and another 21 species threatened but also partially benefiting (e.g from additional food resources) from *Lantana* invasions. Of the bird species benefit from *Lantana*, 28 are reported to consume *Lantana* fruit as well as the fruits and seed of range of native plant, some of which are also threatened by *L. camara* (Downey, The role of native bird in weed invasion, species decline, revegetation and reinvasion: consequences for *Lantana* management, 2008). This is how the invasion of non-native plant species could alter the resource dependency amongst native organisms which again directly or indirectly cause the decline in population of native flora and fauna.

RESULT AND DISCUSSION:

Lantana as an invasive species, poses a significant threat to native biodiversity in most of the areas around the world. Current study comes up with the observation that total 33 (20, butterfly species, 7 bird species, 5 other insect species and 1 Mammal species) from study area are being dependable on *L. camara* for additional food source, shelter, nesting or oviposition sites. In such cases invasive plant *L. camara*, currently performing important ecological functions. This might due to the scarcity of food and lack of enough foliage in study area, during summer season. There are three frugivore bird species (Red vented Bul-Bul, The Indian White eye, Orange Headed Thrush) which are being observed feeding on *Lantana* berries more often, besides this purple sunbird is one of the nectars feeding bird, which also feed on the *lantana* nectar. Ashy Prinia and Silverbill these bird species have been observed building nest on *L. camara*. These species tend to utilize *L.camara* plant resources despite of it

being an invasive species which make *L.camara* an important part of the current ecosystem. Thus, these birds may have indirectly contributed to native plant species decline through the dispersal of *Lantana* into native community. Shifting of resources utilization by native Bird, insect and mammal species may result in serious decline in population on native plant species in near future. Increase in pollination and seed dispersal may also bring the danger of over dominance in native ecosystem or related areas where *L. camara* is spreading vigorously. Government and other private agencies spend thousands of Dollars for eradication and controlling of *L. camara* for the sake of conservation of native habitat. Now it is high time to make people aware that, currently it is playing important role in its native habitat as a host plant, providing food and shelter for multiple species. it is point of concern that being an invasive species it is damaging the native flora and on the other side total 33 species are shifting their resource preferences on the lantana specifically.

Suggestions and Recommendations: This study highlights the year wise increasing species dependency on *L. camara* which may be the main area of concern for government, ecologists, other agencies which are trying to eradicate and control it. Given a superficial thought these reports seems to be of importance, but comprehensively these invasive effects could make remarkable differences in near future in the local ecosystems. It is recommended to eradicate *L. camara* and promote native plant species in order to maintain ecosystem healthy. It is also recommended that government and other bodies should aware and educate students and common people about *Lantana camara* and its adverse effects, and strict care should be taken while planting these invasive plants in the gardens or elsewhere. We can reduce the chances of further dispersion of *L. camara* by

making people aware and shifting selection preference of endemic plant species for beautification of gardens.

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Table 1. List of Butterfly species dependent on *Lantana camara*



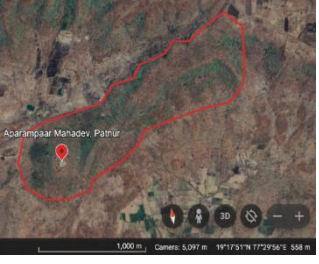
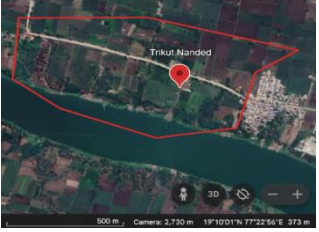
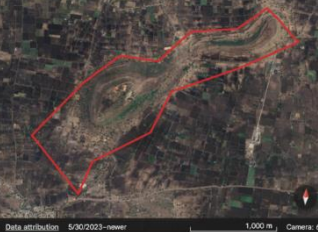

| | Common Name | Scientific Name | Type of Dependency on |
|----|----------------------|-----------------------------------|------------------------------|
| 1 | Angled castor | <i>Ariadne ariadne</i> | Feed on nectar |
| 2 | Blue pansy | <i>Junonia orithya</i> | Feed on nectar |
| 3 | Blue tiger butterfly | <i>Tirumala limniace</i> | Feed on nectar |
| 4 | Common evening Brown | <i>Melanitis leda</i> | Feed on nectar |
| 5 | Common Crow | <i>Eupleoa core</i> | Feed on nectar |
| 6 | Common jay | <i>Graphium doson</i> | Feed on nectar |
| 7 | Common Mormon | <i>Papilio polytes nikopbarus</i> | Feed on nectar |
| 8 | Crimson tip | <i>Colotis danae</i> | Feeding & oviposition site |
| 9 | Danaid egg fly | <i>Hypolimnas misippus</i> | Feed on nectar |
| 10 | Great Egg fly | <i>Hypolimnas bolina</i> | Feed on nectar |
| 11 | Lemon Emigrant | <i>Catopsilia pomona</i> | Feed on nectar |
| 12 | Lemon Pansy | <i>Junonia lemonias</i> | Feed on nectar |
| 13 | Lime Butterfly | <i>Papilio demoleus</i> | Feed on nectar |
| 14 | Mottled Emigrant | <i>Catopsilia pyranthe</i> | Feed on nectar |
| 15 | Peacock Pansy | <i>Junonia almana</i> | Feed on nectar |
| 16 | Plain Tiger | <i>Danaus chrysippus</i> | Feed on nectar |
| 17 | Tailed Jay | <i>Graphium agamemnon</i> | Feed on nectar |
| 18 | Vindhyan Bob | <i>Arnetta vindhiana</i> | Feed on nectar |
| 19 | Crimson Rose | <i>Pachliopta hector</i> | Feed on nectar |
| 20 | Common Grass Yellow | <i>Eurema hecabe</i> | Feeding & oviposition site |







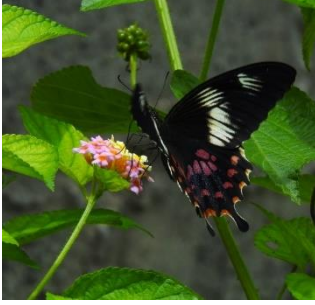


Table 2. List of Bird species depend on *Lantana camara*








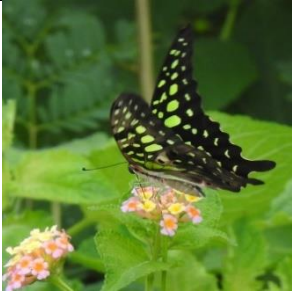

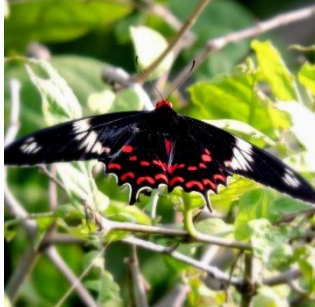

| | Common Name | Scientific Name | Type of Dependency on <i>L. camara</i> |
|---|-----------------------------|------------------------------|--|
| 1 | Ashy prinia | <i>Prinia socialis</i> | Build nest by stitching leaves together. |
| 2 | Orange headed thrush | <i>Geokichla citrina</i> | Build nest on the stems |
| 3 | Indian White-eye | <i>Zosterops palpebrosus</i> | Feed on fruits and Build Nest |
| 4 | Red Vented bulbul | <i>Pycnonotus cafer</i> | Build Nest, eat fruits |
| 5 | Purple Sunbird | <i>Cinniris asiaticus</i> | Forage on nectar and often insects. |
| 6 | Indian Silverbill | <i>Euodice malabarica</i> | Build nest and use it as main perching site during hot summer. |
| 7 | Yellow eyed babbler | <i>Chrysomma sinense</i> | Build nest on <i>L. camara</i> |











Table 3. List other organisms depend on *Lantana camara*

| | Common Name | Type of Dependency on <i>L. camara</i> |
|---|---|---|
| 1 | Wasp Moth (family- <i>Sphingidae</i>) | Feed on the nectar. |
| 2 | Blue Banded bee (<i>Amegilla cingulata</i>) | Feed on the nectar |
| 3 | Honey bee wasp | Feed on the nectar and make hive. |
| 4 | Bag worm moth | Form its cocoon on <i>L. camara</i> |
| 5 | Squirrel | Feed on berries of <i>L. camara</i> |

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| <p>Fig 1. Overall study area marking</p> | <p>Fig 2. Study site I (Nanded city and outskirts)</p> | <p>Fig 3. Study site II (Patnur forest area)</p> |
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| <p>Fig 4. Study site III (Trikut area)</p> | <p>Fig 5. Study site IV (Ratneshwari forest area)</p> | <p>Fig 6. Study site V (Ganganbid forest area)</p> |

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|---|--|---|
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| <p>Fig 1. Angled castor (<i>Ariadne ariadne</i>)</p> | <p>Fig 2. Blue Pansy (<i>Junonia orithya</i>)</p> | <p>Fig 3. Blue tiger (<i>Tirumala limniace</i>)</p> |
|  |  |  |
| <p>Fig 4. Common Evening Brown (<i>Melanitis leda</i>)</p> | <p>Fig 5. Common Crow (<i>Eupleoa core</i>)</p> | <p>Fig 6. Common Jay (<i>Graphium doson</i>)</p> |
|  |  |  |
| <p>Fig 7. Common Mormon (<i>Papilio</i>)</p> | <p>Fig 8. Crimson tip (<i>Colotis danae</i>)</p> | <p>Fig 9. Danaid egg fly</p> |

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|---|--|---|
| <p><i>polytes nikopbarus</i>)</p>  |  | <p><i>(Hypolimnas misippus)</i></p>  |
| <p>Fig 10. Great Egg Fly (<i>Hypolimnas bolina</i>)</p> | <p>Fig 11. Lemon Emigrant (<i>Catopsilia pomona</i>)</p> | <p>Fig 12. Lemon Pansy (<i>Junonia lemonias</i>)</p> |
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| <p>Fig 13. Lime Butterfly (<i>Papilio demoleus</i>)</p> | <p>Fig 14. Mottled Emigrant (<i>Catopsilia pyranthe</i>)</p> | <p>Fig 15. Peacock Pansy (<i>Junonia almana</i>)</p> |
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| <p>Fig 16. Plain Tiger (<i>Danaus chrysippus</i>)</p> | <p>Fig 17. Tailed Jay (<i>Graphium agamemnon</i>)</p> | <p>Fig 18. Vindhya Bob (<i>Arnetta vindhiana</i>)</p> |
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| <p>Fig 19. Crimson Rose (<i>Pachliopta hector</i>)</p> | <p>Fig 20. Common Grass Yellow (<i>Eurema hecabe</i>)</p> | |

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|  <p>Nesting site of Ashy Prinia</p> |  |  |
| <p>Fig 1. Ashy prinia nesting on <i>L.camara</i>.</p> | <p>Fig. 2. Oriental white eye nesting <i>L.camara</i></p> | <p>Fig. 3. Silverbill nesting on <i>L.camara</i></p> |
|  <p>Nesting Site of Red vented Bulbul</p> |  |  |
| <p>Fig. 4. Red vented Bulbul nesting on <i>L.camara</i></p> | <p>Fig. 5. Purple sunbird Feeding on <i>L. camara</i></p> | <p>Fig. 6. yellow eyed babbler feeding on <i>L. camara</i></p> |
|  |  |  |
| <p>Fig. 7. Wasp species feeding and laying eggs on <i>L. camara</i></p> | <p>Fig. 8. Bag worm moth caterpillar making cocoon in <i>L. camara</i>.</p> | <p>Fig 9. Blue banded bee (<i>Amegilla cingulata</i>) feeding on the <i>L.camara</i></p> |
|  | | |
| <p>Fig. 10. Hawk moth (family-<i>Sphingidae</i>) feeding on the <i>L.camara</i>.</p> | | |