

Ecological Evaluation of the Invasiveness and Establishment of *Lantana camara* L. in Udawalawa and Lunugamvehera National Parks of Sri Lanka

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Abstract

L. camara has become an invasive species in most of the habitats in national parks (NP) of Sri Lanka including Udawalawa and Lunugamvehera. Due to the invasive nature of Lantana, natural flora of the NP are being threatened. Further, elephants and other grazing animals like Deers, Barking deers, Rabbits and Porcupines are highly affected due to the suppression of their feeding stuff by Lantana. *L. camara* which has been a difficult weed to control by chemical and conventional methods. Burning, slashing and digging result in the regrowth of larger number of roots. Further, chemical control of *L. camara* has not met with great acceptance due to its hazardous impact to the fauna and flora of the relevant area, while biological control attempted worldwide has not been particularly successful.

Objectives of this study were to ecologically evaluate the invasive behaviour and establishment of *L. camara* using different ecological indices in Udawalawa National Park (UNP) and Lunugamvehera National Park (LNP) in Sri Lanka to control *L. camara* population in above national parks of Sri Lanka.

In each studied NP, three characteristic types of ecosystems were selected for the study as follows; Natural forest (NF), Shrub land of Lantana (SL) and area where Lantana had regenerated after mechanical removal (LR). Three representative transects, each with 20m length was demarcated from each ecosystem and four 1m×1m quadrates were laid or demarcated within 5m distance from each transect. The quantitative analysis such as density, frequency, abundance, the percentage values of the relative frequency and density were calculated. The species richness was calculated by using the Margalef's index of richness (D_{mg}). $D_{mg} = (S - 1) / \ln N$; Where, S = Total number of species, N = Total number of individuals. Species diversity was calculated by using Shannon-Weaver index of diversity: $H' = -\sum P_i \ln P_i$; Where, H' = Shannon index of diversity, P_i = The proportion of important value of the i^{th} species. The species dominance (D) was calculated by using

Simpson index of dominance. $D = \sum(P_i)^2$. Indices of similarity and dissimilarity for *L. camara* were calculated by using formula of Misra and Sorensen.

The number of species present in the specified area and their relative abundances defined as species richness and diversity. According to Maragalef's Index; 1.51 in UNP and 1.17 in LNP, species richness of the studied ecosystems with *L. camara* is higher in UNP. That indicates the higher species diversity in UNP than LNP. Species diversity and dominance were evaluated by using Shannon's diversity index and Simpson's index (D) of dominance respectively. Simpson's index represents the likelihood that two randomly chosen individuals will be the same species. As the study revealed, D of LNP (0.568) is higher than the D of UNP (0.212). This clearly shows that *L. camara* is a more dominant species in LNP compared to the UNP. Shannon-Weaver Index calculation revealed that species diversity of UNP (1.57) was higher than LNP (1.21) indicating a more complex and healthier NP because a greater variety of species generate high level of species interactions, greater system stability and good environmental conditions. This clearly indicates that UNP with higher diversity typically has higher levels of energy transfer (food webs), predation, competition and niche availability. Index of similarity and index of dissimilarity were 0.588 and 0.412 respectively. These indices provide explicit comparisons of UNP and LNP and revealed that species overlapping in two ecosystems is 0.588. It also indicates that species structure found in two NPs are different up to a certain level.

The revealed information from this study on performance of *L. camara* indicates the potential for ecologically based management of *L. camara* in NPs of Sri Lanka by applying ecological tools; creation and maintenance of higher species diversity.

Keywords: Ecological evaluation; Invasiveness; Lantana camara; National parks

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Refer page 114 of the appendix for further details.

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