



Phytosociological Studies of Invasive Alien Plant Species and Their Effects on Vegetation in District Jaunpur, U.P., India

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ARTICLE INFO	ABSTRACT
Article history: Received – 14 January 2026 Received in revised form – 12 March 2026 Accepted -25 March 2026 Available online – 30 March 2026	Invasive alien plant species (IAPS) pose a serious threat to native biodiversity, ecosystem stability, and agricultural productivity. The present study aims to assess the diversity, distribution, and phytosociological characteristics of invasive alien plant species and evaluate their impact on natural and semi-natural vegetation in District Jaunpur, Uttar Pradesh, India. Extensive field surveys were conducted during 2024–2025 across agricultural fields, wastelands, roadsides, riverbanks, and forest fringes using quadrat and transect methods [1]. A total of 32 invasive alien plant species belonging to 28 genera and 14 families were recorded [2]. Asteraceae was the dominant family, followed by Poaceae and Amaranthaceae. Phytosociological parameters such as frequency, density, abundance, and Importance Value Index (IVI) were calculated. Species like <i>Parthenium hysterophorus</i>, <i>Lantana camara</i>, <i>Eichhornia crassipes</i>, and <i>Chromolaena odorata</i> showed high IVI values, indicating their strong dominance and ecological impact. The study reveals that invasive species significantly reduce native species richness and alter community structure. Effective management strategies are urgently required to control invasive alien species and conserve native vegetation in the region.
Keywords: Invasive alien species, Phytosociology, IVI, Biodiversity, Jaunpur, Uttar Pradesh	

1. Introduction

Biological invasions are recognized as one of the major drivers of biodiversity loss worldwide. Invasive alien plant species are non-native species that establish, spread rapidly, and negatively affect native ecosystems, agriculture, and human health. India, due to its varied climatic conditions and increasing anthropogenic disturbances, is highly vulnerable to plant invasions [3,4].

District Jaunpur, located in the Middle Gangetic Plain of Uttar Pradesh, has witnessed rapid land-use changes, expansion of agriculture, urbanization, and transportation networks, which facilitate the introduction and spread of invasive alien plant species [5]. These species often outcompete native flora due to high reproductive capacity, allelopathic effects, and ecological adaptability. Most of the developed countries have these basic studies and are defined with the help of vegetation maps. However, most of these forests are under immense anthropogenic disturbances and require careful management intervention to maintain overall biodiversity and sustainability [6]. In the present investigation studies will be carried out on phytosociological and species diversity in the district Jaunpur of U.P. state. The main purpose of the phytosociological analysis is to understand floristic vegetation characteristics, to estimate the species richness, diversity and their impacts which are present in the study area. The study of the establishment, spread and ecological impact of species translocated from one region or continent to another outside their normal range, particularly when the translocation is the result of a human activity is termed as Invasive Ecology [7]. Invasive Alien Plant species that are

introduced as a consequence of human activities to new geographic areas, where they become established and then proliferate, and spread to the detriment of human interests and natural systems. Invasive species cause the loss of biodiversity including species extinction and changes in hydrology and ecosystem function. Invasive Alien Plant species are increasingly seen as a threat not only to biodiversity and ecosystem services but also to economic development and human-well-being.

Phytosociological studies provide quantitative information on vegetation composition, structure, and species dominance, which is essential for understanding the ecological impact of invasive species [8]. The present investigation was undertaken to document invasive alien plant species, analyze their phytosociological attributes, and assess their effects on local vegetation in District Jaunpur.

Study Area: -

District Jaunpur is situated between 25°24'–26°12' N latitude and 82°07'–83°05' E longitude in eastern Uttar Pradesh. The region experiences a subtropical monsoon climate with hot summers, moderate rainfall (900–1100 mm annually), and cool winters. The major rivers Gomti and Sai influence the local vegetation. The area supports agricultural lands, wetlands, wastelands, and fragmented forest patches.



Fig- 1(Map of Jaunpur)

Materials and Methods: -

Field Survey and Sampling: -

Seasonal field surveys were conducted from July 2024 to June 2025. Sampling sites were selected randomly across different habitats. Quadrat methods were employed:

- Herbs: 1 × 1 m quadrats
- Shrubs: 5 × 5 m quadrats
- Aquatic plants: visual estimation and belt transect

Identification of Species: -

Plant species were identified using standard floras and taxonomic keys. The invasive status was confirmed using national and regional invasive species databases and literature.

Phytosociological Analysis: -

The following parameters were calculated using standard formulas:

- Frequency (%)
- Density (plants/m²)
- Abundance
- Relative Frequency (RF)
- Relative Density (RD)
- Relative Abundance (RA)
- Importance Value Index (IVI = RF + RD + RA)

Data Analysis: -

Species richness, family dominance, and life-form analysis were carried out to assess invasion patterns and ecological impacts.

Result and Discussion: -

Diversity of Invasive Alien Plant Species: -

A total of 32 invasive alien plant species belonging to 14 families were recorded. Herbs constituted the dominant life form (68%), followed by shrubs (22%) and aquatic plants (10%).

Table 1. List of Invasive Alien Plant Species Recorded in District Jaunpur

S. N o.	Botanical Name	Family	Habit	Native Region
1	<i>Parthenium hysterophorus</i>	Asteraceae	Herb	Tropical America
2	<i>Lantana camara</i>	Verbenaceae	Shrub	Central America
3	<i>Chromolaena odorata</i>	Asteraceae	Shrub	South America
4	<i>Eichhornia crassipes</i>	Pontederiaceae	Aquatic	South America
5	<i>Ageratum conyzoides</i>	Asteraceae	Herb	Tropical America
6	<i>Xanthium strumarium</i>	Asteraceae	Herb	America
7	<i>Cassia tora</i>	Fabaceae	Herb	Tropical America
8	<i>Ipomoea carnea</i>	Convolvulaceae	Shrub	Tropical America
9	<i>Amaranthus spinosus</i>	Amaranthaceae	Herb	Tropical America
10	<i>Prosopis juliflora</i>	Fabaceae	Tree	Mexico

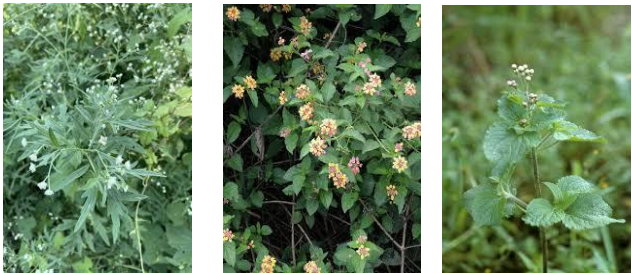


Fig-2 (*Parthenium hysterophorus*) (*Lantana camara*) (*Ageratum conyzoides*)

Family-wise Distribution: -

Asteraceae was the dominant family with 10 species, followed by Poaceae (5 species) and Amaranthaceae (4 species).

Table 2. Family-wise Distribution of Invasive Alien Plant Species

Family	Number of Species	Percentage (%)
Asteraceae	10	31.25
Poaceae	5	15.62
Amaranthaceae	4	12.50
Fabaceae	4	12.50
Others	9	28.13

Phytosociological Attributes: -

Species such as *Parthenium hysterophorus* and *Lantana camara* showed maximum frequency, density, and IVI values, indicating their aggressive invasive nature.

Table 3. Phytosociological Parameters of Dominant Invasive Species

Species	Frequency (%)	Density	Abundance	IVI
<i>Parthenium hysterophorus</i>	78	22.4	28.7	82.6
<i>Lantana camara</i>	64	15.2	21.5	69.3
<i>Chromolaena odorata</i>	52	12.6	18.4	58.1
<i>Eichhornia crassipes</i>	48	10.1	16.9	46.7
<i>Ageratum conyzoides</i>	45	9.8	14.2	42.5

IVI- Importance Value Index**Impact on Native Vegetation: -**

Invasive species-rich sites exhibited reduced native species richness, altered species composition, and suppression of regeneration of native plants. Allelopathic effects of *Parthenium* and dense thickets of *Lantana* were particularly detrimental.

Discussion: -

The dominance of invasive alien plant species in District Jaunpur is closely associated with anthropogenic disturbances, agricultural intensification, and water resource modification. High IVI values of certain species reflect their competitive superiority and adaptability. Similar invasion patterns have been reported from other regions of the Gangetic plain.

The decline in native vegetation due to invasive species threatens ecosystem services, including soil fertility, fodder availability, and habitat quality. Regular monitoring and integrated management approaches are essential to mitigate their spread.

Conclusion: -

The present study highlights the significant diversity and dominance of invasive alien plant species in District Jaunpur. Phytosociological analysis confirms the aggressive nature of species like *Parthenium hysterophorus* and *Lantana camara*, which severely impact native vegetation. Immediate management and awareness programs are recommended for biodiversity conservation and sustainable ecosystem management.

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