

Asian Resonance

Rhizosphere Soil Analysis of Some Selected Exotic Species From Ajmer Region, Rajasthan

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Abstract

The study was conducted in Ajmer region of Rajasthan, India and aimed at determining the impact of some exotic plant species (*Prosopis juliflora*, *Parthenium hysterophorus*, *Lantana camara*) on soil chemical properties. Soil samples were collected from the rhizosphere of selected exotic species. Most of the soil parameters which were taken into consideration for study purpose indicate that these species do not impose adverse impact on soil nutrients. All these plants were widely distributed in B. K. Kaul Nagar of Ajmer region from where the soil samples were collected and studied.

Keywords: Exotic, Rhizosphere, *Prosopis juliflora*, *Parthenium hysterophorus*, *Lantana camara*.

Introduction

Prosopis (Fabaceae) is native to Mexico, South America and Caribbean, *Parthenium* (Asteraceae) is native to tropical north America and *Lantana* (Verbenaceae) is native to tropical America. Biological invasions occur when any species enters into an area where it was not found previously. Alien species

alter the ecosystem to a large extent as they differ from indigenous species in their ecophysiological characteristics. All these exotic species occur intensively and can outcompete native species and lead to a great reduction in biodiversity. According to the Convention of Biological Diversity, alien species which are invasive pose a great threat to indigenous species and are the second largest cause of biodiversity loss over the world. During the last decades the exotic invasive species have expanded their distributional range dramatically. My present research focuses on the availability of soil nutrients in the rhizosphere of alien species under study.

Review of Literature

Allelopathic interaction has been extensively investigated as one of the important variables influencing species distribution and abundance within plant communities, as well as its role in the success of invasive plants. In their review article, Montserrat Vila et al. (2011) found that alien plants had a substantial impact on 11 of the 24 categories of impact characteristics studied. Both within and between distinct forms of impact, the amount and direction of the impact varied. According to them, alien species impacts are not unidirectional in general, and even within a single impact category, they are varied. Major consequences on plant species and ecosystems are likely to have already happened by the time changes in nutrient cycling are identified, according to their findings. The majority of Alien spp. investigations in India are basically documentation. (Yadav et.al, 2015; Mishra et.al.2016; Sharma et. al . 2016). Invasive plant species in tiny numbers may not survive, but their multiple and sequential introduction into the environment can easily make them invasive over time, according to Sharma et al. (2016). Bashir S. et al (2019) in their phytochemical studies on *Lantana camara*, indicated the presence of some secondary metabolites in fruit, stem and leaves of *Lantana camara*. Dharmasoth and Battu (2019) in their qualitative phytochemical screening on *GREWIA TILIFOLIA* leaf extracts, in eight different solvents also revealed the presence of some bioactive compounds which could be used for the synthesis of new drugs which could be useful in curing diseases. The goal of the work carried out by Mansoori et al (2020) was to look into the phytochemical characteristics, free radical scavenging activity, and antibacterial capabilities of methanolic crude extracts of leaf and flower of *Lantana camara*.

Objective of the Study

The aim of this study is to carry out rhizosphere soil analysis of some selected exotic species (*Prosopis juliflora*, *Parthenium hysterophorus* and *Lantana camara*) in Ajmer, Rajasthan.

Renu Sharma
Research Scholar,
Dept. of Botany,
SPC Govt College,
Ajme, Rajasthan,
India

Vibha Khanna
Associate Professor,
Dept. of Botany,
SPC Govt College,
Ajmer, Rajasthan,
India

Materials and Methods

For collection of soil sample the surface litter around the sampling spot was cleared and the auger was driven inside the soil to draw out the soil samples. In this manner, soil samples were collected from the rhizosphere of selected exotic species (*Prosopis juliflora*, *Parthenium hysterophorus*, *Lantana camara*) and analysed by AAS (Atomic Absorption Spectrophotometer) method. Presence of soil nutrients and soil organic matter was carried out by using Klett Calorimeter, Flame spectrometer, Titration method, etc.

Result and Discussion

In all the soil samples, soil was found to be basic in nature. Electrical conductivity (EC) of soil was also measured. EC of soil, is the measure of the ability of soil to conduct electricity. With regards to fertility it indicates the nutrients available in the soil which in turn is an indicative of presence of more cations like Zn⁺⁺, Fe⁺⁺, Cu⁺⁺, Mn⁺⁺. Presence of organic matter in soil was determined from soil organic carbon percentage using the conversion factor 1.72 (derived from 100/58, that is about 58 % of mass of organic matter exist as carbon). Organic matter percentage = Total organic carbon x 1.72 Amount of zinc, iron, copper, manganese in ppm was also analysed.

		Analytical Results				
		pH	Electrical Conductivity mS/cm	Organic Carbon Percentage	Phosphate per kg	Potash per kg
1.	<i>Prosopis juliflora</i>	8.0	0.53	0.27	27	163
2.	<i>Parthenium hysterophorus</i>	8.1	0.42	0.27	25	211
3.	<i>Lantana camara</i>	7.9	0.34	0.24	22	218

		Nutrients in ppm			
		Zn	Fe	Cu	Mn
1.	<i>Prosopis juliflora</i>	0.48	4.8	0.69	4.6
2.	<i>Parthenium hysterophorus</i>	0.48	4.9	0.48	3.4
3.	<i>Lantana camara</i>	0.56	5.6	0.54	4.2

Conclusion

Rhizosphere soil analysis of the plants under study reveals the following: With regards to the pH, the soil is normal. Organic carbon (nitrogen) in soil samples is found to be low. Available phosphorus is of low to medium level and available potash is of medium level. These parameters indicate that the deficiency of these elements would hamper the growth of native plants. Analysis of micronutrients like Zn, Fe, Cu and Mn indicates that soil samples were deficient in zinc. It (less than 0.6 ppm zinc is deficient). Our findings suggest that physical and chemical influences, as well as changes in soil conditions, can have a big impact on native species composition and, as a result, natural vegetation is affected. More species-specific research would be extremely beneficial in this context in order to gain a better knowledge of ecosystem processes.

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