

Prosopis juliflora- Invasive Alien Species (Harmful Impact on Environment)

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ABSTRACT

Invasive alien species are species that are introduced, accidentally or intentionally, outside of their natural geographic range and that become problematic. Invasive alien species (IAS) can have severe ecological effects on the invaded environments. They may lack natural predators in their new environments, allowing them to quickly increase their abundance and spread. They can carry diseases, outcompete or prey on native species, alter food chains, and even change ecosystems by, for example, altering soil composition or creating habitats that encourage wildfires. These impacts can lead to local or global extinctions of native species and eventual ecological devastation. Invasive alien species (IAS) are species whose introduction and/or spread outside their natural past or present distribution threatens biological diversity. The most severe infestation occurred by *Prosopis juliflora*, which is posing threat to survival of native biodiversity of the desert. Such IAS are major problem and obstruction for conservation of biodiversity. The main purpose of the present study was to determine the presence of potentially invasive plants within different habitat of the Thar desert and to suggest effective management practices for mitigating their adverse impacts on native flora

Key Words- Flora, Species, Biodiversity, Environment, Alien, Invasive

INTRODUCTION

An alien species which becomes established in natural or semi-natural ecosystems or habitat, is an agent of change, and threatens native biological diversity. They are often introduced as a result of the globalisation of economies through the movement of people and goods, for instance via shipping, consignments of wood products carrying insects, or the transport of ornamental plants to new areas. Common characteristics of IAS include rapid reproduction and growth, high dispersal ability, phenotypic plasticity (ability to adapt physiologically to new conditions), and ability to survive on various food types and in a wide range of environmental conditions. A good predictor of invasiveness is whether a species has successfully or unsuccessfully invaded elsewhere. Ecosystems that have been invaded by alien species may not have the natural predators and competitors present in its native environment that would normally control their populations. Native ecosystems that have undergone human-induced disturbance are often more prone to alien invasions because there is less competition from native species. Threats from invasive alien species include direct predation of native wildlife, competition for resources and ecosystem damage (e.g. through the removal of a key species such as a pollinator). Invasive species can have huge economic impact if they target commercial crop species, or indirectly influence them through effects such as soil destabilisation. Invasive alien species have caused numerous extinctions, modified ecosystem processes and acted as disease vectors affecting both humans and other species

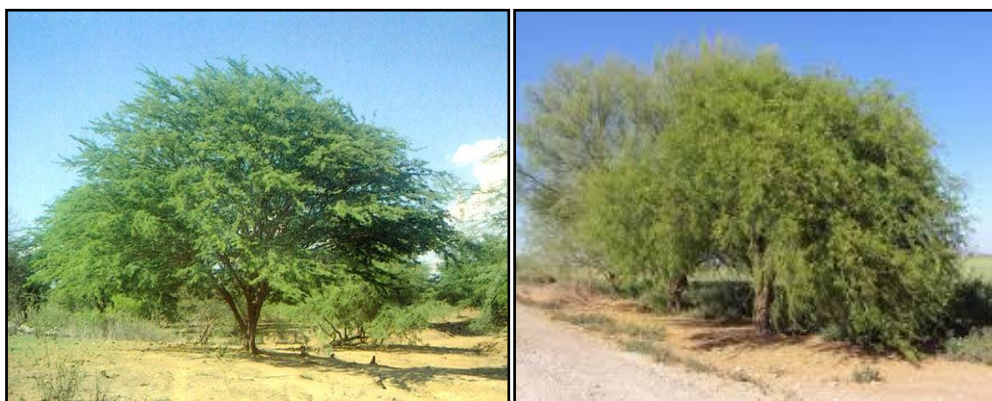
The desert ecosystem, especially near areas of rural as well as urban settlements, are severely invaded by *Prosopis juliflora*, *Lantana camara*, *Parthenium hysterophorus*, *Ageratum conyzoides*, *Argemone mexicana* etc. The most severe infestation occurred by *Prosopis juliflora*, which is posing threat to survival of native biodiversity of the desert.

Negative Impact of *Prosopis juliflora*

The most notorious among such species is *Prosopis juliflora*, a tree from Central America, likely introduced to the Thar between 1980 and 2000. The plant is a “nitrogen-fixer,” this means that it increases nitrogen levels in the soil, so they are not ideal for native plants adapted to nutrient-deficient. *Prosopis juliflora* is an alien invasive plants spreading throughout the Indian arid and semi-arid region lying under Thar desert and as well elsewhere in many states of India. Invasiveness of this plant is known to exert significant impact on the natural vegetation communities as they cause their displacement and hence exert imbalance in the natural and agricultural ecosystem. This discrepancy causes the formation of large monoculture of invasive plants in the alien environment. The plant affects not only the species diversity of the native areas, but also their ecological integrity. They grow fast, have, greater reproductive potential, competitive ability, high plasticity and allelopathy that make them successful invaders of non native habitat. *Prosopis*

juliflora, have as became threaten to the natural pastoral production system in the areas. They may be responsible for a significant reduction in production potential of the rangelands. The biodiversity of the western arid Rajasthan has recently been threatened by encroachment by this woody species.

The plant that has been .widely spreading over the area at an alarming rate must have now exerted a substantial amount impact on the biodiversity of rangelands and arable lands. Wherever it invades the plant forms predominant exotic vegetation by replacing the indigenous grasses and other herbaceous plants that have for years been used for grazing. In addition, the plant makes land infertile and weakens the quality of grazing land, animal health. It is imperative to identify rangeland species that may have the ability to resist or overcome the challenges of the plant, which is increasingly reducing the quality and quantity of the composition and biomass of the herbaceous species._The major problem facing the pastoral production in western Rajasthan is the wide scale degradation of native pasture encroached by *Prosopis juliflora*. In contrary, *Prosopis juliflora* is playing a vivacious role in supporting the livelihoods of the rural 'poor, including the landless, small farmers.



Prosopis juliflora is a highly IAS species, and its introduction in various regions has caused significant environmental, ecological, and socio-economic impacts. Some of the negative effects include:

1. Biodiversity Loss

Prosopis juliflora can outcompete native vegetation due to its aggressive growth, forming dense monocultures that reduce the diversity of plant species in the area. This limits the habitats available for native animals and reduces overall biodiversity. The tree's dense canopy also restricts the growth of understory plants, further decreasing plant diversity.

2. Soil Degradation

Prosopis juliflora can alter the soil structure, composition and fertility. *Prosopis juliflora* has deep roots that extract significant amounts of water and nutrients from the soil, which can lead to a reduction in soil quality. It also increases soil salinity and acidity, making it less hospitable for native plants and reducing agricultural productivity.

3. Water Consumption

As a drought-resistant species, *Prosopis juliflora* consumes large amounts of groundwater, further depleting already limited water resources in arid and semi-arid regions. This can lead to water scarcity for both human populations and other native species that rely on these water sources.

4. Impact on Livestock and Agriculture

The thorns on *Prosopis juliflora* can injure livestock, and the plant is not suitable as fodder due to its high tannin content, which can affect the health of grazing animals.

The tree competes with crops for water and nutrients, thereby negatively impacting agricultural productivity, especially in areas that rely on rain-fed farming..

5. Fire Hazard

The tree has a high resin content, which makes it prone to catching fire. In areas prone to wildfires, large quantities of *Prosopis juliflora* can fuel fires, making the spread of fires more dangerous.

6. Displacement of Native Species

In many regions, *Prosopis juliflora* has displaced native vegetation, often replacing traditional plant species with an invasive and non-native one. This results in a loss of ecosystem services, such as pollination, water filtration, and soil stabilization, that native plants typically provide.

7. Human Health Concerns

The thorny nature of the tree can pose risks to human safety, especially in rural areas where people may come into contact with the thorns while collecting firewood or performing agricultural tasks. The plant can also contribute to the spread of allergens, affecting people with respiratory issues or allergies.

8. Alteration of Fire Regimes

Prosopis juliflora can increase the frequency and intensity of fires in areas where it dominates, altering natural fire cycles and making ecosystems more prone to destructive wildfires.

Prosopis is a very noxious invader, with areas of high infestation resulting in surrounding indigenous plants failing to deliver valuable ecosystem services for that ecological niche. The invasive woody alien plant species, as non-native organisms that increase from the point of introduction and become much more abundant, have a great potential to cause harm to the environment, as they are the key drivers of environmental change, disrupting ecosystem functioning, being detrimental to grazing lands, and tending to threaten the native biological diversity (being the main causes of biodiversity losses around the world), economics, and human and animal health.

CONCLUSION

Prosopis juliflora used for many purposes such as charcoal production, house/fence construction, livestock feed, food, soil conservation, erosion control, fixation of nitrogen in the soil, dyes, traditional medicine, shades, medicines, gums, apiculture, control invasive weed etc. On the other hand, it is among the most widespread damaging invasive alien plant species in various environments including crop lands, rangelands, road sides, forests, watersheds and other economically important ecosystems; and there is also having a potential for species to spread further. The disadvantages and costs of *Prosopis* for local livelihoods, rangeland health and biodiversity, and for the national economy due to reduced livestock production, outweigh the benefits. The detrimental effects on the environment and human livelihoods are escalating rapidly from time to time, and there is an urgent need to develop more effective management approaches to drastically reduce adverse impacts and enhance benefits. By using its potential beneficial effects as opportunity there is a possibility to eradicate this weed to reduce negative impacts. This can be achieved by creating job opportunity for job seekers which ensuring the proper removal of the tree for different purposes. However, there must be initial support from the government and nongovernmental organizations for those groups so as to ensure the effectiveness of eradication by utilization

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