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INVASIVE SPECIES *Prosopis juliflora* IN THE COASTAL REGION OF HAMBANTOTA DISTRICT

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ABSTRACT

Due to high salinity levels and arid conditions prevailing at Hambantota district, vegetation and agriculture had been poor during the early part of the last century. Legume species *Prosopis juliflora,* a species native to Central and Northern South America was introduced to this area in early 1950 s to improve the vegetation cover. It has now become invasive and a threat to the Bundala National Park, the only wetland in Sri Lanka listed under Ramsar Convention. This species at present is spreading fast along the coastal areas via monkeys and cattle. It affects all vegetation types in the area and the most affected native species is *Salvadora persica*, one of the few species which shows affinities of Sri Lanka flora with that of African Flora. A study on the distribution impacts on native flora and antrhopogenic factors contributing to invasiveness of *Prosopis juliflora* suggests that this species is in a stage where it can and should be controlled without delay.

INTRODUCTION

Prosopis juliflora (Fabaceae) is a species native to Central and Northern South America. It has been planted in arid areas of the tropical and subtropical regions in Africa and Asia mainly in afforestation programs. It was introduced to Hambantota, Sri Lanka in early 1950's to improve the salt affected soils and for firewood and vegetative cover. A variety of this species is said to be naturalized and it has now become invasive. The wetland site report published by Central Environmental Authority (1993) indicates it as a serious threat to Bundala National Park (the only Ramsar site in Sri Lanka) and has strongly recommended the need to conduct further studies.
The main objectives of this study were to find (i). Distribution (ii). Impacts on native flora and human (iii). Factors contributing towards invasiveness and (iv). Possible control measures.

MATERIALS AND METHODS

Distribution

The present distribution within Sri Lanka was found out using published records and personal communication. The distribution within each area /district was determined by visiting the areas.

Impact on native flora

Native and other plant species present in natural vegetation types in Hambantota district were identified and recorded using standard taxonomic procedures. Plots of 10x10 m were established subjectively in invaded and non-invaded areas to find the species composition, cover of *P. juliflora* and other species using Braun-Blanquet cover abundance scale values. Using the results and observations the most affected species and possible impacts were assessed. Invaded areas within Bundala National Park were mapped.

Impact on human population

Interview surveys were carried out using 30 households based on a standard data sheet.

Factors contributing towards invasiveness

The following propagation factors were determined: sexual reproduction and seed dispersal mechanism; vegetative reproduction; number of new plants that rise from mature trees to near by area through seed and root sprouting; seed germination ability in 4 different soils with and without acid treatment; growth factors including percentage survival, production of root nodules; dry weight and growth rates in 4 different soils; crown cover and spreading ability of root system.

Control methods

Manual methods such as uprooting, cutting and burning of trees of different crown cover classes were tested. All the trials were conducted out side the Bundala National Park. Two possible biological control agents, which were found naturally on pods *of P. juliflora*, were isolated and identified under laboratory conditions.

RESULTS

Present distribution

Although this species is recorded at present in Hambantota district only, during this investigation it was found in Puttalama district, too. The study within Hambantota district shows that *P. juliflora* has spread more towards the sea and Bundala National Park where brackish water lagoons are found. But in Puttalam district *P. juliflora* has colonized a completely different habitat about 20 km inland from the sea.

Impact on native flora

A total of 91 plant species belonging to 35 families were identified in 4 vegetation types (beachfront, thorny shrub, lagoon marsh and sand dune vegetation). Two members of the 4 African element species namely *Salvadora persica, Azima tetracantha* (restricted only to arid and dry zone of Sri Lanka) were recorded in this area. *P.juliflora* being a species fast growing and preferring the same habitat conditions similar to those of *Salvadora persica* repress the spread and growth of this species.

In natural state over 75% of the beach is covered with *Spinifex littoreus* with other native species. Thorny shrub forest in natural state is covered entirely with native species such as *Dichrostachys cinerea, Flueggea leucopyrus, Cassia auriculata, Salvadora persica and Ziziphus* species *etc.*

With the presence of *P. juliflora* a reduction in cover of above species was observed in both of the above vegetation types. *P. juliflora* has invaded the beach near Hambantota town and it is spreading towards Bundala National Park. In thorny shrub forest it invades the disturbed open areas and gradually encroaching the forests interior. The most seriously invaded vegetation is lagoon marsh. More than 75% of the lagoon marsh is replaced by *P. juliflora*. Sometime it acts positively on the ecosystem; example: avoid soil erosion around lagoon, provide resting, feeding and nesting places for birds and in drought periods cattle, elephants, birds, and monkeys feed on parts of this plant.

Impact on human population

As the home gardens, in either sides of roads and paddy fields are highly invaded, it affects the lives of all types of residents due to the presence of poisonous sharp thorns. But at the same time provides shelter and firewood.

Factors contributing towards invasiveness

Throughout the year production of flowers and seeds in large numbers, early flowering, roots sprouting give rise to a large number of new plants. The seed germination study showed direct germination of seeds. The acid treatments resulted to quick germination. Long distance dispersal of seeds takes place through cattle and monkeys. Although this species is restricted to the arid zones, seed germination and percentage survival studies showed the ability to germinate and survive on even in wet zone soil. Highest growth rate and production of root nodules were observed in lagoon marsh soil.

Control measures

Uprooting of small saplings (30 cm in height) is effective. Cutting of trees during drought and cut and burning shows some effectiveness. A Bruchid beetle and Ascomycetes fungus were isolated capable of destroying the seeds.

CONCLUSION

Taking all the facts into consideration *P. juliflora* is at a stage where it should / can be controlled without delay. The invasion is substantial requiring immediate control. Therefore a proper management plan by responsible research institutes should be implemented based on a risk assessment, after analyzing cost benefits of control.

REFERENCES

Central Environmental Authority (CEA), 1993. Wetland Conservation Project: Bundala Wetland Site Report, Sri Lanka.