

PARTHENIUM (*Parthenium hysterophorus* L.) DISTRIBUTION AND ITS BIO-RESOURCE POTENTIAL FOR RICE PRODUCTION IN PUDUCHERRY, INDIA

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ABSTRACT

*Parthenium (Parthenium hysterophorus L.) is an important problematic invasive weed of India. It is known to cause severe economic, environmental, human and animal health problems. It achieved the status of weed of national importance in India. The existence of parthenium was noticed in the Puducherry, a coastal town of South India. Hence, the distribution and its bio-resource potential were investigated on growth and yield of rice at Union Territory of Puducherry during 2008-09. A weed survey, using list or census quadrat method was conducted to study the distribution and intensity of parthenium in Puducherry. A field experiment was carried out to investigate the possibility of using Parthenium weed as a potential bio-resource to increase the rice (*Oryza sativa* L.) production. Results of weed survey indicated that Parthenium had encroached into the majority of villages in Puducherry (87.5%) except the sea shore villages. It was also found to infest the fields of agricultural and horticultural crops like sugarcane, banana and coconut. Results of field experiment indicated that use of parthenium as a nutrient bio-resource significantly increased productivity of rice (4.57 t/ha) compared to non-application (4.13 t/ha) and reduced the fertilizer application by 25%.*

Key words: Bio-resource, parthenium, distribution, rice production

INTRODUCTION

Parthenium (*Parthenium hysterophorus* L.) is a major problematic weed found in India. It releases enormous amount of pollen grains which tend to cause allergy, asthma and dermatitis in human beings. Parthenium is a prolific seed producer (25,000 seeds/plant) which can lead to an enormous soil seed bank of 2, 00,000 seeds/m² (Joshi, 1991).

Recently, parthenium was observed in and around the Union Territory of Puducherry, India. Being obnoxious, parthenium is considered unfit as livestock feed, but it is regarded as potentially useful as an important component of integrated nutrient management to improve soil health and rice yield potential. The present study was undertaken to study distribution of Parthenium in Union Territory and

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explores the possibility of utilizing Parthenium weed biomass as bio-resource for improving the rice productivity.

MATERIALS AND METHODS

Weed survey was undertaken in order to study the distribution and intensity of parthenium in and around coastal town of Puducherry, located in southern part of India. Initially, the particulars on names of villages/hamlets, revenue villages and communes (blocks) in Puducherry was obtained from survey department of Puducherry Union Territory. The list or census quadrat method was adopted to collect data on distribution and intensity of weeds in each revenue village. A list quadrat of 50 x 50 cm was used to record the population of parthenium. Clip quadrat method was adopted to collect data on biomass of parthenium.

Also, a field experiment to study the bio-resource potential of parthenium was conducted at Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal, Puducherry U.T during *kharif* (June –September) 2008 on sandy clay loam soil. The soil had pH of 7.29, low in available nitrogen (172 kg/ha) and high in available phosphorus (33 kg/ha) and potassium (373 kg/ha). The experiment was laid out in factorial randomized block design with nine treatment combinations consisting of three levels of weed organic sources (W_0 : no weed biomass addition, W_1 : parthenium @ 5 t/ha, and W_2 : water hyacinth @ 10 t/ ha) and three levels of fertilizers level (F_0 : 0, F_1 : 75% and F_2 : 100 % recommended Nitrogen, Phosphorus and Potassium (NPK)). Recommended fertilizer dose for rice in Puducherry region is 150:50:50 kg NPK/ha during *kharif* season (June-September month). The weed organic sources - fresh Parthenium and water hyacinth were collected from nearby areas around the institute and incorporated into the soil 15 days before transplanting as per the treatments. Rice cultivar ADT 43 was transplanted with spacing of 20 cm x 10 cm. Data on rice grain and straw yield were subjected to statistical scrutiny as per procedures given by Panse and Sukhatme (1967).

RESULTS

Weed Survey

Results of the weed survey indicated that parthenium had found encroached into majority of villages in Puducherry (87.5% of villages) except sea shore villages of different communes. Out of seven communes in Puducherry, three communes *viz.*, Nettapakkam, Mannadipet and Villanur were encroached by parthenium plants. Population density was ranged from 4 to 76, 4 to 120 and 4 to 168/m², respectively. parthenium fresh weight ranged from 1 to 40

t/ha (Table 1). It is found in the uncared fields, grown with wide spaced crops like sugar cane, banana and coconut, respectively.

Table-1. Intensity, population and fresh weight of Parthenium in different communes of Puducherry, India

S.No	Commune	Intensity (%)	Population range (number/ m ²)	Fresh weight range (t/ha)
1	Puducherry	62.5	4 - 64	4 - 40
2	Oulgaret	50.0	4 - 68	4 - 22
3	Ariyankuppam	66.7	4 - 104	1 - 24
4	Bahour	85.7	4 - 80	1 - 30
5	Nettapakkam	100	4 - 76	1 - 30
6	Mannadipet	100	4 - 120	1 - 30
7	Villianur	100	4 - 168	1 - 30
	Mean	87.5		

Bio-resource Utilization

Parthenium used as bio-resource resulted in rice grain and straw yields of 4.57 and 8.07 t/ha, respectively. Also, incorporation of water hyacinth biomass @ 10 t /ha resulted in significantly higher grain and straw yields of 4.72 and 8.35 t/ha, respectively.

Among fertilizer levels, 100% NPK registered significantly higher grain and straw yields (4.89 and 9.31 t/ha, respectively) than non-application of fertilizers (3.96 and 6.47 t/ha). However, it was found to be at par with application of 75% NPK (4.57 and 8.44 t/ha). In general, grain and straw yields of rice had a linear response with fertilizer levels. The interaction effects were not significant (Table-2).

DISCUSSION

Parthenium occurrence was found to be high in Nettapakkam, Mannadipet and Villanur, where industrialization was more. It is due to variable dormancy behaviour of parthenium weed. So parthenium is found to grow and flower throughout the year unaffected by soil types, soil pH and other climatic conditions (Mani *et al.*, 1976). However, parthenium was less common in coastal villages of Puducherry, where tidal line is less than three kilometres. Results for its bio-resource potential revealed that incorporation of biomass of water hyacinth and parthenium enhanced grain yield of rice by 14.1 and 10.7%, respectively over control.

Additive benefits derived from parthenium and water hyacinth may be due to its macro and micro nutrient availability to crops (Ramasamy, 1990). Availability of nutrients in soil to rice crop resulted in better growth and yield attributes and ultimately rice yield. Also, the problem of emergence of parthenium was not encountered due to

continuous submergence of water under lowland conditions for rice cultivation.

Similar effects of weed biomass utilization on yield of crops were earlier reported by Son and Ramaswami (1997) and Saravanane et al. (2008). It was observed that incorporation of weed biomass and application of 75% fertilizer dose of rice registered grain and straw yields similar to that of application of 100% recommended fertilizer dose, facilitating the reduction of 25% of synthetic fertilizer application.

Table-2. Effect of parthenium weed as bio-resource on grain and straw yields (t/ha) of rice

Treatments	Grain yield (t/ha)	Straw yield (t/ha)
<i>Weed Source</i>		
W ₀ : No weed biomass addition	4.13	7.81
W ₁ : Parthenium @ 5 t/ha	4.57	8.07
W ₂ : Water hyacinth @ 10 t/ ha	4.72	8.35
S.Em.	0.21	0.40
C.D. (P=0.05)	0.44	0.84
<i>Fertilizer levels</i>		
F ₀ : No fertilizer application	3.96	6.47
F ₁ :75% recommended NPK	4.57	8.44
F ₂ :100% recommended NPK	4.89	9.31
S.Em.	0.21	0.40
C.D. (P=0.05)	0.44	0.84
<i>Interaction</i>		
S.Em.	0.36	0.70
C.D. (P=0.05)	NS	NS

NS: Not Significant

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