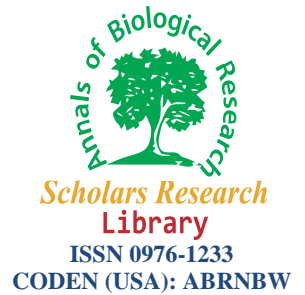




Scholars Research Library

Annals of Biological Research, 2016, 7 (9):45-48
(<http://scholarsresearchlibrary.com/archive.html>)



Prevalence and distribution of *Parthenium hysterophorus* weed in Jaffna peninsula, Sri Lanka

S. Kirshanthan, E. C. Jeyaeelan and J. Nandakumar

Department of Botany, Faculty of Science, University of Jaffna

ABSTRACT

Parthenium hysterophorus is a noxious weed, which causes significant threat on agriculture, human health and biodiversity in several countries including Sri Lanka. Since the first report in late 90s the weed spreads aggressively in many regions in Northern Sri Lanka. There is an urgent need to eradicate the weed from infested sites and prevent further spreading. With this background, present study aimed to identify the major threaten sites in Jaffna peninsula. People were asked via newspaper article to inform about the sites which infested with *P. hysterophorus*. Based on their responds four administrative divisions Valikamam, Vadamarachi, Thenmarachi, and Jaffna town were selected for sampling. Altogether 24 sampling sites were selected from above four divisions. Population density of *P. hysterophorus* was measured in each site by laying 1m quadrat for 20 times. Population density of *P. hysterophorus* ranged between 16 to 78 plants / m² in Jaffna peninsula. Higher infested sites were noticed in Valikamam division and followed by Thenmarachi division (36 plants / m²). Population density of *Parthenium* plants was less in Vadamarachi and Jaffna town divisions, about 17-18 plants / m². The findings reveal that Valikamam division is in higher risk due to invasion of noxious *P. hysterophorus*, therefore, significant actions are needed to manage this weed.

Keywords: *Parthenium hysterophorus*, Jaffna peninsula, Weed, Survey

INTRODUCTION

Parthenium hysterophorus is an aggressive ubiquitous annual herbaceous weed belongs to Asteraceae family. The plant is commonly known as 'altamisa', carrot grass, bitter weed, star weed, white top, wild feverfew, the "Scourge of India" and congress grass [1]. This is a weed of global significance responsible for severe human and animal health issues, such as dermatitis, asthma and bronchitis, and agricultural losses besides a great problem for biodiversity [2]. *P. hysterophorus* is native of north-east Mexico and is endemic in America. Within the past century it has found its way to Africa, Australia, Asia and Pacific Islands and has now become one of the world's seven most devastating and hazardous weeds [1].

P. hysterophorus is fast maturing, erect, and much branched annual or ephemeral herb (Figure 1). It shows two distinct phases in life: juvenile and adult stage. The juvenile stage exhibits a rosette with large, dark green, simple, radicle, and pinnatisect small leaves lacking flowering. The adult stage is erect, much branched with deep tap root system that reaches up to 2 m in height. The stem is hairy, octangular, longitudinally grooved and becomes tough and woody as the plant matures into a hardy bush. Leaves are simple, alternate, pinnately or bipinnately dissected [2]. It is a very prolific seed producer, producing up to 25,000 seeds/plant, leading to large seed bank in the soil [3]. There are several studies have been done in different countries to find out the prevalence and distribution of *P. hysterophorus* [4, 5, 6, 7]. Number of studies have been done to control this weed by using chemical and biological agents [8, 2]. *Parthenium* has been identified as an invasive alien plant in Sri Lanka, after a post-entry risk assessment [9]. The plant has also been listed in the "Weeds of National Significance (WONS)" by the Sri Lanka Council for Agricultural Research Policy (SLCARP) in its National Weed Strategy for 2009-2014 [10] and National

Priorities in Plant Protection Research 2011-2013 [11] thus, indicating the highest-level recognition received by this invasive alien plant to design appropriate management practices.

The invasion of *P. hysterophorus* to Sri Lanka is not clear, however, many people believe that it was introduced from India by various sources. Jaffna peninsula is northern region of Sri Lanka. Nowadays invasive growth of this weed was noticed in several parts of Jaffna (Figure 2). The present study aimed to find out major infested regions and density of *P. hysterophorus* in those regions.

MATERIALS AND METHODS

Selection of sampling sites

P. hysterophorus survey was conducted in four major divisions out of five in Jaffna peninsula. Those divisions were Valikamam, Vadamarachi, Thenmarachi, and Jaffna town. Firstly, the scientific background of *P. hysterophorus* was explained to people through local newspapers and requested to inform about the infested areas from all parts of Jaffna peninsula to Department of Botany, university of Jaffna. *P. hysterophorus* infested sites (Table 1) were selected for the survey based on the responses from general public, farmers and community based agricultural organizations.

Determination of population density of *Parthenium*

Quantitative estimation of *P. hysterophorus* was carried out in the selected sites by random sampling method between 11th June, 2015 to 2nd August 2015. In each site 1meter quadrat was randomly laid for 20 times. In every quadrat, population counts were taken for young, mature and dead *P. hysterophorus* plant. Density of *P. hysterophorus* was determined using following equation.

Plant density = $\frac{\text{Total number of } P. \text{ hysterophorus plants in } 1\text{m}^2 \text{ quadrat in a sampling site}}{\text{Total number of quadrats laid}}$



Figure 1: Mature *P. hysterophorus* plants



Figure 2: Infestation of *P. hysterophorus* weeds near the brinjal cultivation at Urelu

Table 1: *P. hysterothorus* sampling sites in four divisions in Jaffna peninsula

Division	Sampling site	Sampling area (m x m)
Thenmarachi	Kaithady (near Palmyra research institute)	20 x 20
	Kaithady - Kopay road	20 x 20
Valikamam	Kopay North, Rasaveethi junction	20x18
	Kopay central- Manipay Road	20x16
	Kopay- Rasaveethi	20x20
	Kondavil junction	10x10
	Kondavil North	20x20
	Siththivinayakar temple, Punnalaikadduvan	10x10
	Punnalaikadduvan junction	10x10
	Maskan junction- Evinai Road	15x15
	Navakiri-Nilavarai	10x10
	Urumpirai East	30x30
	Urumpirai North	20x20
	Urelu	20x20
	Vasavilan East	10x10
	Evinai	10x10
	Urelu West	10x10
	Rasaveethi, Thoppu-Achuveli	10x10
Maruthanarmadam	15x15	
Thellipalai Junction, Kankesanthurai Road	10x10	
Vadamarachi	Kalluvam Uppuvallai Junction	15x15
	Arasadi-Point Pedro Road	10x10
Jaffna Town	Nayanmarkaddu, Nallur, Jaffna	10x10
	Ariyalai Junction, Kandy road, Jaffna	10x10

RESULTS AND DISCUSSION

This survey confirmed that four major divisions of Jaffna peninsula, namely Valikamam, Vadamarachi, Thenmarachi, and Jaffna town, considerably infested with *Parthenium hysterothorus*. But *P. hysterothorus* was not identified in the islands of Jaffna.

Population density of *P. hysterothorus* ranged between 16 to 78 plants / m² in Jaffna peninsula (Table 2). The lowest and highest density was noticed in Kalluvam-Uppuvallai Junction in Vadamarachi division and Kopay North, Rasaveethi junction in Valikamam division respectively. Higher infested sites were noticed in Valikamam division; the density was higher in village sites compared to town sites. The average density of *Parthenium* plants was less in Vadamarachi and Jaffna town divisions, about 17-18 plants / m². A moderate density was found in Thenmarachi division, 36 plants / m².

The observation during the quantitative survey of *P. hysterothorus* proved that invasion of *P. hysterothorus* from Valikamam division to other non-infested localities is taking place at high rate by means of vehicles and flood water channels. It was observed that population density of *P. hysterothorus* is decrease from Valikamam to Jaffna town division along the K.K.S Road and palaly Road. At the same time *P. hysterothorus* is spreading into new sites laterally from the K.K.S and Palaly Road.

Based on the conversation with native people in Vadamarachi, *P. hysterothorus* seems to be introduced newly after the road development project by which *P. hysterothorus* seeds were introduced along with soil that was brought for Road development. Except these two area there was no other *P. hysterothorus* infested sites in Vadamarachi up to now.

Jaffna town division seems to be lower distribution of *P. hysterothorus* since the urban development project is going on rapidly, bare pasture grounds are being reduced. Hence rapid infestation is not possible but it may serve as the reservoir of *P. hysterothorus* seeds to invade further to town premises.

In this survey, we found that *P. hysterothorus* grows luxuriantly in waste lands, agricultural areas, urban areas and along road sides and railway tracks. The survey was carried out in dry season, however rich growth of *P. hysterothorus* was noticed in almost all sampling sites. It is necessary to repeat this work during monsoon and post monsoon seasons in order to find how temperature and rain influence on *P. hysterothorus* population density in Jaffna peninsula. In most of the sites where we carried out this survey *P. hysterothorus* was the dominant species. It was also noticed that the diversity and number of other plants present in the *P. hysterothorus* infested sites was less than nearby non-infested sites. The aggressive invasive growth of *P. hysterothorus* may affect plants which grow in vicinity.

Table 2: Density of *Parthenium* present in different sites in Jaffna peninsula

Division	Sampling site	Density (plants/m ²)			
		Seedlings	Mature plants	Dead plants	Population density
Thenmarachi	Kaithady (near Palmyra research institute)	22	12	8	34
	Kaithady - Kopay road	20	18	2	38
Valikamam	Kopay North, Rasaveethi junction	48	30	4	78
	Kopay central- Manipay Road	37	21	1	58
	Kopay- Rasaveethi	12	12	1	24
	Kondavil junction	20	11	1	31
	Kondavil North	19	11	1	30
	Siththivinayakar temple, Punnalaikadduvan	13	12	1	25
	Punnalaikadduvan junction	10	14	1	24
	Maskan junction- Evinai Road	19	13	1	32
	Navakiri-Nilavarai	21	15	1	36
	Urumpirai East	17	18	2	35
	Urumpirai North	19	13	1	32
	Urelu	26	26	3	52
	Vasavilan East	18	17	2	35
	Evinai	11	13	3	24
	Urelu West	16	12	1	28
	Rasaveethi,Thoppu-Achuveli	18	18	2	36
Maruthanarmadam	25	16	2	41	
Thellipalai Junction, Kankesanthurai Road	29	20	2	49	
Vadamarachi	Kalluvam Uppuvallai Junction	9	7	1	16
	Arasadi-Point Pedro Road	10	8	1	18
Jaffna Town	Nayanmarkaddu, Nallur, Jaffna	10	8	1	18
	Ariyalai Junction, Kandy road, Jaffna	10	8	1	18

Population density = density of seedlings + density of mature plants; values are average of 20 replicates.

CONCLUSION

Jaffna peninsula is facing high risk due to invasion of noxious *P. hysterophorus*. The weed is being invading without any barrier so, it is going to be a problematic issue in near future. Significant actions are needed to manage the spreading of *P. hysterophorus*.

Acknowledgment

Authors tanks to community members who actively contributed to identify *P. hysterophorus* infected sites.

REFERENCES

- [1] S Patel. *3 Biotech*, **2011**, 1, 1-9.
- [2] M Kaur; NK Aggarwal; V Kumar; Dhiman R. *International Scholarly Research Notices*, **2014**, 2014, 1-12.
- [3] A.Javaid; Adrees H. *Natural Product Research*, **2009**, 23, 16, 1541–1551.
- [4] J Nandakumar; K Suganthan; Kugathasan KS. *Sri Lanka Association for the Advancement of Science*, **2001**, 57, 36.
- [5] M Worku. *African Journal of Agricultural Research*. **2010**, 5, 9, 922-927.
- [6] AJ Mcconnachie; LW Strathie; W Mersie; L Gebrehiwot; K Zewdie; A Abdurehim; B Abrha; Tana T. *Weed Research*, **2011**, 51, 71–84.
- [7] R Kilewa; Rashid A. *International Journal of Science and Research*. **2014**, 3, 12, 1724-1727.
- [8] K Dhileepan; Senaratne KADW. *Weed Research*, **2009**, 49, 557–562.
- [9] S Ranwala; B Marambe; S Wijesundara; P Silva; D Weerakoon; N Atapattu; J Gunawardena; L Manawadu; Gamage G. *Pakistan Journal of Weed Science Research*, **2011**, 18, 863-871.
- [10] R Rajapakse; N Chandrasena; B Marambe; Amarasinghe L. *Pakistan Journal of Weed Science Research*, **2012**, 18, 843-853.
- [11] B Marambe; S Jayaskera; JD Samarasinghe; Kumara WP. In National Priorities in Plant Protection Research – Strategic Approach 2011-2013, Sri Lanka Council for Agricultural Research Policy, Colombo, **2011**, pp.38-45.