

GPS Based Density and Distribution Mapping and Composting a Sustainable Approach for Monitoring and Managing Parthenium (*Parthenium hysterophorus* L.) in Northern Sri Lanka

Kishojini P., Pakeerathan K.* , Mikunthan G.

Department of Agricultural Biology, Faculty of Agriculture, University of Jaffna, Ariviyal Nagar, Kilinochchi, Sri Lanka

Abstract The silent habitat invader Parthenium is a most important problematic weed to native biodiversity and agriculture. Its accidental incursion and quick adaptation in Northern Sri Lanka is considered to be the major threat to the dry-zone agriculture. There is an urgent need for controlling this herbicide tolerant noxious weed to prevent economic crop losses due to allelopathic effect. Investigations were planned for distribution and density mapping and; to manage the Parthenium through bio-composting as substitute for environmentally harmful inorganic fertilizer. For the density based distribution mapping, Geographical Positioning System (GPS) device and 1 m² quadrat were used. For vermi and distillery spent wash (DSW) composting, proportionate Parthenium, cow dung, cow urine, teak leaf, mixed substrates were evaluated in different experiments. Compost performance were evaluated by setting seed germination experiment. The results showed that highest density of Parthenium was found in Jaffna district, whereas it was not found in Mannar district. study was identified that this weed rapidly spreading and invading the new places in Kilinochchi and Mullaithevu districts and; Karainagar, Mathagal, Kangesanthurai, Valveddithurai, Pointpedro, Jaffna town, Kaithady and Chavakachcheri of Jaffna district. In the vermi-composting of Parthenium investigation, treatments used were significantly different from other at $P > 0.05$. Cocoon production and worm multiplication was high in 10g Fresh Parthenium + 200g cow dung treatment. *Amaranthus* seed germination was highly significant in 100g Teak leaves +200g cow dung + 10g Dry Parthenium treatment with the mean of 70.5 ± 8.18 whereas no any germination was recorded in 100g Fresh Parthenium + 200g cow dung and; 100g Dry Parthenium + 200g cow dung treatments. In distillery spent wash compost *Amaranthus* germination was highly significant in distillery spent wash (5ml) + Dry Parthenium (10g) + cow dung (5g) with the mean of 69.13 ± 6.02 . But in distillery spent wash (5ml) + Fresh Parthenium (10g) + cow urine (5ml) and distillery spent wash (5ml) + Dry Parthenium (10g) + cow urine (5ml) treatments germination percentage was significantly very lower. This investigations concluded that Parthenium is invading very quickly to new lands. Allopathic chemicals present in the fresh Parthenium is detrimental to earthworm as well as seed germination. Optimum level of dry Parthenium can be used for the production of compost with the different combinations of other bio-rationales to minimize the usage of inorganic chemicals as well as to alleviate this weed from the ecosystem.

Keywords Parthenium, *Amaranthus*, Earthworm, Distillery spent wash, GPS

1. Introduction

Asteraceae family member Parthenium (*Parthenium hysterophorus* L.) is a one of the world's top seven most aggressive weeds (Gnanavel, 2013). It is native to tropical America. Botanically, Parthenium is a resilient plant, therefore, it can grow in a wide range of soil and climatic

conditions (Khaket *et al.*, 2012; Evans, 1987). Kaur *et al.* (2014) reported that Parthenium has been invaded more than 30 countries around the globe, including five continents and numerous islands within short period of time using its own biological power. This weed known by several region specific common names such as congress weed, rag weed, altamisa, carrot grass, Santa Maria, bitter weed, star weed, white top, wild feverfew and gajar ghas, the "scourge of India" (Saini *et al.*, 2014). Parthenium has numerous beneficial chemical and pharmacological properties including anti-cancer effects, antioxidant and anti-inflammatory activities (Pandey *et al.*, 2012; Saini *et al.*, 2014; Venkataiah *et al.*, 2003), hypoglycemic activity (Patel *et al.*, 2008), antibacterial activity against *Staphylococcus*

* Corresponding author:

pakeerathank@univ.jfn.ac.lk (Pakeerathan K.)

Published online at <http://journal.sapub.org/ijaf>

Copyright © 2018 The Author(s). Published by Scientific & Academic Publishing

This work is licensed under the Creative Commons Attribution International

License (CC BY). <http://creativecommons.org/licenses/by/4.0/>