



## Distribution of microorganisms in the *Parthenium* weed infested soil of Tamil Nadu

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### ABSTRACT

Survey conducted to assess the distribution of soil microorganisms in the *Parthenium* infested soils of Tamil Nadu revealed that the *Parthenium* infested soil harboured 13 microorganisms that included *Aspergillus niger*, *A. flavus*, *A. fumigatus*, *Chaetomium globosum*, *Corynespora cassicola*, *Curvularia lunata*, *Curvularia* sp., *Eurotium chavelari*, *Fusarium oxysporum*, *F. moniliforme*, *Monilia* sp., *Rhizopus stolonifer* and *Trichoderma harzianum*. Among this, *A. niger* and *R. stolonifer* were found to be present throughout Tamil Nadu. Both *A. flavus* and *T. harzianum* ranked next with an equal distribution of 78.57 per cent. *Monilia* sp. and *C. cassicola* represented poor percentage distribution (17.86%) in Tamil Nadu.

**Key words :** *Parthenium* weed, soil microorganism, distribution.

### INTRODUCTION

*Parthenium hysterophorus* L. commonly known as congress weed belonging to the family Asteraceae is considered to be a native of West Indies and North East America. In India, it was first reported in the year 1956 from Pune in Maharashtra state (Bennett *et al.*, 1978) and now it has spread to almost all states from Kashmir to Kanyakumari and Gujarat to Arunachal Pradesh (Towers and Subbarao, 1992). It occupies over 5 million hectare of land in the country. The perusal of the literature revealed that *Parthenium* is a prolific seed producer with seed bank estimated at 2, 00,000/m<sup>2</sup> in the abandoned fields (Joshi, 1991). More than 340 million seeds per ha can be present in the surface soil. Seeds buried at 5cm below soil surface survived for at least 2 years, whereas seeds on the soil surface did not survive for longer than 6 months (Sankaran, 2007). Seeds do not have a dormancy period and are capable of germinating anytime when moisture is available. The highest germination rates are at temperatures ranging from 12° to 27° C. In general, soil microorganisms play an important role in checking its seed germination and seedling establishment (Jeyalakshmi *et al.*, 2003; Adkins *et al.*, 2005). Hence, a preliminary survey was conducted to assess the distribution of soil microorganisms in the *Parthenium* infested soils of Tamil Nadu.

### MATERIALS AND METHODS

A total of 10 soil samples were collected from Coimbatore, Cuddalore, Dindigul, Dharmapuri, Erode, Kanchipuram, Kanyakumari, Karur, Madurai, Nagapattinam, Namakkal,

Perambalur, Pudukottai, Ramanathapuram, Salem, Sivagangai, Thanjavur, The Nilgris, Tirunelveli, Tiruvellore, Tiruvarur, Tiruvannamalai, Tiruchirapalli, Tutucorin, Theni, Vellore, Villupuram and Virudunagar districts of Tamil Nadu, India, just below the *Parthenium* bush along with leaf litters and used for the isolation of soil microorganisms. The serial dilution of each soil sample was prepared individually in sterile distilled water up to 10<sup>-4</sup> dilutions and the microorganisms present in each sample was isolated using Rose Bengal Medium and *Trichoderma* special medium (Warcup, 1960). The plates were aseptically incubated at room temperature (28 ± 2°C) for three days. The fungal colonies from the plates were transferred into agar slants and identified based on their cultural and morphological characters (Ainsworth, 1961). and confirmed with CAB - International Mycological Institute, Kew, Surrey, England, UK.

### RESULTS AND DISCUSSION

The results revealed that a total of 13 fungi including *Aspergillus niger*, *A. flavus*, *A. fumigatus*, *Chaetomium globosum*, *Corynespora cassicola*, *Curvularia* sp., *Curvularia lunata*, *Eurotium chevelari*, *Fusarium oxysporum*, *F. moniliforme*, *Monilia* sp., *Rhizopus stolonifer* and *Trichoderma harzianum* were isolated from the *Parthenium* infested soils of Tamil Nadu with different per cent distribution. Among this, *A. niger* and *R. stolonifer* had 100 per cent distribution followed by *A. flavus*, *Trichoderma harzianum*, *Curvularia lunata* and *F. moniliforme* (Table 1). Luke (1976) had isolated

**Table 1.** Occurrence of soil - borne pathogens / microorganisms in *Parthenium* infested soil of Tamil Nadu

Microorganisms	IMI Number	Districts Name	Percent distribution
<i>Aspergillus niger</i> Van. Tieghem	-	All districts.	100.00
<i>A. flavus</i> Link ex. Fr.	-	Coimbatore, Dindigul, Erode, Kanchipuram, Kanyakumari, Karur, Madurai, Nagapattinam, Namakkal, The Nilgris, Ramanathapuram, Salem, Sivagangai, Tanjavur, Trivannamalai, Tiruvarur, Tirunelveli, Trichy, Theni, Vellore, Villupuram and Virudhunagar.	78.57
<i>A. fumigatus</i> Fries.	-	Cuddalore, Dharmapuri, Erode, Kanchipuram, Kanyakumari, Karur, Nagapattinam and Salem.	28.57
<i>Chaetomium globosum</i> Kunze.	-	Coimbatore, Erode, Karur, Madurai, Ramanathapuram, Tiruvannamalai, Tuticorin and Virudhunagar.	28.57
<i>Eurotium chevelari</i> Mangin.	379994	Dindigul, Dharmapuri, Karur, Nagapattinam, The Nilgris, Pudukottai, Salem, Tanjavur, Tiruvallore, Tiruvarur, Tirunelveli, Trichy and Tuticorin.	46.43
<i>Curvularia lunata</i> R.R. Nelson & F.A. Haesis	378927	Coimbatore, Dharmapuri, Karur, Madurai, The Nilgris, Pudukottai, Ramanathapuram, Salem, Tiruvannamalai, Tiruvarur, Tirunelveli and Tuticorin.	42.86
<i>Curvularia</i> sp.	379999	Erode, Ramanathapuram, Theni and Vellore.	14.29
<i>Corynespora cassicola</i> Berk & M.A. Curtis	379985	Coimbatore, Erode, Sivagangai, Theni and Vellore.	17.86
<i>Fusarium oxysporum</i> Sch. Ex. Fries.	-	Cuddalore, Dharmapuri, Kanchipuram, Perambalur, Theni and Vellore.	21.43
<i>F. moniliforme</i> Sheld.	-	Coimbatore, Dharmapuri, Kanchipuram, Karur, Perambalur, Salem, Pudukottai, Ramanathapuram, Tanjavur, Tiruvallore and Theni.	39.29
<i>Monilia</i> sp.	-	Cuddalore, Dindigul, Erode, Namakkal and Theni.	17.86
<i>Rhizopus stolonifer</i> (Ehren. ex. Fr.) Vuill.	-	All districts.	100.00
<i>Trichoderma harzianum</i> Rifai.	-	Coimbatore, Cuddalore, Dindigul, Dharmapuri, Kanchipuram, Erode, Kanyakumari, Karur, Nagapattinam, Madurai, Namakkal, Perambalur, Pudukottai, Ramanathapuram, Salem, Tanjavur, Tirunelveli, Trichy, Theni, Vellore, Villupuram and Virudhunagar.	78.57

*Alternaria tenuis*, *Aspergillus flavus*, *A. niger*, *A. ochraceus*, *A. sulphurus*, *A. candidus*, *Cladosporium herbarum*, *Curvularia lunata*, *Helminthosporium tetramera*, *Fusarium* sp., *Myrothecium roridum*, *Penicillium* sp., *Phoma glomerata*, *Pythium intermedium*, *Rhizopus nigricans*, *Starkeomyces korchelamoides*, *Theilavia terricola*, *Trichoderma viride* and *Verticillium albo-atrum* from the rhizosphere of *Parthenium* weed at post flowering stage and concluded that the root exudates played an important role in the composition of root mycoflora. Begum and Houssain (1989) opined that

*A.niger*, *A.tamarii*, *Curvularia* sp. and *Trichoderma* sp. were predominant in rice, jute, sugarcane and blackgram fields and suggested that the distribution of microorganisms in soil was dependent on the leaf litter composition (organic matter content), soil type, pH, hydrothermal condition etc. Crist and Friese (1993) too have reported that the ubiquitous nature of fungi in soil can affect the seed survival directly through decomposition or pathogenesis thereby playing an important role in soil seed dynamics. Javaid and Adress (2009) and Kumar *et al.* (2009) identified herbicidal

activity of *Cladosporium* sp. against *Parthenium*. The present survey correlates with previous reports envisages the pathogenic nature of *Curvularia lunata*, *Fusarium moniliforme* and *F. oxysporum* (Aneja and Manpreet Kaur, 1995; Pandey *et al.*, 1992) in *Parthenium*. The findings pave the way for future researchers to assess the impact of these organisms in *Parthenium* seed germination and its establishment in the natural ecosystems.

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