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

C. Jeyalakshmi and V. Valluvaparidasan

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 chevelari, 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/m² 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, Tiruvanamalai, Tiruchirapalli, Tutucorin, Thuni, 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 10⁻⁴ 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 lunata, Curvularia sp., 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>
<thead>
<tr>
<th>Microorganisms</th>
<th>IMI Number</th>
<th>Districts Name</th>
<th>Percent distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspergillus niger Van. Tieghem</td>
<td>-</td>
<td>All districts.</td>
<td>100.00</td>
</tr>
<tr>
<td>A. flavus Link ex. Fr.</td>
<td>-</td>
<td>Coimbatore, Dindigul, Erode, Kanchipuram, Kanyakumari, Karur, Madurai, Nagapattinam, Namakkal, The Nilgris, Ramanathapuram, Salem, Sivagangai, Tanjavur, Trivunnalamalai, Tiruvur, Tirunelveli, Trichy, Theni, Vellore, Villupuram and Virudhunagar.</td>
<td>78.57</td>
</tr>
<tr>
<td>A. fumigatus</td>
<td>-</td>
<td>Cuddalore, Dharmapuri, Erode, Kanchipuram, Kanyakumari, Karur, Nagapattinam and Salem.</td>
<td>28.57</td>
</tr>
<tr>
<td>Chaetomium globosum Kanze.</td>
<td>-</td>
<td>Coimbatore, Erode, Karur, Madurai, Ramanathapuram, Tiruvannalai, Tuticorin and Virudhunagar.</td>
<td>28.57</td>
</tr>
<tr>
<td>Eurotium chevelari Mangin.</td>
<td>379994</td>
<td>Dindigul, Dharmapuri, Karur, Nagapattinam, The Nilgris, Pudukottai, Salem, Tiruvalluru, Tiruvur, Tirunelveli, Trichy and Tuticorin.</td>
<td>46.43</td>
</tr>
<tr>
<td>Curvularia lunata</td>
<td>378927</td>
<td>Coimbatore, Dharmapuri, Karur, Madurai, The Nilgris, Pudukottai, Ramanathapuram, Salem, Tiruvannamalai, Tiruvur, Tirunelveli and Tuticorin.</td>
<td>42.86</td>
</tr>
<tr>
<td>Curvularia sp. Berk &amp; M.A. Curtis</td>
<td>379999</td>
<td>Erode, Ramanathapuram, Theni and Vellore.</td>
<td>14.29</td>
</tr>
<tr>
<td>Fusarium oxysporum Sch. Ex. Fries.</td>
<td>379085</td>
<td>Coimbatore, Erode, Sivangagai, Theni and Vellore.</td>
<td>17.86</td>
</tr>
<tr>
<td>F. moniliforme Sheld.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monilia sp.</td>
<td>-</td>
<td>Cuddalore, Dharmapuri, Kanchipuram, Perambalur, Theni and Vellore.</td>
<td>21.43</td>
</tr>
<tr>
<td>Rhizopus stolonifer (Ehren. ex. Fr.) Vuill.</td>
<td>-</td>
<td>Coimbatore, Dharmapuri, Kanchipuram, Karur, Perambalur, Salem, Pudukottai, Ramanathapuram, Tanjavur, Tiruvalluru and Theni.</td>
<td>39.29</td>
</tr>
<tr>
<td>Trichoderma harzianum Rifai.</td>
<td>-</td>
<td>Cuddalore, Dindigul, Erode, Namakkal and Theni.</td>
<td>17.86</td>
</tr>
</tbody>
</table>

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

Alteraria tenuis, Aspergillus flavus, A. niger, A. ochraceus, A. sulphurus, A. candidus, Cladosporium herbarum, Curvularia lunata, Helminthosporium tetramera, Fusarium sp., Myrothecium roridum, Penicillium sp., Phoma graminea, Pythium intermedium, Rhizopus nigricans, Starkeomyces korcheelamoides, 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.

REFERENCES


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