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# Pathogenicity of Some Fungi to *Parthenium*, an Obnoxious Weed in Madhya Pradesh

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**ABSTRACT**

**Pathogenicity of nineteen fungi isolated earlier from living and diseased parts of exotic weed *Parthenium hysterophorus* L., in Madhya Pradesh was tested. *Colletotrichum gloeosporioides*, *Alternaria alternata*, *A. dianthi*, *A. macrosporus*, *Myrothecium roridum*, *Fusarium oxysporum*, *F. moniliforme*, *Phoma herbarum* and *Bipolaris* sp. were found to cause considerable damage to the weed under laboratory conditions.**

KEY WORDS : *Parthenium hysterophorus*, fungi, control potential

The exotic weed *Parthenium hysterophorus* L. is a serious environmental, agricultural and medical hazard in various states of India (Kanchan, 1975; Towers *et al*, 1977; Subba Rao *et al.*, 1978; Joshi, 1987). Considerable sum of money and human and fossil energy are spent for mechanical and chemical control. Plant pathogens, especially fungi have been successfully used in the past to control unwanted weeds (Templeton, 1990; Templeton and Heiny, 1990 and Van Dyke, 1991). Phytopathogenic fungi being highly virulent, host specific, genetically stable, environmentally safe and having a wide range of parasitism, offer great potential as mortality agents for many trouble-some weeds including *Parthenium* in India.

During a survey of microbial diseases of *Parthenium*, nineteen fungi were isolated from its living as well dead parts (Rajak *et al.*, 1990). In the present work, the pathogenic potentiality of these fungi was investigated.

## MATERIALS AND METHODS

Standard mycopathological techniques (Conway, 1979; Agarwal and Hasija, 1986) were followed. Plants were raised in earthen pots. Aqueous suspension of conidia prepared in sterile distilled water with 0.05% (W/V) oxysorbic (20 POE) polyoxyethylene sorbitan mono-oleate surfactant (Tween 80) at concentration of 2-2.3 x $10^1$ conidia/ml were applied by wetting the foliage of the seedlings in the four to five leaf stage. Control plants were sprayed with sterile distilled water. Immediately following inoculation, plants were placed in Environmental Test Chamber (Remi CH-6 A) at 28°C ± 1°C and RH 95% for 48 h and then removed to green house benches and evaluated 14 days after inoculation for disease potentiality.

Pathogenicity of wilt inducing fungi was determined following the methods of Scheffer and Walker (1953) and Sati and Grewal (1981). The effect of spore suspensions on seed germination and seedling growth were tested as per Mortensen and Hsiao (1987). The treatments were replicated thrice and the experiment repeated twice. For data analysis, methods of Mortensen (1985) were followed.

## RESULTS AND DISCUSSION

Results presented in Table-1 show that the maximum reduction in the height as compared to control was observed in the plants treated with *Collectotrichum gloeosporioides* followed by *Alternaria alternata, Myrothecium roridum, Fusarium moniliforme, F. oxysporum, Phoma herbarum, Bipolaris* sp. and *Alternaria*

**Table 1. Response of *P. hysterophorus* to spores of various fungi in green house experiments (average of 30 plants after 14 days of inoculation, at 28 ± 1°C, 95% RH)**

| Name of the fungi tested | Dose Spores/ ml X $10^2$ | Reduction in height** of treated plant (in cm) | % disease damage in leaf | % plant killed | %inhibition of seed germination (a) | % seedling mortality | Disease Index |
|---|---|---|---|---|---|---|---|
| *Alternaria alternata* | 2.1 | 7.6 | 95 | 95 | 98 | 100 | A |
| *A. dianthi* | 2.2 | 2.5 | 90 | 91 | 90 | 90 | A |
| *A. macrosporus* | 2.1 | 5.5 | 92 | 93 | 85 | 80 | A |
| *Acremonium alternatum* | 2.0 | 1.0 | 15 | 5 | 80 | 70 | B |
| *Aspergillus niger* | 2.3 | 1.0 | 5 | 2 | 100 | - | C |
| *Chaetomium globosum* | 2.1 | 1.0 | 5 | 1 | 100 | - | C |
| *Cladosporium gladosporioides* | 2.2 | 2.2 | 20 | 3 | 60 | 20 | D |
| *Colletotrichum gloeosporioides* | 2.2 | 8.0 | 98 | 100 | 98 | 100 | A |
| *Curvularia lunata* | 2.1 | 1.5 | 40 | 5 | 80 | 75 | B |
| *C. senegalensis* | 2.2 | 2.0 | 35 | 10 | 85 | 66 | B |
| *Dreschlera indica* | 2.2 | 2.5 | 30 | 15 | 75 | 48 | B |
| *Fusarium oxysporum* | 2.3 | 6.5 | 100* | 100 | 90 | 100 | A |
| *F. moniliforme* | 2.1 | 7.3 | 100* | 100 | 98 | 100 | A |
| *Bipolaris* sp. | 2.3 | 5.5 | 80 | 85 | 75 | 50 | C |
| *Myrothecium roridum* | 2.2 | 7.5 | 98 | 100 | 95 | 100 | A |
| *Pestalotia* sp. | 2.0 | 2.5 | 25 | 20 | 40 | 50 | C |
| *Paecilomyces varioti* | 2.2 | 2.1 | 15 | 5 | 80 | 60 | C |
| *Phoma herbarum* | 2.3 | 5.5 | 90 | 95 | 90 | 100 | A |
| *Rhizopus stolonifer* | 2.2 | 1.0 | 5 | 2 | 100 | - | C |

* Complete leaves become Yellow and fall down

* * Height of control plants = 10.0 cm

(a) =Average of three methods- (i) Blotter, (ii) seed + spore suspension + soil, (iii) soil + spore suspension + seed

Disease index (overall assessment)
A = Most effective
B = Slightly higher
C = Moderate
D = Less effective

*macrosporus*. At this stage, it was difficult to interpret the actual relationship of the treatment and reduction in the height of the plants. In addition, the above mentioned fungi also caused significant damage to the leaves and mortality of the plants. Most of the fungi tested also inflicted 75-100% inhibition in seed germination and seedling mortality. *Aspergillus niger* and *Rhizopus stolonifer* failed to cause sufficient damage to the leaves, but caused significant inhibition of seed germination, indicating their seed borne nature.

Culture filtrates of *F. oxysporum* and *F. moniliforme* caused drooping, yellowing and wilting of leaves and stem tips. Collapse of vascular elements in proximal portion of the leaves was also seen. Wilted plants in incipient stage when placed in distilled water, failed to recover, indicating irreversible nature of wilting. The culture filtrate was also toxic to the seeds as it caused significant inhibition of seed germination. However, the chemical nature of the culture filtrate is yet to be determined.

The present findings reveal that some of the fungi tested possess considerable potentiality and needs thorough investigations to understand their disease cycle, specificity and safety towards non- target organisms which are underway in this laboratory.

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