

Effect of Trichoderma Seed Dressing On Rhizoplane Mycoflora of Brassica Juncea

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ABSTRACT

Two varieties of Brassica juncea (L.) czern. and coss. cv. Varuna (containing high amount of glucosinolate) and selection EH-3 (containing very low amount of glucosinolate) were selected for rhizoplane study. The seeds of Brassica juncea cv. EH-3 and Varuna were treated with Trichoderma-talk powder. The rhizoplane mycoflora were isolated at different stages of plant growth. These mycoflora were isolated by serial root washing technique. Aspergillus sp. Curvularia lunata, Alternaria sp., F. oxysporum and Trichoderma viride are the most common fungi isolated during the investigation. Percent incidence of pathogenic fungi like Alternaria sp. were found less.

Keywords : Brassica juncea, Glucosinolate content, Rhizoplane mycoflora, Trichoderma treatment, Pathogenic fungi incidence

INTRODUCTION

The term rhizoplane was proposed by Clark (1949) and described the immediate external surface of plant roots together with closely adhering soil particles or root debris. Rhizoplane microorganisms may be isolated from the root scraping or serial root washing and the data thus obtained are related to a root surface basis and not to a soil basis while, Rovira, *et al.*, (1974) studied the rhizoplane directly in microscopy and estimated the 10 fold more bacterial population than estimated by plate count method. Since, soil is loaded with a variety of microorganisms, and plants depend for their nutrition and growth on soil, a complex relationship exists between plant roots and soil. The resultant biological and biochemical

interactions extend beyond rhizoplane to the rhizosphere. Rhizoplane provide nutrient base for many species of bacteria and fungi. Vuurde (1978) studied the rhizoplane microflora of wheat and due to the urea leaf treatment he found that the bacteria and actinomycetes were stimulated after seven and nine days but the total number of fungi reduced after nine days. Atique *et al.*, (1982) found that the number of rhizoplane fungal species of gram were highest during the vegetative period and declined with flowering and reached to minimum during fruiting. Satyaprasad (1982) demonstrated the rhizoplane mycoflora of susceptible and resistant variety. The 15 days old susceptible variety shows the dominance of *A. flavus* and *Fusarium* spp., while later on *Fusarium* spp.,

dominated in later stages of the plant growth. While, resistant variety exhibited the dominance of *Acrophilphora* spp., *A. flavus*, *A. niger* and *Monocillium* spp., at all stages of plant growth. Ansari and Prakash (1986) reported *A. terreus* with highest frequency value and *Mucor globosus*, *Drechslera australiensis* and *Humicola Fuscoatra* with lowest frequency value in diseased plant. However, healthy plant shows highest frequency of *A. flavus* and lowest for *Thielavia terricola*. With respect to economical importance of mustard in India and worldwide the present study is based on two varieties of *Brassica juncea* (L.) czern. and coss. cv. Varuna (containing high amount of glucosinolate) and selection EH-3 (containing very low amount of glucosinolate). Mehrotra and Claudius, (1974), Dhedhi et al., (1990) studied the rhizosphere and rhizoplane of wilted and root-rot diseased plant of *Lens culinaris* and Chickpea plants, respectively and suggested that the diseased plants and healthy plants both show considerable variation in rhizosphere and rhizoplane mycoflora. By considering their characters as high glucosinolate, high erucic acid and susceptible to white rust and *Alternaria* leaf spot in cultivar variety Varuna while low glucosinolate, zero erucic acid and resistant to white rust in selection line EH-3, the investigation was carried for rhizoplane mycoflora at different stages of plant growth.

Material and Methods:

1. **Description of the study area:** To investigate the rhizosphere mycoflora of *Brassica juncea* var. Varuna and cultivar line EH-3 were selected for experimental study. The seeds were procured from the Dhara Vegetable Oil and Foods Company Ltd. (DOFCO) sponsored project, Department of Botany, R.T.M. Nagpur University, Nagpur, Maharashtra, India. The seeds were grown in the field and foliar applications were made to alter the rhizoplane mycoflora (Plate I).

2. **Seed Dressing:** Antagonistic effect of *Trichoderma* was checked by seed dressing technique. For this *Trichoderma* powder was made as per the procedure of *Trichoderma*-Talc-powder formulation (Sinha, 2001). *T. viride* isolate II was grown on PDA plate for 8 days. Peptone dextrose broth was prepared and dispensed at the rate of 100 ml in each 250 ml Erlenmeyer flask. Discs were cut with sterilized cork borer from the plate cultures of *T. viride* II and inoculated at $28 \pm 10^\circ\text{C}$ for 7 days.
3. **Isolation of rhizoplane mycoflora:** The Rhizoplane mycoflora were isolated by serial-root washings technique (Harley and Waid, 1955) –(Plate II & III).
4. **Identification of Mycoflora:** The fungi isolated from rhizosphere and rhizoplane were identified with the help of standard literature available in the Department. (Nagmani et.al. 2006, Booth, 1977, Raper and Fennell, 1965 and Raper and Thom, 1949.).



Plate I : Brassica juncea cv EH-3 and Varuna field at Department of Botany, RTM Nagpur University Nagpur

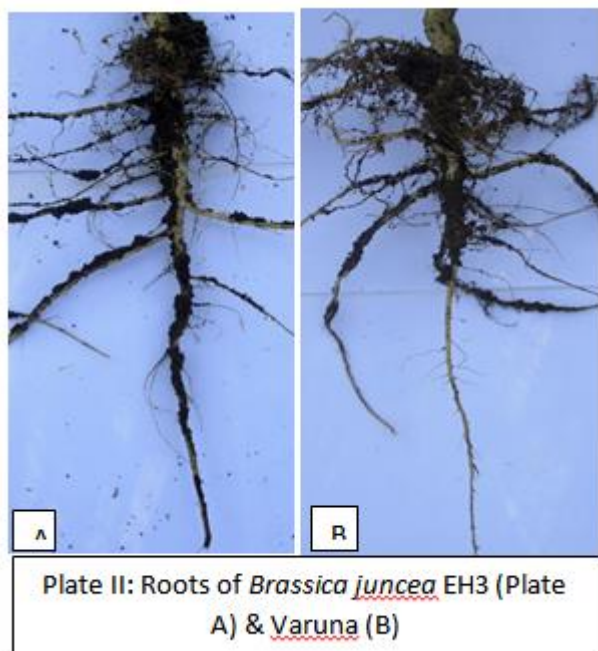


Plate III: Rhizoplane mycoflora of Brassica juncea cv. EH-3 and Varuna

Result & Discussion

Trichoderma powder was used for the seed dressing of EH-3 and Varuna. *Aspergillus niger*, *A. fumigatus*, *A. terreus*, *C. lunata*, *F. oxysporum* and *Trichoderma viride* were isolated throughout the growth of plants of EH-3. Similarly, *Aspergillus niger*, *A. nidulans*, *Alternaria alternata*, *F. graminearum*, *F. oxysporum* and *Trichoderma viride* were isolated at all the stages of plant growth of Varuna (Table 1).

Occurrence of fungi also varied with the age of plants. At seedling stage of EH-3 *Aspergillus nidulans*, *A. terreus*, *F. oxysporum*, *Trichoderma viride* and

Rhizopus sp. were the most dominant. *Trichoderma viride* and *Aspergillus niger* were the dominant fungi during flowering and maturity stages, respectively. Similarly, in seedling stage of Varuna *Alternaria alternata*, *Curvularia lunata*, *F. oxysporum* and *Trichoderma viride* were the most dominant fungi while at flowering stage *Aspergillus fumigatus*, *Curvularia lunata* and *Fusarium oxysporum* were found to be the most dominant whereas at maturity *Aspergillus nidulans*, *Trichoderma viride* and *Fusarium oxysporum* were most dominant. Seed treatment with biocontrol agents for disease management particularly against soil-borne pathogens was attempted by many workers like Papavizas (1985), Kehri and Chandra (1991) Harman and Hadar (1983) reported that seed treatment with *Trichoderma* spp. prevents emergence of damping off and Suriachardraselvan et al., (2004) also used the seed treatment technique with the help of *Trichoderma* spp. for the control of Charcoal rot in sunflower caused by *Macrophomina phaseolina*.

The result showed that *Trichoderma viride* I and II occurred throughout the growth of plants. Similar results were obtained by Roy and Pan (2004). They showed that all the isolates (wild and mutants) of *Trichoderma harzianum* and *T. virens* multiplied in groundnut rhizosphere soil at different stages of plant growth. Shankar and Jeyarajan (1996) stated that proliferation of *Trichoderma* population in the rhizosphere takes place due to seed treatment with *Trichoderma* sp.

Table 1: Rhizoplane mycoflora of *Brassica juncea* at different stages of plant growth when treated with *Trichoderma*.

S. No.	Fungal isolates	Control						EH-3			Varuna		
		EH-3			Varuna			TSD			TSD		
		S	F	M	S	F	M	S	F	M	S	F	M
1	<i>Absidia</i> sp.	-	-	-	-	-	-	-	-	6.25	6.82	6.45	-
2	<i>Alternaria alternata</i>	-	6.45	-	-	9.68	12.50	4.55	-	6.25	6.82	4.84	3.51
3	<i>Alternaria</i> sp.	-	9.68	7.69	-	9.68	9.38	-	5.26	4.17	-	3.23	-
4	<i>Aspergillus flavus</i>	7.41	9.68	7.69	8.70	6.45	9.38	4.55	5.26	-	-	-	8.77
5	<i>Aspergillus fumigatus</i>	14.81	12.90	10.26	8.70	9.68	12.50	6.82	8.77	10.42	-	9.68	7.02
6	<i>Aspergillus nidulans</i>	7.41	3.23	7.69	-	9.68	-	11.36	7.02	8.33	6.82	8.06	8.77
7	<i>Aspergillus niger</i>	18.52	12.90	12.82	17.39	9.68	6.25	9.09	7.02	12.50	4.55	8.06	12.28
8	<i>Aspergillus terreus</i>	-	-	2.56	-	-	-	11.36	3.51	10.42	9.09	-	8.77
9	<i>Curvularia lunata</i>	14.81	9.68	15.38	17.39	12.90	9.38	2.27	7.02	10.42	11.36	9.68	5.26
10	<i>Curvularia</i> sp.	11.11	9.68	7.69	13.04	-	9.38	-	10.53	6.25	4.55	-	-
11	<i>Drechslera</i> sp.	-	-	-	-	6.45	-	9.09	-	8.33	-	-	3.51
12	<i>Fusarium graminearum</i>	-	-	-	-	-	-	6.82	-	2.08	9.09	8.06	8.77
13	<i>Fusarium oxysporum</i>	14.81	9.68	15.38	8.70	6.45	15.63	11.36	3.51	8.33	11.36	9.68	10.53
14	<i>Fusarium</i> sp. 1	3.70	9.68	-	13.04	9.68	9.38	9.09	7.02	-	-	3.23	-
15	<i>Fusarium</i> sp. 2	-	-	-	-	-	-	-	-	-	4.55	8.06	3.51
16	<i>Helminthosporium</i> sp.	-	-	-	-	-	-	2.27	5.26	-	-	6.45	1.75
17	<i>Phoma</i> sp.	-	-	-	-	-	-	-	-	6.25	4.55	-	-
18	<i>Rhizopus</i> sp.	7.41	6.45	5.13	13.04	6.45	6.25	11.36	10.53	-	9.09	6.45	5.26
19	<i>Trichoderma viride</i>	-	-	-	-	-	-	11.36	12.28	10.42	11.36	8.06	12.28
20	Mycelia sterilia	-	-	-	-	3.23	-	-	7.02	-	-	-	-
TSD - <i>Trichoderma</i> Seed Dressing													

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