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ORIGINAL ARTICLE

Seed Mycoflora of Coriander and Effect of Some Fungal Metabolite on Seed Germination and Seedling Growth

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Abstract

Coriander seed samples were collected from different Mandi's, shops, farms, farmers and seed division of Kota. 30 samples of seeds were tested by three different methods for their mycoflora. 23 fungal pathogens were isolated. Their frequency in samples and percentage relative density in seeds were recorded. Only six fungi showed presence in all the samples. Aspergillus niger showed maximum percentage relative density in seed. In another set of experiments metabolites of all the six fungi showing 100 percent frequency were tested for the effect of their metabolite on seed germination and seedling growth. All the six fungal metabolites affect seed germination and seedling growth with various degree of inhibition. Maximum inhibition in seed germination was observed in Rhizoctonia solani and maximum reduction in seedling growth was observed in Fusarium solani.

KEYWORDS: *Coriandrum sativum, fungal metabolites, seed mycoflora, seed germination, seedling growth.*

INTRODUCTION

Coriander (*Coriandrum sativum* L) seeds have great economical and medicinal value. In Kota district of Rajasthan coriander is grown in 38160 hectare with a production of 11.79 lac quintals (J D. Deptt. of agriculture, Kota) Many fungal pathogen get established internally and externally during pre-harvest period [1]Many pathogens get associated with seeds during transit and storage. These pre-harvest and post-harvest mycoflora not only cause seed deterioration but also make seed unfit for human consumption [2]**.** In many cases the fungi affect the seeds during storage through the production of toxic metabolite [3]. There are many reports on seed mycoflora of coriander and their effect on seeds [4, 5].

Present study deals with the screening of coriander seeds of Kota region for fungal mycoflora and their effect on seed germination and seedling growth.

MATERIAL AND METHOD:-

Collection of samples: Seed samples were collected from different shops, farmers, agricultural farms and seed division of Kota. Total 30 seed samples were collected in separate polythene bags.

1.Washing Test: Two-gram seeds were shaken for 10 minutes with 10 ml of water on mechanical shaker and the suspension was centrifuged at 3000 rpm for 30 minutes. Supernatant was discarded and spores were again suspended in two ml of lacto-phenol. Quantitative estimation was done by using haemocytometer [6]

1.Blotter Method: 25 seeds were sown in plastic Petri plates with three layers of blotter moistened with tap water and inoculated at 25 +/- 1^0 C for seven days. [7]. Associated mycoflora were examined under stereo-binocular microscope.

2.Agar plate Method: PDA was used in glass Petri-plates in place of blotters. 10 seeds per plate were placed equidistantly. For storage fungi 180 gm of sodium chloride per litre of PDA was added. The seeds were pre-treated

with 1% $HgCl_2$ before placing. The plates were placed at 15^0C as low temperature is useful for the growth of endogenous fungi. The isolated mycoflora were recorded and identified with the help of different manuals. [8,9 - 15].

3.Preparation of Fungal Metabolite: The fungi were cultured on Czapeks media (KH_2PO_4 1.0 gm,$MgSO_4$-0.5 gm, KCl 1.0 gm, $FeSO_4$ traces, Yeast powder 0.5 gm, $NaNO_3$ -2.0 gm, Dextrose 10.0 gm, Agar Agar 15.0 gm in one litre solution) for seven days at 25 $^+$/$_-$ 1^0C, fungal mycelia from pure culture were aseptically transferred to liquid Czapek's media and cultured for 10 days at 25 $^+$/$_-$ 1^0C, filtered with Whatman filter paper no. I and centrifuged at 10,000 rpm for 10 minutes. The filtrate was used to soak the seeds. The treated seeds were then put to germination test. Percent germination and seedling growth were recorded.

RESULT AND DISCUSSION: Twenty-three fungi were isolated from the thirty samples. The frequency of isolated fungi ranged from 3.33 percent (present only in one sample) in *Verticillium dahliae* and *Chaetomium cochliodes* to 100 percent (present in all the thirty samples) in *Alternaria alternata, Fusarium moniliformal, Rhizoctonia solani, Curvularia lunata Aspergillus niger* and *Aspergillus flavus. Alternaria solani* showed presence in twenty eight samples. *Colletotrichum capsici* [10] and *Ascochytq* spp. [11] pathogen of coriander were not found in any sample, however Stem gall pathogen *Protomyces macrosporus* was found in more than 50 per cent samples.

TABLE I
MYCOFLORA OF CORIANDER SEEDS

S. No.	Seed Mycoflora	No. of Samples Showing Presence	Frequency in Sample (30)	Percentage Relative Density in Seed
1.	*Alternaria solani*	28	93.33	32.65
2.	*Alternaria alternate*	30	100.00	49.32
3.	*Aspergillus flavus*	30	100.00	42.69
4.	*Aspergillus niger*	30	10.00	61.70
5.	*Fusarium oxysporum*	05	16.66	12.35
6.	*Helminthosporium gramineum*	13	43.33	29.40
7.	*Curvularia lunata*	30	100	41.26
8.	*Penicillium citrinum*	03	10.00	11.00
9.	*Rhizoctonia solani*	30	100	20.54
10.	*Gliocladium roseum*	14	46.66	19.22
11.	*Chaetomium globosum*	01	3.33	4.90
12.	*Trichothecium roseum*	06	20.00	11.19
13.	*Nigrospora oryzae*	20	66.66	26.72
14.	*Trichoderma viride*	16	53.33	11.05
15.	*Mucor sp.*	22	73.33	34.33
16.	*Epicoccum purpurescens*	23	76.66	44.39
17.	*Cladosporium cladosporioidis*	06	20.00	23.90
18.	*Verticillium dahliae*	01	3.33	21.39
19.	*Rhizopus nigricans*	17	56.66	45.37
20.	*Mycelia sterilea*	19	63.33	28.17
21.	*Fusarium solani*	30	100	59.00
22.	*Protomyces macrosporus*	17	56.66	37.10
23.	*Setosphaeria rostral*	07	23.33	13.52

TABLE II
EFFECT OF FUNGAL METABOLITE ON SEED GERMINATION

Fungal Metabolite of seed mycoflora	Percentage of		Length of Radicle	Percentage Reduction in length of Radicle	Fresh/Dry weight of Seedling
	Seed Germination	Germination Inhibition			
1. *Alternaria alternata*	88.32	8.91	6.6	8.3	0.29/0.15
2. Aspergillus niger	82.57	14.87	6.8	5.5	0.298/0.15
3. *Aspergillus flavus*	79.34	18.20	5.6	22.2	0.216/0.13
4. *Fusarium solani*	76.52	21.11	5.2	27.7	0.209/0,13
5. *Curvularia lunata*	72.94	24.80	5.9	18.0	0.271/0.14
6. *Rhizoctonia solani*	68.16	29.73	5.3	26.3	0.262/0.13
7. Control	97		7.2		0.320/0.16

Aspergillus niger showed highest percent relative density in seeds (61.70) followed by *Fusarium solani* (59.00). *Penicillium citrinum* showed 10.00 percent and *Alternaria alternata* showed 49.32 percent. *Chaetomium globossum* had lowest relative density of 4.90 percent in coriander spores. All other fungi showed relative density between 10 to 50 percent. Metabolites of all the six fungi which showed presence in all the samples with high relative density were found to reduce seed germination and seedling growth of coriander. *Rhizoctonia solani* showed maximum inhibition of seed germination (29.73 percent over control) while *Alternaria alternata* showed minimum inhibition (8.91 percent over control). Among all the six fungi *Fusarium solan*i showed maximum suppression of radical growth (27.7 percent over control). Highest fresh / dry weight was observed in *Aspergillus niger* while maximum reduction in fresh / dry weight was observed in *Fusarium solani*. Reduction in seed germination and radicle growth of coriander due to the harmful effect of secondary metabolites of Fusarium [12]. Inhibitory factor present in the fungal culture filtrate may be responsible for these adverse effects on seed [13].

Mycoflora of seeds have high protolytic and cellulolytic enzymes beside the power of dissolving cutin.(1)

Fungal metabolites not only affect seed health, cause damage in seedling, enhance disease incidence in later stage of plant but also affect consumers. [14]

All the studied samples of coriander were found to be loaded with fungi that affect seed health, reduce production and make seeds unfit for human consumption.

REFERENCES

1. Prasad, B.K., 1979. "Synecological Studies on the Seed Decay of Coriander (Coriandrum sativum Lin) during Storage" Doctoral Thesis, Magadh University. Bodh Gaya-824-234.
2. Miller, J.D., 1995. Fungi and Mycotoxin in Grain: Implication for Stored Product. *Journal of Stored Product research* 31: 1-6.
3. Turner, W.B., 1971. Fungal Metabolites. Academic Press, New York.
4. Vaidehi, B.K., 1984. Fungi from Coriander Seeds. *Indian Bot. P.eptr.* 3 (2) : 154-155.
5. Prasad, B.K., 2004. Seedling Diseases inflicted by Storage Fungi of the Seed. "Applied Botany" Distributor, Jaipur (Raj) pp 145-150.
6. Rice, W.N., 1939. *Proc. Ass off Seed anal* 1939 :124-127.
7. ISTA 1993., International Rules for Seed Testing Proceedings. Int. Seed Testing Association. Zurich, Switzerland. 13:300-520.
8. Agrawal, S.R., Sharma, K and Bhatt, B.N., 1990. Quality Evaluation in Coriander. Indian Cocoa, *Areca nut and Spices Journal* 13 : 137-138.

9. Chaudhary, P.N., 2000. Manual on Identification of Plant Pathogenic and Bio-Control Fungi of Agricultural Importance, IARI, New Delhi-110012.
10. Seghal, S.P., Deshpande, A.L. and Srivastava, V.S., 1965. A New Disease of Coriander caused by Colletotrichum capsici (Syd.) Butler. et. Bispy from India. *Curr. Sc.* 34(3) : 89-90.
11. Rajan, F.S.,P.G.B. Vedamuthu,M.K. Khader and R.Jayarajan 1990. Screening Coriander lines against Grain Mould Disease. *S. Indian Hortic.* 38 : 168-169.
12. Hashim, M.H. and Thrane, U., 1990. Mycotoxin and other Secondary Metabolites in species of Fusarium isolated from Seeds of Capsicum, Coriander and Fenugreek. *Pak .J. Bot.* 22: 106-111.
13. Tiwari, V. 1993. Toxic Effect of Food Borne Fungi on Seed Health. *Indian J. Mycol. Pl. Pathol* 23.
14. Bateman, G.L. and Kwasna, H., 1999. Effect of Number of Winter Wheat Crops Grown Successively on Fungal Communities on Wheat Roots. *Applied Soil Ecology.* 13 : 271-382.
15. Sigurd funder 1961 practical mycology. manual for identification of fungi. A.W. Broggers pperi A/S Olso-Norway.

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