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STUDIES ON TOXICITY OF CULTURE FILTRATES OF FUNGI FROM TOMATO FRUITS

Botany

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ABSTRACT

Tomato (Lycopersicon esculentum Mill.) is one of the common vegetables grown all over the country extensively almost the year round. The crop is reported to be affected by about twenty diseases of microbial origin. Among them, the fungal pathogens have been found to affect and damage severely the tomato fruits both in field at different developmental stages as well as in the market during storage. This may result in the qualitative and quantitative loss of tomato fruits. The fungi are known to produce different toxins during pathogenesis. In the present investigation, toxicity of culture filtrates of fungi isolated from tomato fruits was studied on seed germination in tomato as well as some non-host crops.

KEYWORDS

Toxicity, culture filtrates of fungi, tomato fruits.

INTRODUCTION

Tomato (Lycopersicon esculentum Mill.) is one of the common vegetables grown all over the country extensively almost the year round. The crop is reported to be affected by about twenty diseases of microbial origin. Among them, the fungal pathogens have been found to affect and damage severely the tomato fruits both in field at different developmental stages as well as in the market during storage. This may result in the qualitative and quantitative loss of tomato fruits.

Toxins are important metabolites of microorganisms which are produced during infection which damage the host tissue or interrupt normal physiological functions or may cause death. The toxic culture filtrates of different plant pathogenic fungi induce diverse symptoms in plants including inhibition of seed germination, root and shoot growth, wilting, etc. The role of toxins in pathogenesis has been discussed by various workers (Wheeler and Luke, 1963; Deverall, 1994 and Wood, 1967). The effect of fungal toxins on seed germination in tomato was studied by Bakhariev (1978), in arhar by Kamal and Verma (1978), in mung by Sinha and Prasad (1981), in soybean by Singh et al. (1986) and Sharma (1990) and in groundnut by Reddy et al. (1991).

The present paper deals with effect of culture filtrates of fungi isolated from tomato fruits on seed germination in tomato as well as some non-host crops.

MATERIAL AND METHODS:

a) Production of Phytotoxins:

The test fungi isolated from tomato fruits were grown on Richard's medium (Composition: Sucrose - 30 gm, KNO_3 - 10 gm, KH_2PO_4 – 5.0 gm, $MgSO_4$. $7H_2O$ – 2.5 gm, $FeCl_3.7H_2O$ – 0.02 gm, Distilled Water – 1000 ml).Twenty five ml of each medium was added in 100 ml conical flask and autoclaved at 15 lb pressure for 15 minutes. On cooling, the flasks were inoculated separately with 1ml of spore suspension of the test fungi prepared from 7 days old cultures grown on Potato Dextrose Agar slants. The flasks were incubated at 25 °C for 9 days and were harvested by filtering their contents through Whatman No. 1 filter paper. The filtrates were collected in pre-sterilized bottles and termed as crude toxin preparation. These preparations were tested for their toxicity.

b) Assay of Phytotoxins:

The toxicity of culture filtrates was determined by using seed germination method. Surface sterilized hundred seeds of tomato were soaked in crude toxin preparation for 24 hours. They were then placed on moist blotters in Petri plates. Seeds soaked similarly in freshly prepared un-inoculated liquid medium served as control. Percent inhibition of seed germination, root length and shoot length of seedlings were measured after 7 days of incubation at room temperature.

RESULTS AND DISCUSSION

Table 1: Effect Of Culture Filtrates Of Fungi On Seed Germination In Tomato

Fungi	Percent inhibition of seed germination	Root length (cm)	Shoot length (cm)
Alternaria solani	58	4.2	2.0
Geotrichum candidum	48	3.9	1.9
Fusarium oxysporum	62	4.1	2.1
Rhizoctonia solani	59	3.5	1.5
Phytophthora sp.	48	4.5	2.0
Asperillus niger	49	3.1	1.8
Asperillus flavus	67	2.9	1.7
Rhizopus stolonifer	42	4.2	2.7
Control	00	5.9	3.4

Table 2: Effect Of Culture Filtrates Of Fungi On Seed Germination In Non-host Crops

Fungi	Percent inhibition of seed germination					
	Brijal	Chilly	Pea	Mung	Urid	Gram
Alternaria solani	52	41	35	30	50	60
Geotrichum candidum	21	43	30	25	28	32
Fusarium oxysporum	43	58	50	55	58	40
Rhizoctonia solani	45	50	40	52	40	60
Phytophthora sp.	32	29	40	43	27	31
Asperillus niger	29	52	60	55	50	63
Asperillus flavus	40	57	56	62	47	51
Rhizopus stolonifer	53	48	37	44	32	34
Control	00	00	00	00	00	00

Inhibitory nature of culture filtrates of fungi isolated from tomato fruits was studied on seed germination in tomato as well as some non-host crops (Table-1). It was noted that seed germination is inhibited by the culture filtrates to a greater extent. Similar results indicating toxic nature of culture filtrates of fungi on tomato seeds were recorded by Kumar and Mehmood (1986) and Arya and Saxena (1989).

Effect of culture filtrates of tomato fungi was also studied on seeds of different non-host crops, Viz. brinjal, chilly, pea, mung, urid, and gram (Table-2). It was found that the culture filtrates were highly toxic to the seeds of the crops studied. Inhibitory nature of culture filtrates was also recorded by different workers in different crops, such as Sinha and Prasad (1981) in mung due to Alternaria alternata, Curvularia lunata and Macrophomina phaseolina; Charaya and Reddy (1982) in mung due to Fusarium oxysporum ; Anwar and Mirdha (1987) in urd bean due to Aspergillus flavus.

REFERENCES

1. Arya Rekha and S. K. Saxena (1989). Effect of Aspergillus niger, Pythium aphanidermatum and their culture filtrates together with Melodogyne incognita on germination of seeds of tomato.
2. Proceedings of 76th session of Indian Science Congress, Madurai, PP. 45.
3. Anwar, M. N. and A. U. Mirdha (1987). Effect of culture filtrates of some fungi on seed germination of some important crops. Seed and Farms 13 (1): 31-33.
4. Bakhariev, D. (1978). Effect of anthracnose on the sowing qualities of tomato seeds.
5. Rastitelna Zashichita 27 (9): 26-29.
6. Charya, M.A.S. and S. M. Reddy (1982). Toxic effects of Fusarium oxysporum on seed germination and growth of mung (Vigna radiata). Indian Bot. Reptr. 1 (2): 169-170.
7. Deverall, B. J. (1994). Microbial behavior in vivo and in vitro. H. Smith and J. Taylors (eds.), Cambridge University Press, pp. 165-186.
8. Kamal and A. K. Verma (1978). Seed borne mycoflora of arhar (T-21), effect of culture filtrates of some isolates on seed germination and fungicidal treatment.
9. Indian J. Mycol. Pl. Pathol. 9 (1): 41-45.
10. Kumar, S. and Mehmood (1986). Bioassay of culture filtrates of isolates of Colletotrichum dematium on seeds, seedling and fruits of chilly. Indian Phtopath. 39 (2): 382.
11. Reddy, G. R., A.G.R. Reddy and K. C. Rao (1991). Effect of certain seed borne fungi on

seed germination and seedling vigour of groundnut. J. Res. APAU. 19 (2): 77-78.
12. Sharma, A. K. (1990). Effect of metabolites of seed borne fungi on seed mycoflora and seed germination of soybean. Int. Conf. Seed Sci. and Tech. New Delhi, Feb. 21-25, pp. 201.
13. Singh, V., R. K. P. Sinha and S. K. Sinha (1986). Effect of culture filtrate of seed mycoflora of soybean upon seed germinability and seedling length.
14. Indian J. Mycol. Pl. Pathol. 10 (2): 192-193.
15. Sinha, R. K. and T. Prasad (1981). Effect of fungal metabolites on seed germination, microbial
16. Wheeler, H. and H. H. Luke (1963). Microbial toxin in plant disease.
17. Ann. Rev. Microbiol. 17: 223-242.
18. Wood, R. K. S. (1967). Physiological Plant Pathology. Oxford and Edinburgh, Blackwell Scientific Publications, pp. 590.