



Plant Archives

Journal homepage: <http://www.plantarchives.org>
DOI Url : <https://doi.org/10.51470/PLANTARCHIVES.2021.v21.no2.011>

APPLICATION OF FUNGICIDES AND PLANT EXTRACTS IN CONTROL OF *FUSARIUM* ROT OF TOMATO FRUITS

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(Date of Receiving : 12-12-2020; Date of Acceptance : 19-04-2021)

ABSTRACT

In the present study few Fungicides and Plant extracts were tested for the control of *Fusarium* rot of tomato fruits, among fungicides Carbendazim was found to be the most effective in inhibiting the mycelia growth of *Fusarium solani*. In the case of leaf extracts, the leaf extracts of Neem (*Azadirachta indica*) reduced effectively the incidence of *Fusarium* rot of tomato fruits.

Keywords: *Lycopersicon esculentum*, *Fusarium solani*, fungicides, plant extracts.

INTRODUCTION

Tomato (*Lycopersicon esculentum* Mill.) is an important Solanaceous crop, which is also called as “golden apple”. In the world it is the second extensively grown commercial vegetable crop after potato, may be due to its tangy taste and very high nutritive value. Tomato is high in many vitamins particularly vitamin A, C, β -carotene and essential minerals. It has been noticed that the tomato fruit may be subjected to attack by many deteriorative fungal pathogens facilitated by certain inevitable injuries in harvest and transport to market which result in heavy losses during storage and also reduces the market value of this fruit. It is evident that the plant diseases is one of the most important reducing factors to loss in crop yield all over the world and day by day it is gaining importance as the world population increases. In this world about 200 diseases caused by different pathogens have been reported on tomato (Bhatti *et al.*, 2010).

Among all diseases the seed borne diseases are caused by various microorganisms such as fungi, bacteria, virus and nematodes and among the parasitic organisms the fungi are most frequently encountered on seeds. The diseased seeds served as a main source of primary infection and becomes the main cause of establishment of plant diseases, due to which they cause adverse effect on seed health, reducing early seedling growth parameters such as the germination capacity, poor seedling quality and transfer fungus to the growing seedlings, enhancing the infection in storage. (Dhekle and Bodke, 2013).

A perusal of available literature revealed that tomato fruits are infected by several fungi viz, *Fusarium solani*, *Fusarium oxysporum*, *Alternaria alternata* and *Alternaria solani*, *Aspergillus flavus*, *Rhizopus stolonifer*, *Curvularia* spp etc. occur that cause infection to the seeds such as seed rotting, necrosis seed toxification and seed abortion which rot

the fruit during harvest, transport and storage (Asha *et al.*, 2011), and among all these diseases the fruit rot (*Fusarium solani*) was reported to cause severe losses to this fruit. Control of *Fusarium* rot of tomato with certain fungicides and different plant extracts was attempted.

MATERIALS AND METHODS

In vitro condition, Efficacy of fungicides viz., carbendazim, mancozeb and captain were tested respectively at 10, 25 and 50ppm. Plant extracts viz., neem, garlic, and ginger were also tested respectively 10, 15 and 20 percent by following food poisoning technique (Nene and Thapliyal, 1997), Suitable controls were also maintained, After 3-4 days of incubation at $28 \pm 1^\circ\text{C}$, the radial growth of *Fusarium solani* was measured and percent inhibition of growth was calculated by the formula suggested by Bliss, (1934). Fungicides at higher dosages i.e. above 50 ppm were found to be highly effective but showed high toxicity in fruits besides being expensive.

To evaluate the same fungicides and plant extracts, in vivo, mature tomato fruits of equal size that were surface sterilized, inoculated with 7 d old culture of *Fusarium solani* and treated by dipping the fruits in fungicides and plant extracts at various concentration, Fruits were treated 24 h before or after inoculation and incubated at $28 \pm 1^\circ\text{C}$, Five days after incubation, the infected fruits were categorized on disease rating scale 0-5 described by Pathak *et al.* (1996) with a slight modification as 0=0%; 1=1 – 10%; 2=11 – 30%; 3=31-50%; 4=51-70% and 5=>70%. The percent infection index and efficiency of disease control were calculated (Wheeler, 1969).

RESULTS AND DISCUSSION

Management of disease caused by fungal pathogens is commonly done by the use of fungicides in the absence of resistant varieties. In the present study among different

fungicides tested, carbendazim was proved to be the most effective fungicides in inhibiting mycelial growth of *Fusarium solani* as well as in controlling *Fusarium* rot of tomato (Table 1) Similar observations were also reported by Ismael, 2010. Fungicides cannot be used frequently of fruits and vegetables, which are directly consumed as such use would result in health hazards. The environmental conscious society may not accept direct use of fungicides (Amini *et al.*, 2010). Therefore to control disease use of chemical is shifted to bio-control, cultural management as well as methods other

than fungicides. Enormous literature is available for screening of plant product to check the growth of fungi. In the present study a few medicinal plant extracts tested, which positively checked the growth of pathogen and controlled fruit rot. A good control of fruit rot was achieved by using *Azadirachta indica*, *Allium sativum* and *Oscimum sanctum* (Table 2), Similar results were also obtained by Islam and Faruq (2012) who tested extracts of *Lantana camara*, *A. indica* and *O. sanctum* against *F. oxysporum*.

Table 1 : Effect of fungicides on mycelial growth of *Fusarium solani* in vitro”

Fungicide	Inhibition (%)					
	10	25	50	75	100	250
Carbendazim	57.31	78.76	82.21	90.00	90.00	90.00
Mancozeb	31.74	57.89	69.56	90.00	90.00	90.00
Captan	-	-	-	32.99	36.90	59.76
Control	-	-	-	-	-	-

Table 2 : Effects of Pre and Post inoculation with fungicides and plant extracts on *Fusarium* rot of tomato fruits

	Pre-inoculation						Post-inoculation					
	10		25		50		10		25		50	
	II	PEDC	II	PEDC	II	PEDC	II	PEDC	II	PEDC	II	PEDC
Carbendazim	28	72	23	81	11	96	32	64	28	72	16	91
Mancozeb	35	58	28	72	22	82	40	47	32	64	28	72
Control					63						63	
CD (P=0.05)												
Fungicides				1.89						1.39		
Doses				1.64						1.26		
Interaction				3.28						2.40		
CV (%)						8.07						
<i>A. indica</i>	38	51	30	68	25	76	44	39	38	55	32	65
<i>A. sativum</i>	39	49	31	66	26	76	46	35	39	50	34	62
<i>O. sanctum</i>	40	47	33	61	28	72	48	31	40	49	36	58
Control	61						63					
CD (P=0.05)												
Plant extracts				0.75						0.46		
Doses				0.65						0.40		
Interaction				1.31						0.81		
CV (%)				2.62								

II=Infection index; PEDC = per cent efficiency of disease control

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