

EFFICACY OF FUNGICIDES AGAINST *FUSARIUM OXYSPORUM* F SP. *CUMINI*

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Among the ten fungicides tested *in vitro* and *in vivo* against *Fusarium oxysporum* f.sp. *cumini*, Bavistin and RH 893 were found to be effective in checking the pathogen. These two fungicides also enhanced the seed germination and seedling vigour.

Keywords : *Fusarium oxysporum* f. sp. *cumini*; Cumin; Wilt; Fungicides; Pathogen.

Study of fungal flora of cumin seed (Champawat, 1986) revealed *Fusarium oxysporum* f. sp. *cumini* as external as well as internal seed-borne pathogen. Seeds inoculated with *Fusarium oxysporum* f. sp. *cumini* produced infected seedling. The objectives in the present studies were to find out the effect of *Fusarium* on the cumin seeds, its role in emergence and vigour of seedlings and to test comparative efficacy of some seed protectants.

Experiment was conducted to test the efficacy of 10 different fungicides for spore germination inhibition from 8 day old culture of the pathogen. Different concentrations (10-1000 ppm) of these fungicides were prepared in sterile each 8-distilled water. Two clean glass slides were placed in each Petri dish with moist blotter paper and two

drops of the required concentration of fungicide were placed on each of the slide. One drop of spore suspension having 15-20 spores per microscopic field (100 X) was mixed in fungicide drops. The Petri dishes having drops of sterile distilled water alone were kept as control. The observations on the number of germinated and ungerminated spores were recorded. Per cent inhibition of spores germination was calculated according to the formula given below :

$$I = \frac{C-T}{C} \times 100$$

Where, I = per cent inhibition of spores

C = per cent spores germinated in control

T = per cent spores germinated in treatment

Table 1. In Vitro evaluation of the effect of fungicides on per cent inhibition in germination of spores of *Fusarium oxysporum* f. sp. *cumini*.

Fungicide	Per cent inhibition in spore germination at different concentration (ppm)*					
	10	50	100	250	500	1000
Thiabendazole	0 (0.00)	3 (9.97)	15 (22.79)	38 (38.06)	68 (55.55)	100 (88.19)
Benlate	8 (16.43)	25 (30.00)	42 (40.40)	53 (46.72)	79 (62.73)	100 (88.19)
Demosan	0 (0.00)	0 (0.00)	9 (17.46)	27 (31.31)	41 (39.82)	65 (53.73)
Captan	2 (28.66)	48 (43.85)	65 (53.73)	81 (64.16)	100 (88.19)	100 (88.19)
Bavistin	19 (25.84)	35 (36.27)	65 (53.73)	85 (67.21)	100 (88.19)	100 (88.19)
Dithane M-45	3 (9.97)	19 (25.84)	32 (34.45)	45 (42.13)	79 (62.73)	100 (88.19)
Dithane Z-78	11 (19.37)	25 (30.00)	39 (38.65)	61 (51.35)	100 (88.19)	100 (88.19)
RH 893	23 (28.66)	37 (37.46)	75 (60.00)	100 (88.19)	100 (88.19)	100 (88.19)
Kitazin	7 (15.34)	21 (27.27)	38 (38.06)	59 (50.18)	82 (64.90)	100 (88.19)
Agrosan GN	18 (25.10)	38 (38.06)	62 (51.94)	81 (64.16)	100 (88.19)	100 (88.19)
S Em \pm 3.61; CD at 5% 10.32; CD at 1% 13.80						

Figures in parenthesis are transformed values

To test the efficacy of fungicides against *Fusarium oxysporum* f. sp. *cumini* on emergence and vigour of seedlings, the surface sterilized seeds (CV RS 1) were contaminated by putting them in fungal spore suspension (10^6 spores/ml). These seeds were treated with Thiabendazole, Benlate, Demosan, Captan, Bavistin, Dithane M-45, Dithane Z-78, RH 893, Kitazin and Agrosan

GN, each at 0.2% concentration by shaking vigorously for 10 minutes with suspension or solution of the fungicides. Seeds from each lot were then planted in enamelled trays containing sterilized soil. In control the seeds were not inoculated with pathogen and they were not treated with any fungicides. Twenty days later observations were recorded on the number of seeds germinated and

Table 2. Effect of seed treatment with different fungicides against *Fusarium oxysporum* f. sp. *cumini* on germination and height of seedlings of cumini in sterilized soil.

Fungicides	Germination %	Length of root in* cms/seedling	Length of shoot in* cms/seedling
Thiabendazole	48	2.10	2.20
Benlate	67	2.85	2.98
Demosan	45	2.03	2.17
Captan	65	2.52	2.75
Bavistin	71	3.02	3.10
Dithane M-45	55	2.15	2.45
Dithane Z-78	61	2.30	2.50
RH 893	75	3.10	3.15
Kitazin	53	2.15	2.25
Agrosan GN	50	2.27	2.33
Control**	78	3.20	3.35
S Em \pm		0.10	0.18
CD at 5%		0.28	0.50
CD at 1%		0.36	0.66

* Mean of 10 seedlings

** Cumini seeds were not inoculated with *Fusarium oxysporum* f. sp. *cumini* and they were not treated with any fungicides.

length of root and shoot of the seedlings. In each treatment 100 seeds were taken and experiment was performed two times.

It is evident from Table 1 that Captan and RH 893 inhibited 23 per cent spore germination followed by Bavistin 19 per cent, while Thiabendazole and Demosan were unable to inhibit spore germination at 10 ppm. At 50 ppm similar trend was also observed except that Thiabendazole inhibited 3 per cent spore germination. At 100 ppm RH 893 inhibited 75 per cent spore germination followed by Captan and Bavistin. Hundred per cent spore germination inhibited at 250 ppm by RH 893. At 500 ppm 100 per cent inhibition of spore germination was observed in Captan, Bavistin, Dithane Z-78, RH 893 and Agrosan GN. All fungicides except Demosan inhibited 100 per cent spore germination at 1000 ppm.

Results presented in Table 2 show that germination was markedly suppressed in seed contaminated with *Fusarium oxysporum* f. sp. *cumini*. The fungicide RH 893 and Bavistin found to be effective in checking the pathogen in comparison to other fungicides with regard to seed germination. The pathogen also suppressed

the root and shoot development significantly in all treatments except Benlate, Bavistin and RH 893. There was a nonsignificant difference between control and RH 893. Bavistin and Benlate with respect to the shoot and root development.

Out of 10 fungicides tested *in Vitro* against the pathogen Captan, Bavistin, Dithane Z-78, RH 893 and Agresan GN inhibited 100 per cent germination of spores at 500 ppm. These results are in conformity with that of Virk and Gemawat (1981) in sesamum wilt. Cumin seeds contaminated with *Fusarium oxysporum* f. sp. *cumini* and treated with fungicides when grown in sterilized soil showed lower germination and seedling vigour but Bavistin and RH 893 appreciably reduced the infection of the pathogen. Similar results have also been reported in guar by Jain and Patel (1969).

Accepted July, 1990

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