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Efficacy of Different Seed Dressing Fungicides on Seed Mycoflora, Seed Germination and Seedling Vigour of Sunflower (*Helianthus annuus* L.)

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ABSTRACT

Three different fungicides were used to test their efficacy in controlling the seed mycoflora of sunflower. Among them Captan and Captafol were highly effective eon seed mycoflora. Dithane M-45 failed to control seed mycoflora at the lower dosage nad showed phytotoxic effect on seedling at higher dosage. In contrast, Captan and Captafol did not show any adverse effect on seed germination.

INTRODUCTION:

Seed treatment is the cheapest and often the safest method of plant disease control. The Seed treatment with fungicides is essential because when the seed germinates, a large number of pathogens carried with the seed become active and cause either seed or seedlings mortality or produce diseases at later stages . The purpose of seed treatments by the use of fungicides is to destroy of seed –borne fungi that cause seedling blight, seed decay or other diseases. Such treatments also protect the germinating seed from the attack of certain soil-inhabiting fungi.

In the present investigation three different seed dressing chemicals were used in sunflower to improve seed germination and seedling vigour by overcoming the problem of seed borne fungi.

MATERIALS AND METHODS

The three different seed dressing chemicals, Captan (N-trichloro methyl thio-4-cyclohexane-1, 2-dicarboximide), Captafol [Cis-N-(1,1,2,2-tetrachloro ethyl thio)- cyclohexane-1, 2-dicarboximide] and dithane M-45 (Manganus ethylene bis-dithiocarbomate) were dusted separately on sunflower seeds of variety PKVSF-9 at three different concentrations of 0.2, 0.25 and 0.3 percent. Two hundred seeds of such treatment for each fungicide were evaluated for seed mycoflora using standard blotter method. On the other hand, 100 seeds of each chemical treatment were rolled in paper towels and kept for germination. On the seventh day of incubation under standard conditions of temperature and humidity the paper towels were unrolled and the percentage of seed germination, root-shoot length and seedling vigour were calculated. In these cases the untreated seeds served as control.

RESULTS AND DISCUSSION

The effect of fungicidal seed treatment on seed mycoflora (Table 1) revealed that Captan suppressed the seed mycoflora at 0.3% concentration except *Alternaria alternata, Macrophomina phaseolina, Curvularia lunata, Rhizopus* sp., *Phoma* sp., and Catafol controlled some seed mycoflora at higher concentration but was less effective on *Alternaria alternata*, *Macrophomina phaseolina, Aspergillus niger, Rhizopus* sp., and *Phoma* sp. Dithane M-45 did no control seed mycoflora even at higher concentration.

Captan and Captafol were highly effective in controlling the several field fungi as well as storage fungi. As a result *Alternaria zinniae, Actinomycete* sp., *Drechslera halodes, D. hawaiiensis, Cladosporium cladosporioides, Aspergillus flavipes* and *A. nidulans* were failed to express on the treated seeds compared to their existence in Dithane M-45 treatment. The lower concentration of 0.2% was sufficient to inhibit their colonization on the seeds (Table 1).

The fungicidal effect depends on several factors like seed moisture, chemical background of the seed, seed texture, seed size, dosage, duration and method of treatment.

Captan mainly acts as a protectant, but in some cases it is claimed to have acted systemically. The effectivity of the fungicide Captan in suppressing the colonization of fungi is most probably due to the inhibition of the endogenous respiration of the fungal spores. This was claimed by Owens and Novotny (1) in case of the fungus *Neurospora sitohila*. Captan was also used to treat the *Colletotrichum* infected seeds and its efficacy on fungal infection was discussed by Lokesh and Shetty (2)

Captafol is available under different names such as Difolatan, Difosan, Sanspor, etc. Although it is mainly recommended for foliar sprays, it has been used for seed dressing, as well as soil applications (3).

Dithane M-45 is also called as Mancozeb or Maneb as such is not marketed in India, but is available in mixture with other chemicals. Though, maneb has been successfully used against a wide varity of diseases, particularly of vegetables, in the present study it failed to a greater extent in controlling many fungal species. At the same time it was phytotoxic and thus reduced the seed germination and seedling vigour (Table 2). This observation is in confirmation with Kuiper (4) who reported decreased germination in wheat due to Maneb. Non toxicity of Maneb to seed mycoflora is most probably due to the loss of fungicidal property of the chemical under the conditions of incubation.

Captan and Captafol showed no adverse effect on seed germination and seedling vigours. The increased concentration of Dithane M-45 showed slight adverse effect on seed germination. In association with Rhizopus sp. it induced the symptoms like root-rot and browning. Seedling vigours was reduced to a greater extent in all the cases of chemical treatment (Table2). Irrespective of the dosage, Dithane M-45 induced the stunted growth of the shoot portion of the seedling in comparison with the other fungicides. These observations is in can formation with Thippeswam and Lokesh (5). Thus, the observations indicated the reliability of the fungicide Captafol as a promising aid of the seed treatment in sunflower.

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Table: 1. Effect of some common seed dressing chemicals on percent incidence of seed mycoflora of sunflower variety PKVSF-9

Fungi	Concentration of Fungicides (%)									
		Dithane M-45			Captan			Captafol		
	Control	0.2	0.25	0.3	0.2	0.25	0.3	0.2	0.25	0.3
Actinomycete sp.	42	30	29	28	-	-	-	-	-	-
Alternaria alternate	39	12	11	7	8	9	10	6	2	4
A. zinniae	3	2	1	2	-	-	-	-	-	-
Aspergillus flavipes	3	2	3	2	-	-	-	-	-	-
A.Flavus-oryzae	30	20	16	11	-	-	-	-	-	-
A.flavus	57	51	40	32	2	-	-	-	-	-
A.nidulans	7	3	2	-	-	-	-	-	-	-
A.niger	51	41	21	15	-	2	-	2	1	3
A.ochraceus	30	5	4	5	-	-	-	-	-	1
A.Versicolor	50	49	31	16	-	2	-	2	1	-
Cladosporium Cladosporidoides	10	7	4	3	-	-	-	-	-	-
Curvularia lunata	5	1	2	1	-	-	1	1	-	-
Drechslera halodes	3	-	-	1	-	-	-	-	-	-
D.hawaiiensis	3	2	2	1	-	-	-	-	-	-
Fusarium moniliforme	11	3	2	1	1	1	-	-	-	-
F.solani	3	3	2	-	-	-	-	-	-	-
Macrophomina phaseolina	17	12	6	5	1	2	1	3	3	2
Memnoniella sp.	7	1	2	2	-	-	-	-	-	-
Mucor sp.	31	22	17	9	2	-	-	3	2	3
Penicillium sp.	23	10	6	3	-	-	-	-	-	-
Phoma sp.	9	6	5	1	1	1	1	5	2	2
Rhizopus sp.	20	6	14	13	1	1	2	3	2	3

Table-2- Effect of fungicides on seed germination and seedling vigour of sunflower variety PKVSF-9

Fungicide	Concentration (%)	Seed germination (%)	Shoot length (cm)	Root length (cm)	Vigour index
Captan	0.2	93	16.20	21.80	3534.00
	0.25	90	16.35	20.78	3342.60
	0.3	93	1.00	24.00	3812.00
Captafol	0.2	81	13.00	17.34	2457.54
	0.25	84	11.40	13.65	2137.80
	0.3	84	11.20	13.00	2016.00
Dithane M-45	0.2	86	13.44	18.12	2714.16
	0.25	8	11.80	13.65	2137.80
	0.3	81	13.00	17.34	2457.54
Control	-	90	20.00	26.00	4140.00

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