Pakistan J. Sci. Ind. Res., Vol. 28, No. 1, February 1985

CHEMICAL CONTROL OF FUNGI OCCURRING ON SAFFLOWER SEED

M.A.R. Bhatti, M.A. Randhawa and S. Ali

Department of Plant Pathology, University of Agriculture, Faisalabad.

(Received August 12, 1982; revised November 12, 1984)

Treatment of infested safflower (*Carthamus tinctorious* L.) seeds with various fungicides enhanced their germination. The fungicide *Vitavax 200* proved to be the best followed by *Benlate, Captan 50* and *Brassicol.*

INTRODUCTION

Studies conducted in different parts of the world reveal that safflower (*Carthamus tincotrious* L.) seed harbours various fungi [1] which bring about changes in its oil, protein and carbohydrate contents [2]. Recent studies have revealed that *Helminthosporium nodulosum, Fusarium solani, Curvularia lunata* and *Sclerotium bataticola* affected the germination of safflower seed. The inoculated seed germination was 42° as against 65% of that of the uninoculated seed [1].

Little information is available on the effective control of the fungi associated with safflower seed. However, treatment of the seed with 75% wettable powder formulation of *Oxathiin* fungicide (2, 3-dihydro-5-carboxarihido-6-methyl-1, 4 oxathiin-4, 4, dioxide = DCMOD) @ 24 and 48 oz./100 lb. of seed effectively controlled seed-borne rust spores leading to reduced rust infection in two-week old seedlings [3].

MATERIALS AND METHODS

Seeds of safflower strain UTE, Leed 2-6, Zimmerman LHP 1, US-10 and P-S were obtained from the Ayub Agricultural Research Institute, Faisalabad and kept at room temperature for about six months before being used for the performance of the experiment. The seeds were surface-sterilized with 0.1% mercuric chloride solution and rinsed twice with sterilized water. The surface-sterilized seeds of each strain were divided into six equal lots. One lot served as uninfested sterilized treatment. Every one of the remaining five lots were infested with the cultures of *Fusarium solani, Curvularia lunata, Helminthosporium nodulosum, Sclerotium bataticola* and a mixture of these four fungi. Every one of the six lots was divided into five equal sub-lots. Four sub-lots were then treated with *Vitavax 200, Benlate, Captan 50* and *Brassicol* at their recommended rates of application two days after infestation with fungi. The remaining sub-lots were kept untreated. Out of these 30 different treatment combinations, one plot (=pot) was from the surface-sterilized uninfested (with fungi) untreated (with fungicides) seed. Twenty seeds were sown in each pot filled with soil sterilized at 1.1 kg cm^{-2} to serve as one treatment combination out of thirty combinations. The experiment was conducted in triplicate and a total of 450 pots were sown. The seeds were sown 24 hr. after treatment with the fungicides. Data were subjected to statistical analysis for the interpretation of results.

RESULTS AND DISCUSSIONS

The effect of different fungicides as represented in F values in respect of five strains of safflower, four fungi and their mixture, four fungicides and their interactions

Table 1. F values for germination of five strains of safflowers as affected by four fungicides.

Analysis of variance

Source of variation	Degree of freedom	F. Ratio
Strains (S)	4	3.66**
Fungi (F)	5	321.29**
Fungicides (T)	4	66.21**
S x T	16	2.18**
S x F	20	1.35 N.S.
T x F	20	4.08**
S x T x F	80	1.32 N.S.
Error	300	
Total	449	

S.E. for fungicides (T) = 0.54

Fungicides

Vitavax 200	*Benlate*	*Captan 50*	*Brassicol*	*Check*
59.90	57.66	57.66	55.76	48.48

indicate (Table 1) that F values in respect of five strains of safflower were significant. The strain UTE gave more germination than the others but significantly only over US-10 and P-5. The strain Zimmerman L.H.P. 1 ranked middle position and it did not differ significantly from the strain UTE and P-5. F values for germination in respect of seeds inoculated individually and in mixture were significant.

F values for germination in respect of fungicidal treatment were significant. *Vitavax 200* gave maximum germination over all treatments and the rise was significant. *Benlate* and *Captan 50* were rated second and third respectively and these two gave significantly more germination as compared to the infested untreated check.

F values for germination in respect of interaction between strains and treatments were also significant. P-5 responded more with *Vitavax 200* and less with *Benlate*, though *Benlate* was rated the second best fungicide on overall average basis (Table 2). Similarly Zimmerman L.H.P. I gave better germination upon treatment with brassicol in comparison with the other fungicides otherwsie rated better than it.

Table 2. Percentage germination of infested seed of safflower after treatment with fungicides

	US-10	P-5	UTE	Leed-2-6	Zim-merman L.H.P.-1
Vitavax 200	58.05	58.10	61.50	58.20	58.15
Benlate	58.60	52.60	58.20	57.90	58.00
Captan 50	55.00	55.10	58.20	55.05	55.90
Brassicol	55.10	55.92	57.80	56.90	59.00
Check	49.10	47.00	47.90	48.12	46.72

REFERENCES

1. S. Ali, I. Ahmad and M.A. Randhawa, Fungi occurring on safflower seed in Pakistan. Pakistan J. Agr. Sc. **16**: 19-24 (1979).
2. P.B.I. Singh, B.M. Shukla and Y.K. Sharma, Changes in oil protein and carbohydrate contents of diseased safflower (*Carthamus tinctorious* Linn.) seeds. Punjabrao Kirshi Vidyapeeth Res. J., 2:72 Jabalpur, India (1937) (Rev. Plant Pathol., **53**:3126, 1974).
3. D.E. Zimmer, Efficacy of 1,4-oxathiin fungicide for control of seedling safflower rust, Plant Dis. Rep. **51**:586 (1967).