J. Phytol. Res. **20**(2) : 321-323, 2007

EFFECT OF FUNGICIDAL STORAGE OF VEGETABLE SEEDS ON THEIR GERMINATION

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Captan, Thiram, Dithane M-45, Bavistin and Benlate in the concentration of 0.3 and 0.4% were found to kill the fungi causing considerable suppression of germination of vegetable seeds. The enhancement in germination of tomato, lablab bean and cabbage was recorded due to the fungicidal storage of seeds, particularly due to Bavistin and Benlate. The radicles were longest due to the noted last two fungicides.

Keywords : Fungicides; Germination; Radicle length; Storage of vegetable seeds.

Storage fungi in association with the seed have been reported by a number of pathologists[1-4]. They have recorded reduced germination, abnormal and physiologically impaired seedlings[5-8]. Most of the seed pathologists[9,10] have suggested fungicidal storage of the seeds to destroy the storage fungi and consequently enhancing the germination. In the present paper, common fungicides have been screened against popular storage fungi of seeds of common vegetables being cultivated in Bihar state[8]. Suitable concentration of the fungicides got as a result of screening, have been smeared to the vegetable seeds. The seedlots were stored and the germination was observed besides recording the length of the radicle.

Aspergillus nidulans (Eidam) Winter, *A.chevalieri* (Mang)Thom & Church, *A. flavus* Link ex Fries, *A. niger* Van Tieghem, *A. sydowi* (Bain & Sart) Thom & Church, *Penicillium oxalicum* Thom, *Curvularia lunata* (Wakker) Boedijn, *Alternaria alternata* (Fr) Keissler, *A. tenuissima* (Kunze ex Pers) Wiltshire and *Fusarium moniliforme* Sheldon isolated with considerably high frequency from the stroed seeds of tomato (*Lycopersicon esculentum* Mill) var Money marker, lablab bean (*Lablab purpureus* (L) Sweet) Var FD5 and cabbage(*Brassica oleracea* var *capitata* L) var Pusa giant[8] were screened for killing them with Captan (50% N - trichloromethyl) mercapto - 4 Cyclohexane – 1 , 2 - dicarboximide), Thiram (80% tetramethyl thiuramdisulphide), Dithane M-45 (Zn + Mn ethylenebisdithiocarbamate), Bavistin (50% carbendazim) and Benlate (50% methyl 1- butylcarmoyl)-2 benzimidazol carbamate, W.P) adopting poisoned food technique using potato dextrose agar medium. The concentration of the fungicide was maintained 0.1,0.2,0.3 and 0.4% w/v of the medium. The poisoned medium with above fungicide and noted concentrations in triplicate of petri dishes was inoculated with the culture of fungi noted above growing on potato dextrose agar for 7 days at 28 ± 1°C with the tip of sterilized inoculating needle. Petri dishes were incubated for 7 days at 28±1°C. After that the diameter of the culture was measured in mm of scale. Appropriate concentration of the fungicide to suppress complete growth of the fungi was recorded (Table 1). 0.3 % concentration (w/w) of fungicide was smeared over the seeds of tomato, lablab bean and cabbage after one month of harvest and possessing the moisture content of 7.82,9.86 and 8.13% taking the fungicide and seed (tomato and cabbage, 10g each and lablab bean 100g) in dry flasks by rigorous agitation. The moistrue content of the seed was determined on drying the seed -lots at 70° C for 48 hr and cooling over fused calcium chloride in sealed desiccators to the period the weight became constant. The fungicide smeared seed was kept in polyethylene pockets, open end tied tightly with thread and stored in the room to the time of next sowing period. Unsmeared seedlot served as the control.

Ten seeds each of tomato and cabbage stored as above were set for their germination in sterilized moist chamber made of three layers of blotting circles in petri dishes of 8 cm diameter. Ten replicates were prepared. In case of lablab bean seed five seeds were placed in each sterilized moist chamber and twenty replicates were prepared. These were incubated for 8 days at 30±1°C. The result of germination (%) was recorded at the expiry of 8 days besides measuring the length of the radicle in cm of scale. The mean of the length of the redicle of germinated seed was noted.

The effective concentration of fungicides to kill the storage fungi inflicting suppression of seed germination

Table 1. Efffective concentration of fungicides procured on the basis of poisoned food technique to kill the seedborne storage fungi of vegetable seeds.

Storage fungi	Effective Concentration (%) of fungicides				
	Captan	Thiram	DithaneM-45	Bavistin	Benlate
A. flavus	0.3	0.3	0.4	0.3	0.3
A.niger	0.3	0.4	0.3	0.3	0.3
A. sydowi	0.3	0.3	0.3	0.3	0.3
A. nidulans	0.3	0.4	0.3	0.3	0.3
A. chevalieri	0.3	0.4	0.3	0.3	0.4
P. oxalicum	0.3	0.4	0.4	0.3	0.4
C. lunata	0.4	0.4	0.4	0.3	0.4
A. alternata	0.3	0.4	0.4	0.3	0.3
A. tenuissima	0.4	0.3	0.4	0.3	0.3
F. moniliforme	0.3	0.4	0.4	0.3	0.3

Table 2. Per cent germination* of the seeds of vegetables after fungicidal storage of the seed and the length of the radicle (in cm) (in parenthesis).

Fungicides	Vegetable Seeds				
	Tomato	Lablab bean	Cabbage	Mean (Germination)	Mean length
Captan	95(1.4)	92(3.2)	94(1.2)	93.6	1.93
Thiram	96(1.3)	91(3.4)	96(1.3)	94.3	2.00
Dithane M-45	93(1.3)	89(3.3)	93(1.3)	91.6	1.96
Bavistin	97(1.6)	95(3.7)	98(1.4)	96.6	2.23
Benlate	95(1.5)	88(3.5)	95(1.4)	96.0	2.13
Control	82(1.0)	78(2.6)	83(1.0)	81.0	1.53

* Figures were rounded to their whole number.

was either 0.3 or 0.4% (w/v). When 0.3% concentration was used for fungicidal storage (w/w), enhancement of germination of seeds was observed (Table 2). Organic fungicides Captan, Thiram, Dithane M-45 behave approximately alike while systemic fungicides Bavistin and Benlate were observed to be superior in improving seed germination. Nearly similar trend was observed for the length of the radicle. The control seed showed poor germination and smaller radicle in comparision to the fungicide smeared seeds.

Majority of the seed pathologists has suggested the fungicidal storage of the seed against microbial spoilage in storage[1,9,10]. The necessity of fungicidal storage is expressed by the fact that the storage fungi not only reduce the germination potential of the seed but also the physiology and biochemistry of the seeds and seedlings are unduly disturbed[12,13] probably due to secretion of toxins and enzymes. The fungicides kill the fungal spores coming over the surface of the seed and thus the latter are saved of any damage besides that the fungicides arrest the potentiality of secretion of hydrolyzing enzymes[14] but a serious warning is that the moisture level of the seed must be reduced otherwise it would be more injurious to the germination[15].

Acknowledgement

Authors feel obliged to the Principal, B. D. Evening College, Patna for providing facilities.

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