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Chemical management of seed borne mycoflora of pigeonpea seeds and effect of different fungicides on seed germination and seedling vigour

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ABSTRACT : A total six systemic and non-systemic fungicides and 2 fungicidal combinations belonging to the different groups in their respective dose were evaluated as dry seed dresser for their efficacy in controlling the pathogens associated with pigeonpea seeds and increasing sees germination and seedling vigour. The fungicides captan eliminated at the fungal species except 3.0 per cent colonies of *Fusarium moniliforme* and 2.0 colony of *Rhizcotonia solani*. Indofil- 45 also eliminated several fungal species but the frequency of *Fusarium moniliformae* and *Rhizoctonia solani* were recorded 5.0 per cent and 1.0 per cent, respectively. Difoltan was comparatively less effective. Although this fungicides eliminated 6 fungal species but *Fusarium moniliformae*, *Alternaria alternate* and *Curvularia lunata* were observed with the frequencies of 5.0 per cent, 3.0 per cent, respectively. The fungicides Benomyl, carbendazim alone and their combination with Thiram completely eliminated the mycoflora from the seed. Other chemicals were found less effective. Carbendazim in combination with Thiram was found superior to other treatment with regard to seed germination while captan and carbendazim proved superior in better root growth. The shoot growth was found quiteromising when the seed were treated with thiram, Benomyl +Thiram and Carbendazim+ Thiram, indofil M-45 and Captan.

KEY **W**ORDS : Check, Seed vigour, Germination

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Pigeonpea (*Cajanus cajan*) Important pulse crops grown in India. Legume seeds have comparatively higher protein content than non-legume plant. The high protein content makes them desirable crops in agriculture. The seeds of legumes are second only to cereals as the most important source of food for humans and animals (National Academy of Sciences, 1979). All varieties of pulses are excellent source of easily digestible protein. But there are several factors which are responsible for their low production. Among them, diseases play an important role (Nine, 1986 and Pal, 1996).

It is being grown in tropical and subtropical parts of the world and has got high protein content of 21 per cent. Numerous examples exist in literature for the international and national spread of plant diseases as a result of the importation of seeds that were infected or contaminated with pathogens (Agarwal, 1976 and Paul, 1973). Seed-borne diseases have been found to affect the growth and

productivity of crop plants (Kubiak and Korbas, 1999; Weber *et al.*, 2001 and Dawson and Bateman, 2001). Presence or absence of seed borne fungi on seed surface is one of the important aspects that determine the quality of seed. Seed borne pathogen can be managed with integrated approach such as physical, biological, cultural and chemical control but the seed treatment with fungicides is one of most effective and practicable method for controlling both externally and internally seed borne mycoflora (Vaidehi, 2002). The fungicides increases percentage of seed germination, reduced the mortality and increased yield of pigeonpea varieties.

Research Procedure

The research work was carried out in the Department of Agricultural Botany, S.D.J Post Graduate College Chandeshwar Azamgarh.

A random sample of 50g seeds of pigeonpea variety UPAS-120 and Pant A-3 were taken in Erlenmayer flasks of 100 ml capacity. Required Quantity of each fungicides was put in the flask separately .These flasks were plugged with non-absorbent cotton and shake well to have uniform distribution of fungicides on seeds.From each treated and untreated seed lot, 200 seeds were taken and tested in 4 replication, each replication containing 50 seeds were taken and tested in 4 replication, each replication containing 50 seeds. Testing was done by standard blotter method for finding the efficiency of fungicides in controlling the pathogen associated with seeds. In another experiment, 200 treated and untreated seeds of variety UPAS-120 were examined in 4 replications (50 seeds/ replication) between paper methods for their germination under laboratory conditions. The observation was recorded on seed germination, shoot length, root length and fresh weight of seedling after 10 day of planting of the seeds. Measurement of the shoot length, root length and fresh weight of seedlings after 10 days of planting of seeds. Measurement of shoot length (cm) was taken from the base of apical bud and root length (cm) from base to tip of root. Fresh weight (g) of 10 seedlings was recorded.

Research Analysis and Reasoning

For evaluation of efficiency of different fungicides regarding their action on pathogens, the pigeonpea seeds were treated with the fungicides and tested through standard blotter method (ISTA, 1985). After 7 days of incubation period, the examination was made and the resulted are presented in Table 1. It is evident from the Table 1 that the treatment of pigeonpea seeds with fungicides either reduced the number of colonies of the pathogen associated with pigeonpea seeds or completely eliminated them. Complete elimination of the mycoflora from pigeonpea seeds was observed with treatment of

Table 1: Frequencies (%) of pigeonpea seeds carrying different pathogens after treatment with different fungicide

Sr. No.	Fungal sp.	Thiram	Difoltan	Indofil	Captan	Benomyl	Carbendazim	Benomyl+ Thiram	Carbendazim+ Thiram	Control
1.	*Fusrium moniliformae*	3	5	5	3					12
2.	*Alterneria.alternata*	2	3							16
3.	*Aspergilus flavus*									10
4.	*A.niger*									7
5.	*A.fumigatus*									4
6.	*A.candidatus*									3
7.	*Cladaporium cladesporoide*		3							7
8.	*Curvularia lunata*									8
9.	*Rhizoctonia solani*	2		1	2					5
	No. of pathogen	3	3	2	2					9
	%fungal colonies	7	11	6	5					72

Table 2: Effect of different fungicides on seed germination and seedline vigour in pigeonpea

Sr. No.	Fungicides	Thiram	Difoltan 80 w	Indofil M-45	Captan	Benomyl	Carbendazim 25 SD	Benomyl +Thiram	Carbendazim +Thiram	Check
1.	Dosage % w/v	0.3	0.2	0.3	0.2	0.2	0.2	0.2+0.3	0.2+0.3	
2.	Seed germination	83.2	80.3	81.5	80.5	78.5	82.3	84.5	90.0	72.5
3.	increased in germination against check	14.75	10.75	12.41	11.03	8.27	13.51	16.55	24.13	-
4.	Root length (cm)	8.0	8.3	7.9	9.0	8.5	8.6	7.8	8.0	7.4
5.	Increased in root length	8.10	12.16	6.75	21.62	14.86	16.21	5.40	8.10	
6.	Shoot length	10.10	8.3	9.5	9.3	9.2	9.3	9.8	9.9	8.2
7.	Increased in shoot length	21.95	1.21	15.85	13.41	12.19	13.41	19.51	20.73	

the fungicides carbendazim and benomyl and combination of carbendazim+Thiram, Benomyl+Thiram. The fungicides Captan eliminated at the fungal species except 3.0 per cent colonies of *Fusarium moniliforme* and 2.0 per cent colony of *Rhizcotonia solani*. Indofil- 45 also eliminated several fungal species but the frequency of *fusarium moniliformae* and *Rhizoctonia solani* were recorded 5.0 per cent and 1.0 per cent, respectively. The fungicides Thiram was effective in eliminating 6 fungal species while 3.0 per cent colonies of *Fusarium moniliformae* and 2.0 per cent colonies of *Alternaria alternate* and *Rhizoctonia solani* were observed. Difoltan was comparatively less effective. Although this fungicides eliminated 6 fungal species but *Fusarium moniliformae, Alternaria alternate* and *Curvularia lunata* were observed with the frequencies of 5.0 per cent, 3.0 per cent, respectively.

Effect of different fungicides on seed germination and seedling vigour of pigeonpea:

Seed germination and seedling vigour (Shoot and root length) were affected by fungicidal treatment of seeds (Table 2). Germination of seeds treated with the combination of Carbendazim+Thiram was 90 per cent, which was higher than other treatment followed by Benomyl+Thiram 84.5 per cent Thiram 83.2 per cent and Carbendazim 82.3 per cent. The treatment with benomyl, indofil M-45 and Difoltan caused higher germination over control. All the fungicides increased the shoot and root length. Captan was the most effective and caused 21.6 per cent increased in root length over control. Thiram, carbendazim+Thiram and Benomyl+Thiram was mucdh effective in shoot growth and caused 21.9 per cent, 20.7 per cent and 19.5 per cent increased the shoot length over contol.

The fungicides Benomyl, carbendazim alone and their combination with Thiram completely eliminated the mycoflora from the seed. Other chemicals were found less effective. Carbendazim in combination with Thiram was found superior to other treatment with regard to seed germination while captan and carbendazim proved superior in better root growth. The shoot growth was found quiteromising when the seed were treated with thiram, Benomyl +Thiram and Carbendazim+ Thiram, indofil M-45 and captan.

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