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Efficacy of fungicides against seed mycoflora of Indian bean (*Lablab purpureus* L.) cultivars under *in vitro* condition

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ABSTRACT

In vitro evaluation of eight fungicides as seed dresser against seed mycoflora of Indian bean revealed that Pyraclostrobin + Metiram and Carbendazim + Mencozeb combinations were superior. Pyraclostrobin + Metiram proved to be most effective with least number of fungal infected seeds followed by Carbendazim + Mencozeb. Also Carbendazim and Mencozeb solely proved their potential against seed mycoflora.

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INTRODUCTION

Indian bean (*Lablab purpureus* L.) (Sweet) usually known as *Dolichos* bean, Hyacinth bean or Field bean is one of the most ancient crop among cultivated plants. It is a bushy, semi-erect, perennial herb, mainly cultivated either as a pure crop or mixed with finger millet, groundnut, castor, corn, *Bajra* or sorghum in Asia and Africa. It is a multipurpose crop grown for pulse, vegetable and forage purpose (Gowda, 2013).

In India, *Lablab* is a field crop mostly confined to the peninsular region and cultivated to a large extent in Karnataka and adjoining districts of Tamil Nadu, Andhra Pradesh and Maharashtra. Karnataka contributes a major share, accounting for nearly 90 per cent in terms of both area and production in the country. Outside India, the crop is cultivated in East Africa, with similar uses and in Australia as a fodder crop (Gowda, 2013).

Indian bean has been reported to suffer from various types of disease and majority of them are known to be caused by fungi which are seed borne in nature. Among them, anthracnose caused by *Colletotrichum* sp., blight caused by *Alternaria* sp., vascular wilt caused by *Fusarium* sp. and other molds like *Rhizopus* sp. and *Mucor* sp. are major seed borne mycoflora observed in Indian bean (Saxena and Kumari, 2017). Seed borne fungi are the most important plant pathogens that cause direct and indirect losses of the bean crop throughout the world (Schwartz and Galvez, 1980).

MATERIAL AND METHODS

Collection of seed samples:

Seeds of Indian bean cultivars collected from major Indian bean growing areas of Navsari as well as Surat district and also from the Pulse Research Station, Navsari Agricultural University, Navsari. There were five major varieties were collected named GV 1, GV 2,

GNIB 21, GNIB 22, VAL 125-26. The trial was laid out in Completely Randomized Design under laboratory condition.

Isolation of pathogens:

For isolation of seed mycoflora from Indian bean seeds two different seed health testing methods *viz.*, standard blotter method and agar plate method (ISTA, 1985) were used. Further isolated fungi were pure cultured and stored in PDA slants stored under 5^0C for further use.

Preparation of fungicidal solutions:

Required concentration of fungicidal solutions for seed treatment of each fungicide under the study were prepared on the basis of active ingredient available in the formulation.

Management of seed mycoflora:

Seeds of Indian bean (400 as per standard method) were inoculated by soaking the seeds into mixed spore suspension of fungi followed by shade drying. Than they were treated by dry seed dressing with fungicides doses as mentioned above. Further, evaluated by standard agar plate method and incubated at 25 ± 2^0C for seven days. After ending of incubation period observations were recorded as percentage of infected seeds.

Treatment details

Sr. No.	Treatments	Dose (g/kg seeds)
T_1	Thiram 75WP	3
T_2	Mancozeb 75WP	3
T_3	Carbendazim 50WP	3
T_4	Carbendazim 12%+Mancozeb 63% 75WP	3
T_5	Metalaxy l 8% + Mancozeb 64% 72WP	3
T_6	Chlorothalonil 75WP	3
T_7	Thiophanate methyl 70WP	3
T_8	Pyraclostrobin 5%+ Metiram 55% 60WG	3
T_9	Control (Without treatment)	-

RESULTS AND DISCUSSION

In vitro evaluation of eight fungicides (carbendazim, carbendazim + mancozeb, thiram, chlorothalonil, thiophanate methyl, mancozeb, metalaxyl + mancozeb, pyraclostrobin + metiram) as dry seed treatment at their respective concentrations against seed mycoflora showed significant differences in per cent seeds showing mycoflora growth. None of the treatments gave complete control of all fungi. However, pyraclostrobin + metiram @ 3g/kg showed significantly minimum per cent seeds showed mycoflora (20.24%), among all the treatments and also in four cultivars *i.e.* GV

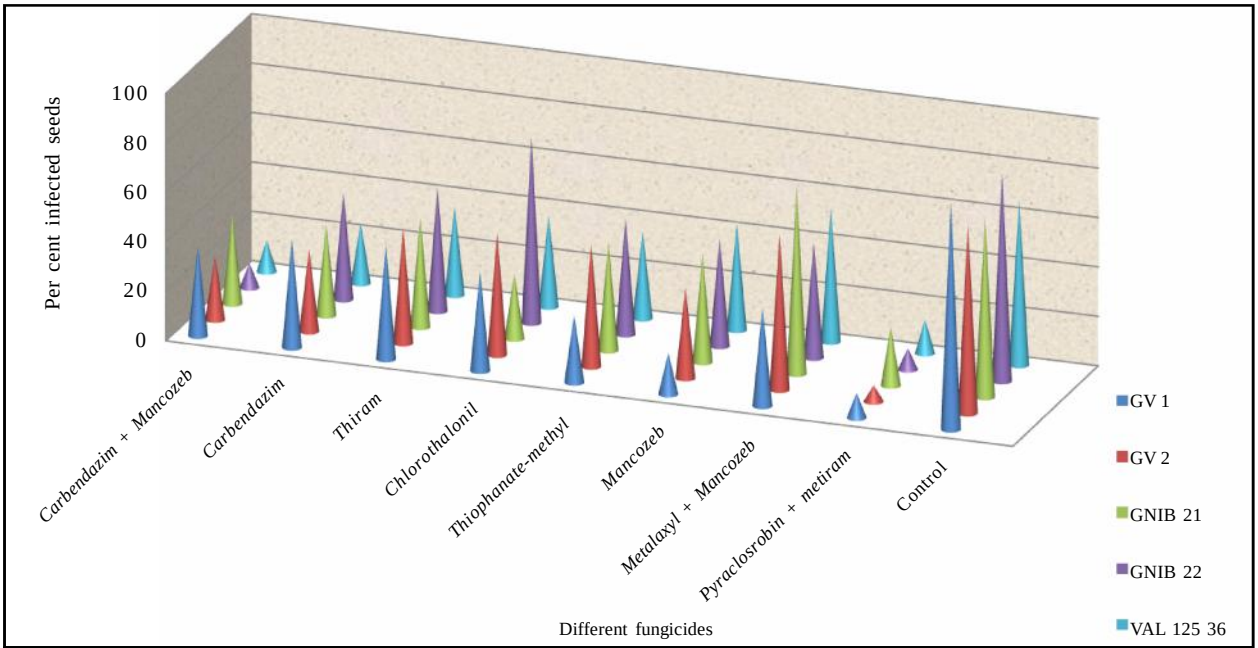

Fig. 1 : Effect of fungicides on seed mycoflora

Table 1: *In vitro* management of seed mycoflora of Indian bean using fungicides

Sr. No.	Treatments	Dose (g/kg seeds)	Per cent infected seeds (Cultivars)					Mean
			GV 1	GV 2	GNIB 21	GNIB 22	VAL 125-36	
1.	Carbendazim + Mancozeb	3g/kg	37.25* (36.66)	30.54 (25.85)	36.98 (36.21)	18.37 (9.94)	21.01 (12.88)	28.83 (24.31)
2.	Carbendazim	3g/kg	41.51 (43.95)	35.27 (33.38)	37.19 (36.57)	41.28 (43.56)	29.53 (24.32)	36.96 (36.36)
3.	Thiram	3g/kg	42.93 (46.44)	43.13 (46.77)	41.76 (44.39)	45.01 (50.05)	36.78 (35.89)	41.92 (44.71)
4.	Chlorothalonil	3g/kg	39.38 (40.29)	44.68 (49.48)	30.92 (26.43)	60.08 (75.17)	37.44 (36.99)	42.50 (45.67)
5.	Thiophanate methyl	3g/kg	31.48 (27.30)	44.97 (49.99)	41.40 (43.78)	43.13 (46.77)	36.40 (35.25)	39.48 (40.62)
6.	Mancozeb	3g/kg	24.11 (16.70)	37.30 (36.76)	41.38 (43.74)	41.26 (43.53)	41.14 (43.32)	37.04 (36.81)
7.	Metalaxyl + Mancozeb	3g/kg	39.14 (39.89)	52.67 (63.27)	58.17 (72.22)	43.06 (46.66)	47.17 (53.83)	48.52 (55.91)
8.	Pyraclosrobin + metiram	3g/kg	18.42 (9.99)	14.91 (6.63)	29.16 (23.77)	16.97 (8.56)	21.74 (13.73)	20.24 (12.54)
9.	Control	-	74.17 (92.22)	61.20 (76.78)	60.58 (75.91)	66.94 (84.44)	54.71 (66.67)	63.04 (78.47)
	S.E.±	-	0.88	0.46	0.41	0.84	0.28	-
	C.D. (P=0.05)	-	2.64	1.37	1.24	2.51	0.84	-
	CV%	-	3.94	1.96	1.71	3.48	1.35	-

*Figures outside parentheses are arcsine transformed values. Figures in parentheses are original values

1(18.42%), GV 2(14.91%), GNIB 21 (29.16%) and GNIB 22 (16.97%) followed by carbendazim + mancozeb @ 3g/kg 28.83 per cent and carbendazim @ 3g/kg 36.96 per cent (Table 1). Better performance of fungicide carbendazim can be attributed due to their systemic nature. Control recorded significantly highest per cent (63.04). In control maximum per cent seed showing mycoflora was recorded *i.e.* GV 1(74.17%), GV 2(61.20%), GNIB 21 (60.58%), GNIB 22 (66.94%) and VAL 125-36 (54.71%) (Fig. 1).

As per the above results combination of pyraclostrobin + metiram and carbendazim + mancozeb served as best treatments. This might be due to the reason that Pyraclostrobin, being systemic fungicide, kills the fungi through inhibiting energy supply by blocking mitochondrial electron transport. Whereas, metiram has prophylactic effect which prevents spore germination and interfering germ tube development. On the other hand carbendazim is systemic and by interfering cell division, it inhibits fungal development whereas, mancozeb is non systemic and inhibits fungi by disrupting their lipid metabolism.

The present investigation are in line with the results of Deshmukh (2012) that dry seed treatment with carbendazim + mancozeb or thiophanate methyl or carbendazim significantly improved seed germination, root length and seedling length in green gram as compared to all other treatments tested.

More or less similar results were recorded earlier by Singh *et al.* (2014) while investigating the effect of carbendazim, mancozeb and thiram on the seed borne mycoflora and germination. All of them found effective but carbendazim proved to be highly effective in reducing the seed borne mycoflora and enhancing the germination percentage of mung bean seeds.

Conclusion:

Eight fungicides were evaluated under *in vitro* condition as seed dresser against seed mycoflora where mean data revealed that pyraclostrobin + metiram @ 3g/kg showing significantly minimum (20.24%) seed mycoflroa followed by, carbendazim + mancozeb @ 3g/kg (28.83%). Control recorded significantly maximum (63.04%) infected seeds.

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