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Effect of Fungicidal Application in Management of Powdery Mildew of Field Pea (*Pisum sativum* L.) Yield

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ABSTRACT

A field experiment was conducted to evaluate the efficacy of fungicides against Field pea powdery mildew (Erysiphe polygoni DC.) in the experimental field of Department of Plant Protection, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad in Rabi Season of 2012-2013. Effect of fungicidal treatments on pod formation at 10 and 20 days after the spray was observed. Significantly maximum number of pods was recorded in propiconazole (13.67 and 14.47 at 10 and 20 days after spray respectively respectively) followed by carbendazim (13.33 and 14.27 at 10 and 20 days after spray respectively respectively) as compared to control which recordered minimum number of pods per plant (8.50 and 9.60 at 10 and 20 days after spray respectively). Maximum test weight of 1000 grain (g/plot) was recorded in propiconazole (183.55 g) followed by carbendazim (182.66 g) as compare to control recorded minimum weight (149.13g). Maximum grain yield q/ha was recorded in propiconazole (19.60 q/ha) followed by carbendazim (19.40 q/ha) as compared to control (13.75 q/ha).

Key words: *Field pea, Fungicides, Pod and Grain yield.*

INTRODUCTION

Pea (*Pisum sativum* L.) belonging to family leguminosae is one of the important vegetable crops of subtropical and temperate areas. The seeds of the crop are consumed as a vegetable and are used as a delicacy with other food stuff[14]. It provides a variety of vegetarian dishes and hence it is liked throughout the world. Field peas are grown as a forage crop for cattle or as a green manure crop for soil improvement or as a cover crop to reduce the soil erosion or as a mature seed. The mature seed may be used as whole or split into '*dal*' and prepared in various ways for human consumption. Beside this, Peas are an excellent source of protein, fibre, minerals and vitamins[7,2]. One pound of green peas contains 13.7 gm fat, 36.1 gm carbohydrates, 45 mg calcium, 249 mg phosphorus and 54 mg ascorbic acid (Khan, 1994).Pea seed is also a source of vitamins A, B, C and contains 35 - 40% starch, 4 - 7% fibre and relatively high levels of lysine.

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This makes it an appropriate dietary complement to cereals[3] addition to their ability to fix atmospheric N, peas enhance soil structure, and provide breaks for disease control which means they have an important role in modern agricultural systems[7,6]. In India, field pea occupies an area of 0.77 million hectare with a production 0.71 million tonnes and productivity 915 kg ha-1[12]. Uttar Pradesh is the major field pea growing state. Uttar Pradesh alone produces about 60 per cent of total pea produced in India. Besides, Uttar Pradesh, Madhya Pradesh and Bihar are the major field pea producing states.[10,11].

Among the various diseases of pea, Powdery mildew is one of the major diseases causing severe loss with in short period of time. Powdery mildew appears in epidemic form when the plants are in the pod stage towards the end of January and in February. Severe infection may result in 24-27% reduction in pod weight, 21-30% reduction in pod number and up to 70% reduction in total yield[9].

The loss due to powdery mildew is proportionate to the disease intensity and varies considerably depending on the stage of plant growth at which disease occurs. Pod forming stage is the most critical stage which should not be coincided with the favourable environmental conditions for disease development. The disease is worst in dry weather with low humidity and low temperature. Yield reduction due to this disease is very high within short period of time. Powdery mildew appears in epidemic form almost every year when the plants are in the pod stage towards the end of January and in February[13]. Sever infection may result in 24-27% reduction in pod weight, 21-30% reduction in pod number and up to 70% reduction in total yield[9].

Pea powdery mildew is usually suggested to be managed by many systemic and non-systemic fungicides which are found to have effect on controlling powdery mildew along with improvement in yield. Selection of proper fungicides helps farmers for management of powdery mildew disease effectively and to obtain boosted pod and grain yield of field pea with less economic for farmers in cost of cultivation. Hence, it's necessary to find out effective fungicide for management of field pea powdery mildew (*Erysiphe polygoni* DC.) along with increase in yield.

MATERIAL AND METHODS

A field experiement was conducted at the Central Research Farm, Department of Plant Protection, Sam Higginbottom Institute of Agriculture, Technology and Sciences Allahabad (Deemed-to-be-University), Allahabad, Uttar Pradesh during the *Rabi* season of 2012-13, to know the Effect of fungicidal application on field pea (*pisum sativum* l.) yield.

Table 1: Details of fungicides used in field experiment on field pea plant

Treatment	Common name	Concentration	Trade Name
T_0	Control	Plain water	_
T_1	Propiconazole	0.1%	(Tilt 25% EC)
T_2	Hexaconazole	0.05%	(Contaf 5% EC)
T_3	Carbendazim	0.1%	(Bavistin 50% WP)
T_4	Chlorothalonil	0.1%	(Kavach 75 % WP)
T_5	Wettable Sulphur	0.3%	(Sulfex 80% WP)
T_6	Mancozeb	0.25%	(Indofil 75%WP)

OBSERVATIONS RECORDED

Number of pods formation per plant for the plot has been recorded in each plot in each individual treatment one day before fungicidal spray, 10 days after spray and 20 days after spray, same way 1000 seed weight g/plot and grain yield (q/ha) also recorded at different intervals.

RESULTS AND DISCUSSION

Effect of fungicidal spray on pod formation of pea at different days of intervals

Number of pods per plant at one day before spray: The data on number of pods per plant of field pea at one day before spray is furnished in table (2) and depicted in figure (1) Number of pods per plant of field pea were found statistically non significant over other treatments including control.

Number of pods per plant at ten days after spray: The data on number of pods per plant of field pea at 10 day after spray is furnished in table (2) and depicted in figure (1) The data showed that all the treatments are significantly effective over control. Among all the treatments the maximum number of pods per plant were recorded in T_1 - treatment with propiconazole (13.67) followed by T_3 - carbendazim (13.33), T_4 -chlorothalonil (13.00), T_2 -hexaconazole (12.67), T_5 - wettable sulphur (12.33), T_6 -mancozeb (11.93) as compared to T_0 -control (8.50).

Number of pods per plant at twenty days after spray: The data on number of pods per plant of field pea at 20 days after spray is furnished in table (2) and depicted in figure (1) The data showed that all the treatments are significantly effective over control. Among all the treatments the maximum number of pods per plant were recorded in T_1 -treatment with propiconazole (14.47) followed by T_3 - carbendazim (14.27), T_4 - chlorothalonil (14.07), T_2 - hexaconazole (13.87), T_5 - wettable sulphur (13.60), T_6 -mancozeb (13.40). The minimum numbers of pods/plant were recorded in T_0 -control (9.60).

Effect of fungicidal spray on 1000- seed weight (g) of field pea: The data on 1000- seed weight (g) of field pea is furnished in table (3) and depicted in figure (2) The data showed that all the treatments are significantly effective over control. Among all the treatments the maximum seed weight was recorded in T_1 treatment with propiconazole (183.55), T_3 -carbendazim (182.66), T_4 - chlorothalonil (181.61), T_2 -hexaconazole (181.09), T_5 -wettable sulphur (180.08), T_6 - mancozeb (179.65) as compared to T_0 -control (149.13). All the treatment are significantly superior over control.

Effect of fungicidal spray on grain Yield (q/ha) of field pea: The data on grain yield q/ha of field pea are furnished in table (4) and depicted in fig (3) The data showed that all the treatments are significantly effective over control. Among all the treatments the maximum yield (q/ha) was recorded in T_1 treatment with propiconazole (19.60) followed by T_3-carbendazim (19.40), T_4 -chlorothalonil (19.18) T_2 - hexaconazole (19.10), T_6 - mancozeb (18.95), T_5 -wettable sulphur (18.98) as compared to T_0 -control (13.75). All the treatments are significant over control.

Results showed with respect to number of pods per plant, grain weight (1000) and grain yield was highest in T_1 - propiconazole followed by T_2-carbedazim over control These results are in agreement with earlier workers [Khunti *et al.*[5], Parasad and Dwivedi[9] and Nargund *et al.*[8]].

Among all the treatment, systemic fungicides such as T_1 -propiconazole and T_3 - carbedazim reduced the powdery mildew intensity and leaves become disease free. Healthy leaves have more photosynthetic activity, ultimately enhance the pod length, pod width, seeds/pod and test weight. But the efficacy of non-systemic fungicides such as T_5 -wettable sulphur and T_6 -mancozeb were less as compared to the systemic fungicides.

Table 2: Effect of fungicidal spray on pod formation of pea at different days of intervals

Treatments	Number of pods per plant		
	One day before spray	10day after spray	20day after spray
T_0 .Control	5.33	8.50	9.60
T_1. Propiconazole	9.00	13.67	14.47
T_2. Hexaconazole	8.13	12.67	13.87
T_3 .Carbendazim	8.73	13.33	14.27
T_4 .Chlorothalonil	8.33	13.00	14.07
T_5 .Wettable Sulphur	8.00	12.33	13.60
T_6. Mancozeb	7.67	11.93	13.40
Overal Mean	**7.88**	**12.20**	**13.33**
F- test	S	S	S
S. Ed. (±)	0.117	0.123	0.078
C. D. (P = 0.05)	0.249	0.262	0.166

Table3: Effect of fungicidal sprays on 1000 grain weight (g/plot) of field pea

Treatments	1000- seed weight (g/plot)
T_0 -Control	149.13
T_1 -Propiconazole	183.55
T_2 - Hexaconazole	181.09
T_3 .Carbendazim	182.66
T_4 -Chlorothalonil	181.61
T_5 -Wettable Sulphur	180.08
T_6 -Mancozeb	179.65
Overal Mean	**176.82**
F- test	S
S. Ed. (±)	1.594
C. D. (P = 0.05)	3.380

Table 4: Effect of fungicidal sprays on grain yield (q/ha) of field pea

Treatments	Grain yield (q/ha)
T_0 -Control	13.75
T_1 -Propiconazole	19.60
T_2 -Hexaconazole	19.10
T_3 -Carbendazim	19.40
T_4 -Chlorothalonil	19.18
T_5 -Wettable Sulphur	18.98
T_6 -Mancozeb	18.95
Overal Mean	**18.42**
F- test	S
S. Ed. (±)	0.141
C. D. (P = 0.05)	0.300

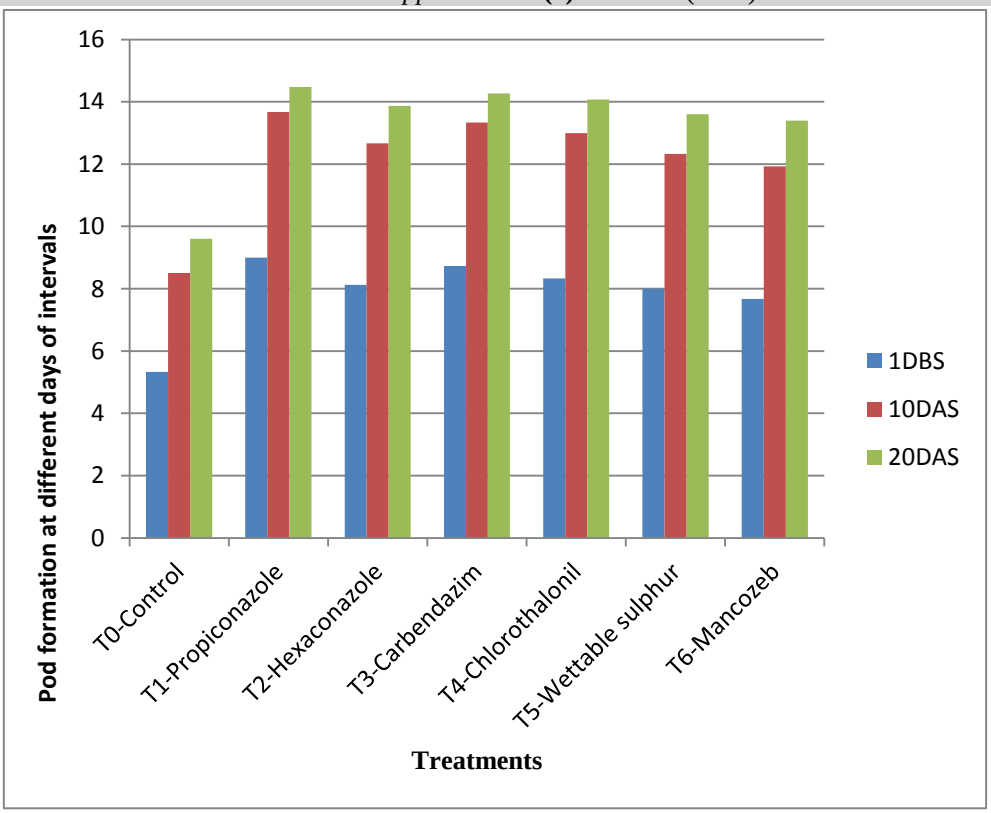

Fig. 1: Effect of fungicidal spray on pod formation of pea at different days of interval

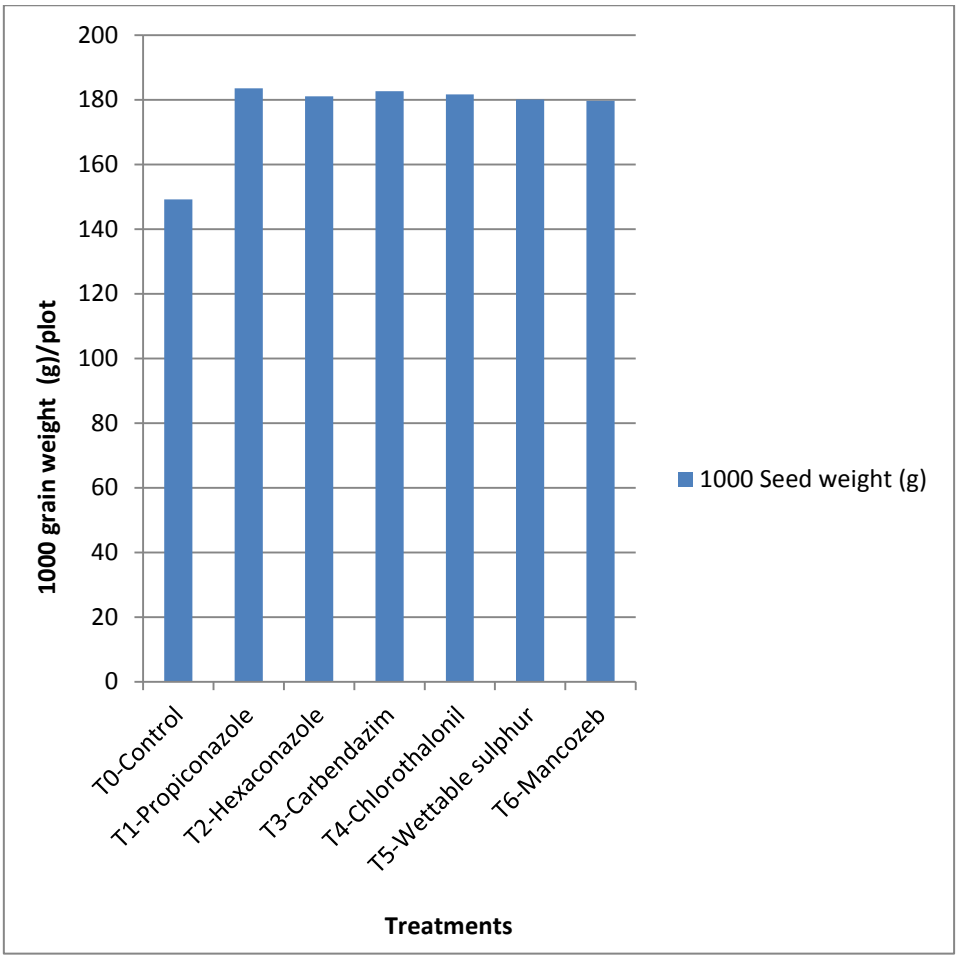

Fig. 2: Effect of fungicidal sprays on 1000 grain weight (g/plot) of field pea

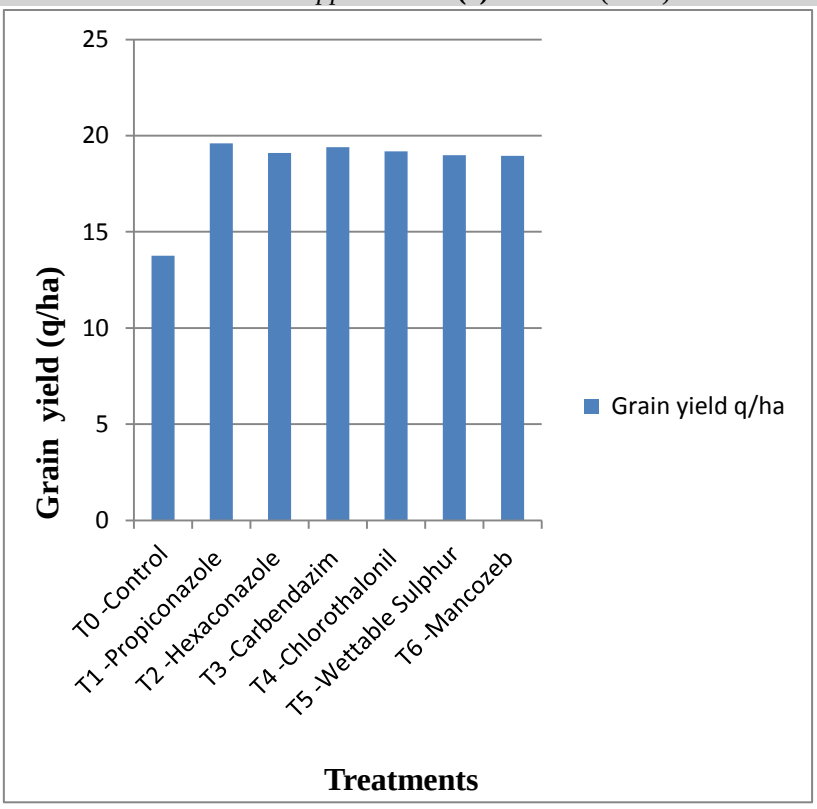

Fig. 3: Effect of fungicidal sprays on grain yield (q/ha) of field pea

CONCLUSION

Application of T_1 –propiconazole @ 0.1 and T_3 –carbedazim @ 0.1 for the management of field pea powdery mildew has given the maximum seed yield with least disease. The early diagnosis of the disease timely taking of plant protection measures avoids the further spread of the disease.

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