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MANAGEMENT OF POWDERY MILDEW AND RUST DISEASES OF GARDEN PEA USING FINGICIDES

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ABSTRACT

Alam, M.M., Sadat, M.A., Hoque, M.Z. and Rashid, M.H. 2007. ***Management of Powdery Mildew and Rust Diseases of Garden Pea Using Fingicides.*** **Int. J. Sustain. Crop Prod. 2(3): 56-60**

The experiment was conducted to find out the efficacy of some new fungicides against powdery mildew and rust diseases of garden pea at Regional Agricultural Research Station (RARS), Ishurdi, and Pabna during 2006-07. Eight different fungicides were tested and all fungicides resulted significantly better performance over control. Considering percent disease index (PDI), pod yield and yield contributing characters (plant height, pods/plant, length of pod, breadth of pod and seeds/pod), Sedozole 5 EC performed better than other fungicides and control treatment, which was closely followed by Conza. The highest PDI of both diseases was observed in control treatment, where as the lowest PDI and percent disease reduction over control was recorded in Sedozole 5 EC. So, Sedozole 5 EC (propiconazole) may be used for controlling powdery mildew and rust diseases and increasing pod yield of garden pea.

Key words: Fungicide, powdery mildew, rust, garden pea

INTRODUCTION

Pea (*Pisum sativum*) is a popular leguminous vegetable in Bangladesh. It is cultivated in area of 38000 acre and annual production in about 13000 metric tons (Anon., 2005). It is grown in Bangladesh mainly for green pods and immature seeds, which are consumed as vegetables. The matured seeds are used as pulse, chatpati, etc. Green peas are rich in vitamin and proteins. Mature seed contain (g/100g weight food) 10.9g water 22.9g protein, 1.4g fat, 60.7g carbohydrate, 1.4g fibre and 2.7g ash (Duke and Ayensu, 1985). The pea has a great agronomic value. In crop rotation, it helps improvement of soil fertility and yield of succeeding crops (Rana and Sharma, 1993). The average yield of pea is quite low as compared to its yield potential. Many diseases are responsible for such low yield. Eleven diseases of pea are reported in Bangladesh (Bakr, 1994). They cause about 30-40% yield loss annually (Anon., 1998).

Among the eleven diseases powdery mildew caused by *Erysiphe polygoni* De C. and rust caused by *Uromyces fabac* de Barry are two major diseases of pea. Yield reduction due to these diseases 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. Heavy reduction in pod formation in pea was occurred due to severe infection of powdery mildew in Bombay and reported that even one picking was not possible, whereas 6-7 pickings were obtained from a normal crop (Uppal *et al*., 1953). The losses in yield in a 100% infected crop were estimated by Munjal *et al.* (1963) to be 21-31% in pod number and 26-47% in pod weight. Rust of pea caused by *Uromyces fabae* de Barry is world wide distributed. It is a macrocyclic autoecious rust. The symptoms of this rust appear first in the month of January. It attacks broad bean, pea, and until, causing partial defoliation of susceptible varieties. All the green parts of the plant including pods are affected. Thus by controlling these diseases through a suitable control measure such loss can be minimized. Many reaserchers tried to control this diseases chemically world wide (Suhag and Rana, 1984, Verma, 1986, Rahman *et al.* 1984, Bakr and Rahman, 1998, Rahman *et al.* 2005; Ahmed *et al.* 2006). Considering above point this study was undertaken to test efficacy of some new fungicides in controlling powdery mildew and rust diseases of garden pea.

MATERIALS AND METHODS

The study of the efficacy of eight different fungicides was tested against powdery mildew and rust diseases of garden pea at RARS, Ishurdi, Pabna during Rabi season 2006-07. Seeds of garden pea variety BARI motor shuti-1 were sown in randomized complete block design with three replications. The unit plot size was 3m x 2.5 m and seeds were sown on 15th November 2006. Recommended fertilizers were applied to raise a good crop. The experiment was conducted under natural infection condition. Eight fungicides, namely T_1=Sistin 50 WP (1 gm/l), T_2=Conza 5 EC, T_3=Acmesulf 80 WDG (2gm/l), T_4=Milivit (2gm/l),T_5= Sedozole 5 EC (propiconazole 1ml. /l), T_6 =Macothan 80 WP (2gm/l),T_7=King Meal 72 WP (2gm/l), and T_8=Bavistin 50 WP (1gm/l) were sprayed thrice with 10 days interval on the standing crop according to the treatments with the initiation of the disease, control plots were sprayed with plain water. The plots were irrigated at two times and other intercultural operations were done when necessary. The crop was harvested at three months and 20 days after sowing (DAS).

The data were recorded from randomly selected 10 plants/plot for plant height, pod/plant, length of pod, breadth of pod and seed/pod. Data collection of disease severity of powdery mildew and rust diseases of garden pea started from just before 1st spray of fungicide 84 DAS. Green pod yield (ton/ha) and disease scoring data were recorded on whole plot basis and then disease score data converted into disease severity (PDI). The efficacy of fungicides was measured by scoring the disease severity (PDI) in the individual plot on the basis of a standard of scoring scale (Anon., 1994). Where, 0=leaf and fruit free from infection 1 = 1-5 leaves are infected, 2= 6-20% leaves are infected, 3= 21-40% leaves and fruits are infected, 4= 41-70% leaves and fruits are infected and 5= above 70% leaves and fruits are infected. The disease data were converted into percent disease index (PDI) suggested by Sharma (1984) and Rahman *et al.* (1986) as fallows:

$$PDI = \frac{\sum (\text{Class rating X Class frequency})}{\text{Total numbers of plants scored X Maximum ratings}} \times 100$$

Data were analyzed following the statistical procedure of Gomez and Gomez (1983). Treatment means were compared by DMRT (Duncan's Multiple New Range Tests).

RESULTS AND DISCUSSION

Efficacy of fungicides on disease severity of powdery mildew and rust of garden pea

All the fungicides used in the trail reduced the severity of powdery mildew and rust of garden pea significantly (Table 1). A significant variation among the fungicidal treatments was observed. Sedozole 5 EC (Propiconazole) gave the best results among the treatments for controlling powdery mildew and rust diseases of Garden pea. The lowest PDI of Powdery mildew (21.33%) and rust (33.33%) disease was recorded from Sedozole treated plots whereas the highest PDI of powdery mildew (66.67%) and rust (84.67%) diseases was observed in untreated control plots. Application of other fungicides was more or less effective against powdery mildew and rust diseases of pea. In case of powdery mildew of pea, the highest PDI decreased over control (68.01%) was found in Sedozole followed by Conza (65.01%). The lowest reduction of PDI over control was noted in Bavistin (3.00%) proceeded by King Meal (6.00%). In case of rust of pea, the highest PDI reduction over control was found in Sedozole (60.63%) followed by Conza (50.05%). The lowest decrease of PDI over control was noted in Milivit (4.72%) proceeded by King Meal (15.75%). The findings of present study are in agreement with Varma (1986), Bakr and Rahman (1998), Rahman *et al*. (1984), Rahman *et al*. (2005) and Ahmed *et al*. (2006) noticed that Tilt 250 EC (Propiconazole @ 0.05%) was the most effective fungicide against rust disease.

Table 1. Effect of the fungicides on PDI of powdery mildew and rust of garden pea

Treatment	PDI of powdery mildew at final stage	PDI reduction of powdery mildew over control	PDI of rust at final stage	PDI reduction of rust over control
T_1= Sistin 50WP	53.33b	20.01	66.67e	21.26
T_2= Conza 5EC	23.33e	65.01	34.67g	50.05
T_3= Acmesulf 80MDG	35.33cd	47.01	64.67e	23.62
T_4= Milivit	34.67d	47.50	80.67b	4.72
T_5= Sedozole 5EC	21.33e	68.01	33.33g	60.63
T_6= Mancothan 80WP	42.67c	35.50	60.67f	28.34
T_7= King Meal 72WP	62.67a	6.0	71.33d	15.75
T_8= Bavistin 50WP	64.67a	3.0	75.33c	28.74
T_9= Control	66.67a	-	84.67a	-
CV%	7.563	-	3.784	-
LSD	9.72	-	3.44	-

Means in a column having same letter(s) do not differ significantly at 5% level by DMRT

Disease severity of powdery mildew was first noticed at the 1st week of February (86 DAS). Gradual increase of Disease severity (PDI) was continued up to last week of February (105 DAS) and before harvesting. Remarkable increase of disease severity (PDI) was recorded at the last week of February (Fig.1). Disease severity of rust of pea was also first noticed at the 1st week of February (86 DAS). Disease severity (PDI) was increased sharply and continued up to last week of February (105 DAS) and before harvesting. Remarkable increase of disease severity (PDI) was recorded at the last week before harvesting (Fig.2).

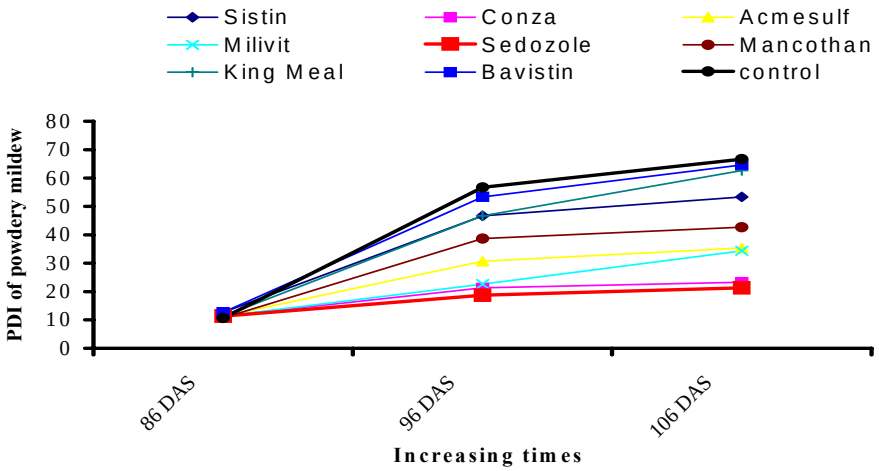

Fig.1. Fluctuation of Percent Disease Index (PDI) of powdery mildew of garden pea in relation to time

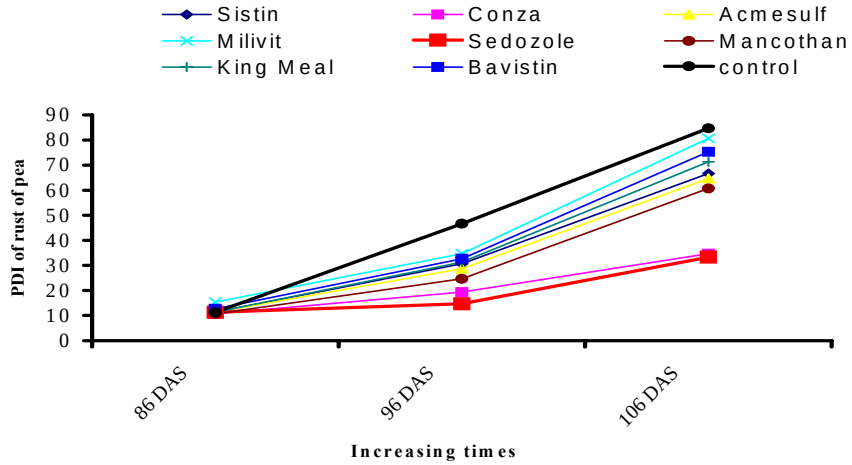

Fig. 2. Fluctuation of Percent Disease Index (PDI) of rust of garden pea in relation to time

Effect of fungicides on yield and yield contributing characters of garden pea

All the fungicides used in the trail increased pod yield significantly (Table 2). The highest plant height was observed in T_5 (99.40cm) followed by T_4, T_8, T_2, T_6, T_7 and T_1. The lowest plant height was obtained from T_9 (77.86cm) proceeded by T_3 (82.46cm). The highest pod/plant was observed in T_5 (18.93) followed by T_2, T_8, T_6 T_4 and T_7 . The lowest pod/plant was obtained from T_9 (12.73) proceeded by T_1 (13.27). Significant differences were not found in pod length. The highest breadth of pod was observed in T_5 (1.43cm) followed by T_8, T_2, T_1, T_4, T_7, T_3 and T_6 and the lowest in T_9 (1.15cm). The highest seed/pod was observed in T_5 (5.67) and the lowest in T_9 (4.13) proceeded by T_6 (4.53) and T_8 (4.87), which were also statistically in significant. The highest pod yield was found in T_5 (10.37 t/ha) followed by T_2, T_4, T_6, T_8 and T_1 and the lowest in T_9 (7.02 t/ha) proceeded by T_3, T_7, T_6, and T_8. The pod yield increased over control was recorded highest (59.78%) while sprayed with Sedozole 5 EC (T_5) followed by Conza 5 EC (T_2) (33.28%), Sistin 50 WP (T_1) (22.80%) and Bavistin 50 WP (T_8) (18.03%). The lowest increased of pod yield over control was recorded (4.78%) while sprayed with Acmesulf 80 MDG (T_3) proceeded by King Meal 72 WP (T_7) (8.17%), Sistin 50 WP (T_1) (22.80%) and Mancothan 80 WP (T_6) (14.48%). Munjal *et al.* (1963) reported that powdery mildew of pea losses in yield 100% infected crop were estimated and 21-31% in pod number and 26-47% in pod weight.

Table 2. Effect of fungicides on the yield and yield contributing characters of garden pea

Treatment	Plant height (cm)	No of pods / plant	Length of pod (cm)	Breadth of pod (cm)	No of seeds / pod	Pod yield (t/ha)	Pod yield increased over control (%)
T_1= Sistin 50WP	83.76a-c	13.27c	7.33	1.27ab	5.33ab	7.97b	22.28
T_2= Conza 5EC	91.93a-c	18.73a	7.93	1.35a	5.40a	8.65b	33.28
T_3= Acmesult 80MDG	82.46bc	13.47bc	7.50	1.24ab	5.00ab	6.80c	4.78
T_4= Mancothan 80WP	97.20ab	15.60a-c	7.20	1.27ab	5.33ab	8.64b	33.13
T_5= Sedozole 5EC	99.40a	18.93a	8.03	1.43a	5.67a	10.37a	59.78
T_6= Mancothan 80WP	90.63a-c	16.67ab	7.43	1.20ab	4.53ab	7.43bc	14.48
T_7= King Meal 72WP	83.87a-c	15.53a-c	7.90	1.25ab	5.67a	7.02c	8.17
T_8= Bavistin 50WP	93.47a-c	17.73a	7.40	1.40ab	4.87ab	7.66bc	18.03
T_9= Control	77.86c	12.73c	7.10	1.15b	4.13b	6.49c	-
CV%	9.19	11.16%	NS	10.64	12.24	9.94	-
LSD	14.15	3.062		0.2322	1.081	1.357	-

Means in a column having same letter(s) do not differ significantly at 5% level by DMRT. NS means non significant.

Relationship between percent disease index and yield

There was a significant negative correlation (-0.67) between PDI of powdery mildew and yield (kg/ha), which indicated that with the increase of PDI of powdery mildew there was a progressive fall in the yield. A linear regression was fitted between yield and PDI of powdery mildew. The correlation co-efficient (r) was - 0.67 and the contribution of regression (R^2 =0.4474) was 45% (Fig. 3). Similar to pod yield and PDI of rust of pea, there was a significant negative correlation (-0.89) between yield (kg/ha) and PDI of rust of pea. The correlation co-efficient (r) was - 0.89 and the contribution of regression (R^2 = 0.7984) was 80% (Fig. 4).

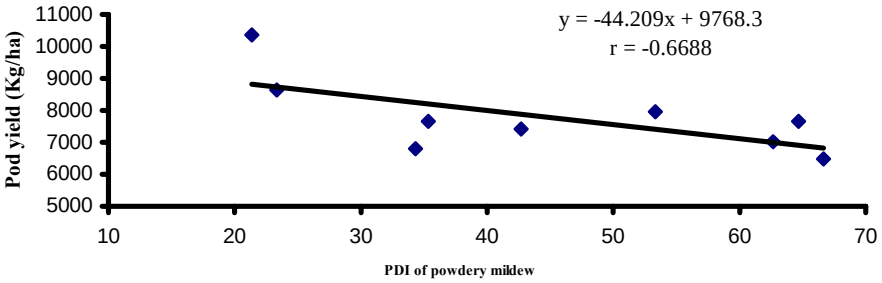

Fig. 3. Relationship between percent disease index of powdery mildew and pod yield of garden pea

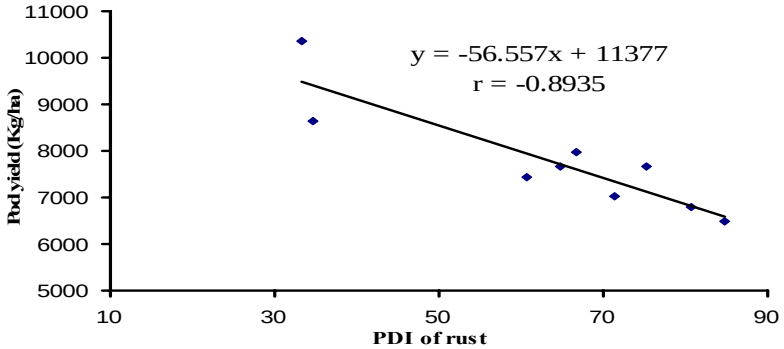

Fig. 4. Relationship between per cent disease index of rust and yield of garden pea

From results and fore going discussion it may be concluded that both the disease symptom was observed in the first week of February (85 DAS) with increasing temperature. Sedozole 5 EC was found most effective followed by Conza 5 EC interms of reducing disease and increasing pod yield. The both diseases may be controlled by spraying Sedozole 5 EC @ 0.1%, 3 times at the interval of 10 days from the first appearance of the diseases.

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