



Screening of Different Promising Varieties of Pea Against Pea Stemfly, *Ophiomyia Phaseoli* (Tryon)

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ABSTRACT

The research was conducted at Research Farm of College of Agriculture, Swami Keshwan and Rajasthan Agricultural University, Bikaner (Rajasthan) during rabi 2016-17. The experiment was conducted comprising of ten varieties viz., Pusa pragati, Kashi udai, Punjab-88, Punjab-87, Azad P-3, Punjab-89, Azad P-1, Matar ageta 6, Mithi phali and G-10 were screened against stemfly, *O. phaseoli*. The data revealed that however none of variety has given complete resistance against stemfly. The varieties, Pusa pragati, Kashi udai and Punjab-88 were found as least susceptible while, Punjab-87, Azad P-3 and Azad P-1 were found moderately susceptible against stemfly. Varieties Punjab 89, Matar ageta-6, Mithi phali and G-10 were found as highly susceptible varieties against *O. phaseoli*.

Keywords: Pea stemfly, pea varieties

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INTRODUCTION

Pea (*Pisum sativum* Linn.) is the prime vegetable crop of Indian sub continent. Pea is cultivated for the fresh green seeds, tender green pods and dried seeds and foliage [2]. Pea is a highly nutritive vegetable. The protein concentration of peas range from 15.5-39.75 percent [1]. Various abiotic and biotic factors causes losses in the pea crop so that the yield of it is reduced. Among the biotic constraints, the losses caused by insects pests are a major limiting factor in realization of optimum yield of the vegetable pea crop. It is known to be ravaged by several insect pests during its various crop stages.

Pea plant has a tap root system, vine weak stem, and shallow root system. It is susceptible to drought and heat. It grows best on well-drained loamy and clayey soils [6]. Pea is a reasonably high yield crop and is suitable for either conventional, low input or organically managed cropping system. Including pea in crop rotation helps to increase diversity and provides a source of nitrogen which reduces reliance on nitrogen fertilizer (the crop adds up to 33-246 kg N ha⁻¹).

Pea crop is subjected to attack by large number of pests in field, viz., pea pod borer, *Etiella zinckenella*, pod borer, *Helicoverpa armigera*, *Lampedes boeticus*, pea stemfly, *Ophiomyia phaseoli*, cotton jassid, *Emrasca devastans*, pea leaf miner, *Phytomyza atricornis*, aphid, *Myzus persicae* and mite, *Tetranychus telarius*.

Pea stem fly, *O. phaseoli* (Tryon) is one of the most serious pest of this crop. The infestation of stem fly maggot occurs at seedling stage. The affected plants in the early stage show thickening or cracking of the stem at or just above the ground level. The heavily infested area can easily be distinguished by the rusty red appearance of the basal portion of the stem. The plant becomes stunted and yellow and finally dries. In most of the cases stem is swollen below the ground level and the plant that can survive, contains small seeds [5]. Under heavy infestation of stemfly it causes wilting of the plant upto to the extent of 99.3 percent. The pea crop is most susceptible in the seedling stage against this pest. The date of sowing may affect the incidence of the pest. The infestation is progressively increased in early sowing crop [3].

MATERIAL AND METHODS

Experiment was conducted during *rabi*, 2016-17 in randomized block design with 10 varieties each replicated thrice. Each variety was grown in individual plot of size 3 x 1.8 m². The spacing between row to row and plant to plant was kept 30 x 30 cm, respectively. Each plot consisted of six rows. The varieties were sown on 3rd November, 2016. All the varieties were allowed to have a natural infestation of *O. phaseoli*. The observations on incidence of pea stem fly were recorded by counting number of damaged and healthy plants in each plot at weekly intervals.

Table 1: The first observation (5th December, 2016) the mean per cent plant mortality in different varieties

Varieties	Average per cent plant mortality at different weeks								Cumulative damage (%)
	5.12.16	12.12.16	19.12.16	26.12.16	2.1.17	9.1.17	16.1.17	23.1.17	
Azad P-1	4.44	3.33	2.78	2.22	1.92	1.78	0.86	0.00	17.33
	(11.99)	(10.28)	(9.36)	(8.34)	(7.64)	(7.36)	(5.13)	(0.00)	(23.24)
Azad P-3	3.89	3.11	2.33	2.15	1.85	1.67	0.78	0.00	15.78
	(11.37)	(10.16)	(8.78)	(8.43)	(7.82)	(7.42)	(5.07)	(0.00)	(23.40)
Punjab-87	3.72	2.78	2.22	2.05	1.67	1.42	0.56	0.00	14.42
	(11.12)	(9.60)	(8.57)	(8.23)	(7.42)	(6.84)	(4.29)	(0.00)	(22.32)
Punjab-88	2.40	1.67	1.48	1.40	0.98	0.86	0.00	0.00	8.79
	(8.91)	(7.42)	(6.99)	(6.79)	(5.68)	(5.32)	(0.00)	(0.00)	(17.24)
Punjab-89	5.56	4.58	3.90	3.05	2.78	2.50	2.05	0.77	25.19
	(13.63)	(12.35)	(11.38)	(10.05)	(9.59)	(9.09)	(8.23)	(5.03)	(30.11)
Matar ageta-6	5.50	4.45	3.92	3.05	2.78	2.45	1.92	1.19	25.26
	(13.56)	(12.17)	(11.42)	(10.06)	(9.60)	(9.00)	(7.96)	(6.26)	(30.17)
Mithi phalli	5.80	4.85	4.45	3.15	2.75	2.45	1.67	0.33	25.45
	(13.94)	(12.72)	(12.18)	(10.22)	(9.55)	(9.01)	(7.42)	(3.29)	(30.30)
Pusa pragati	1.67	1.26	1.00	1.08	0.92	0.56	0.00	0.00	6.49
	(7.42)	(6.44)	(5.74)	(5.96)	(5.50)	(4.29)	(0.00)	(0.00)	(14.76)
G-10	6.11	5.00	4.62	3.18	3.00	2.78	2.50	0.00	26.02
	(14.31)	(12.92)	(12.41)	(10.27)	(9.97)	(9.60)	(9.10)	(0.00)	(30.67)
Kashi udai	1.92	1.33	1.05	0.96	0.86	0.78	0.00	0.00	6.90
	(7.96)	(6.62)	(5.88)	(5.62)	(5.32)	(5.07)	(0.00)	(0.00)	(15.23)
S.Em.±	0.51	0.54	0.52	0.48	0.54	0.51	0.34	0.05	2.12
CD at 5%	1.53	1.60	1.55	1.42	1.59	1.51	1.02	0.15	6.28

RESULTS AND DISCUSSION

The data presented in Table 1 revealed that during the first observation (5th December, 2016) the mean per cent plant mortality in different varieties ranged from 1.67 to 6.11. The minimum infestation of 1.67 per cent was observed on variety Pusa pragati which was at par with Kashi udai (1.92%) and Punjab-88 (2.40%). These varieties were found significantly superior over other varieties in their degree of infestation. The maximum infestation of 6.11 per cent was recorded on variety G-10 followed by Mithi phali (5.80%), Punjab-89 (5.56%) and Matar ageta-6 (5.50%). The order of susceptibility of varieties were as follows G-10 (6.11%) > Mithi phali (5.80%) > Punjab-89 (5.56%) > Matar ageta-6 (5.50%) > Azad P-1 (4.44%) > Azad P-3 (3.89%) > Punjab-87 (3.72%) > Punjab-88 (2.40%) > Kashi udai (1.92%) > Pusa pragati (1.67%).

In second observation (12th December, 2016), the plant mortality in different varieties ranged from 1.26 to 5.00 per cent. The least infestation was recorded on variety Pusa pragati (1.26%) followed by Kashi udai (1.33%) and Punjab-88 (1.67%). The maximum infestation was observed on variety G-10 (5.00%) followed by Mithi phali (4.85%), Punjab-89 (4.58%) and Matar ageta-6 (4.45%). The order of susceptibility of varieties as follows G-10 (5.00%) > Mithi phali (4.85%) > Punjab-89 (4.58%) > Matar ageta-6 (4.45%) > Azad P-1 (3.33%) > Azad P-3 (3.11%) > Punjab-87 (2.78%) > Punjab-88 (1.67%) > Kashi udai (1.33%) > Pusa pragati (1.26%).

The third observation was recorded on 19th December, 2016 in which the mean plant mortality ranged from 1.00 to 4.62 per cent in different varieties. However, the minimum infestation was observed on varieties Pusa pragati (1.00%), Kashi udai (1.05%) and Punjab-88 (1.48%), which were found significantly superior in their degree of infestation over rest of the varieties. The maximum infestation was observed on variety G-10 (4.62%). The order of susceptibility was as follows G-10 (4.62%) > Mithi phali (4.45%) > Matar ageta-6 (3.92%) > Punjab-89 (3.90%) > Azad P-1 (2.78%) > Azad P-3 (2.33%) > Punjab-87 (2.22%) > Punjab-88 (1.48%) > Kashi udai (1.05%) > Pusa pragati (1.00%).

As shown in table 1, that the pea stemfly damaged plants in the fourth observation (26th December, 2016), the plant mortality ranged from 0.96 to 3.18 per cent. The minimum infestation was observed on varieties Kashi udai (0.96%), Pusa pragati (1.08%) and Punjab-88 (1.40%). The order of susceptibility as follows G-10 (3.18%) > Mithi phali (3.15%) > Matar ageta-6 (3.05%) > Punjab-89 (3.05%) > Azad P-1 (2.22%) > Azad P-3 (2.15%) > Punjab-87 (2.05%) > Punjab-88 (1.40%) > Pusa pragati (1.08%) > Kashi udai (0.96%).

In fifth observation (2nd January, 2017), the pest infestation on different varieties ranged from 0.86 to 3.00 per cent. The least infestation was observed on varieties Kashi udai (0.86%), Pusa pragati (0.92%) and Punjab-88 (0.98%) which were found non-significantly in their degree of infestation. The other varieties like, Punjab-87 (1.67%), Azad P-3 (1.85%) and Azad P-1 (1.92%) were in the middle order of infestation. The maximum infestation was recorded on G-10 (3.00). The order of susceptibility was as follows G-10 (3.00 %) > Matar ageta-6 (2.78%) > Punjab-89 (2.78%) > Mithi phali (2.75%) > Azad P-1 (1.92%) > Azad P-3 (1.85%) > Punjab-87 (1.67%) > Punjab-88 (0.98%) > Pusa pragati (0.92%) > Kashi udai (0.86%).

In sixth observation (9th January, 2017), the pest infestation in different varieties ranged from 0.56 to 2.78 per cent. The least infestation was observed on varieties Pusa pragati, Kashi udai and Punjab-88 which were found statistically at par in their degree of infestation to the pea stemfly. The other varieties viz., Punjab-87, Azad P-3 and Azad P-1 were in the middle order of infestation. The maximum infestation was recorded on G-10. The order of susceptibility was as follows G-10 (2.78%) > Punjab-89 (2.50%) > Matar ageta-6 (2.45%) > Mithi phali (2.45%) > Azad P-1 (1.78%) > Azad P-3 (1.67%) > Punjab-87 (1.42%) > Punjab-88 (0.86%) > Kashi udai (0.78%) > Pusa pragati (0.56%).

The seventh observation was recorded on 16th January, 2017 and mean per cent plant mortality ranged from 0.00 to 2.50 in different varieties of pea. No infestation was recorded on varieties Pusa pragati, Kashi udai and Punjab-88. However, the minimum infestation was observed on varieties Punjab-87 (0.56%), Azad P-3 (0.78%) and Azad P-1 (0.86%) which were found significantly superior in their degree of infestation over rest of the varieties. The maximum infestation was observed on variety G-10 (2.50 %). The order of susceptibility was as follows G-10 (2.50%) > Punjab-89 (2.05%) > Matar ageta-6 (1.92 %) > Mithi phali (1.67%) > Azad P-1 (0.86%) > Azad P-3 (0.78%) > Punjab-87 (0.56%) > Punjab-88 (0.00%) > Kashi udai (0.00%) > Pusa pragati (0.00%).

The eighth observation was recorded on 23rd January, 2017 and It was noticed that no plant mortality was observed in several varieties except Mithi phali (0.33%), Punjab-89 (0.77%) and Matar ageta-6 (1.19%).

For the sake of convenience in concluding result the plant mortality caused by pea stemfly on pea varieties recorded during the experimental period was categorized on the basis of formula $\bar{X} \pm \sigma$. The varieties having the mean of the damaged plant below 9.16 per cent 9.16 per cent to 25.16 per cent and above 25.16 per cent categorized as least, moderately and highly susceptible, respectively (Table 2).

Table 2 Categorization of different pea varieties for their susceptibility to *O. phaseoli*

S.No.	Mean of the damaged plants (%)	Category
1.	Above 25.16	Highly susceptible
2.	9.16 to 25.16	Moderate susceptible
3.	Below 9.16	Least susceptible

Mean, \bar{X} = 17.16

S.D. σ = 8.00

Kumar and Sharma [4] screened 25 germplasm of vegetable pea against *O. phaseoli*. Out of 25 germplasm Azad P-1 was the common germplasm taken for consideration by this scientist as well in present findings, the other germplasm were totally different when comparison in between the germplasm, in present findings Azad P-1 was observed as moderate susceptible variety as compared to finding of Kumar and Sharma [4], where they found as least harboring stemfly damage as comparison in different germplasm as well as they have conducted experiment in *rabi*, 1998-99 which is of long back

shows that the variety has come up as moderate susceptible in present findings. However least infestation in present finding was observed in Pusa pragati, Kashi udai and Punjab-88 varieties of pea.

Singh and Mishra [7] screened 12 varieties out of which *Asauji* was found most resistant variety against stemfly, and *Alaska* was more susceptible against pea stemfly.

The work on remaining varieties screened in the present investigation has not been traced in the available literature therefore, the performance of these varieties could not be compared and discussed here.

The order of susceptibility in pea varieties according to cumulative plant mortality recorded during the crop season was Pusa pragati > Kashi udai > Punjab-88 > Punjab-87 > Azad P-3 > Azad P-1 > Punjab-89 > Matar ageta-6 > Mithi phali > G-10.

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