

International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
 ISSN Online: 2617-4707
 IJABR 2024; SP-8(3): 634-637
www.biochemjournal.com
 Received: 07-01-2024
 Accepted: 17-02-2024

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Screening of field pea Germplasms against their major insect pests of field pea

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DOI: <https://doi.org/10.33545/26174693.2024.v8.i3Sh.850>

Abstract

The current study was conducted during the Rabi season of 2021–22 at the G.P.B. Farm, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya, with the goal of "screening of field pea germplasms against their major insect pests of Field Pea." The main insect pests that cause harm to crops at different stages of growth include the pod borer, leaf miner aphid, and stem fly. The population of stem fly was observed from the crop's two leaf stages. Aphids, leaf miner, at 20 DAS and pod borer were observed 50% flowering, and crop harvesting. The ranges for stem fly, aphid, and pod borer were 0.00-6.30, 14.34 to 22.20, 0.00 to 20.80, and 0.00 to 4.26 respectively. Thirteen of the fifty germplasm samples were found to be resistant to aphids, while the remaining thirty-seven showed moderate resistance. Germplasm VL 58, show the maximum pod borer population of 4.26/5 plants was discovered. The germplasm UDP 1302, HFP 8909, HFP 12, HFP 9907, KPMR 400, Pant 243, IPF 13–13, NDP 12-102, RAU 37, KPMR 853, KPF 1036, IPF 11–15, RFG 79, KPMR 928, and Prakash Show the lowest pod borer population, with 0.00 pod borer/5 plants.

Keywords: Screening, field pea, germplasm, field pea, pod borer, stem fly, leaf miner, aphid

Introduction

Pisum sativum L. is a leguminous crop that is a member of the Fabaceae family. It has a greater protein content and includes amino acids, especially lysine. It holds a special place in the market for its superior nutrition, which includes protein content of 22.5%, fat content of 1.2%, and vitamins, minerals, and iron as well as riboflavin, thiamine, and niacin. After soybeans, it is the second most important grain legume (Mihailovic *et al.*, 2005; Singh and Bhatt, 2012) [4, 7]. In 2017, field peas were cultivated on 0.90 million hectares of land in India, yielding 0.74 million tonnes of product and 8.21 q/ha of productivity. According to Anonymous (2017) [2], the total area under pea cultivation in Uttar Pradesh in 2017 was 0.286 m ha, with a yield of 0.285 m tonnes and a productivity of 9.97 q/ha. Pea productivity is lower than that of grains. According to Zohary and Maria (2000) [10], the main causes of its low yield are uneven fertilizer application, disease outbreaks, and insect pest attacks. According to Singh and Mishra (2013) [8], pea insects include *Helicoverpa armigera* (Hub.), Pea leaf miner *Chromatomyia horticola* (Goureau), Pea stem fly *Ophiomyia phaseoli* (Tryon), and thrips *Thrips tabaci*. The two most dangerous pests for this crop are the pod borer and the stem fly, *O. phaseoli* (Tryon). At the seedling stage, stem fly maggot infestation takes place. The plant eventually dries out and turns yellow and stunted. The majority of the time, the stem is enlarged below earth, and the plants that make it contain tiny seeds (Pandey, 1962) [6]. In field conditions, the pea aphid infestation causes a 42% loss in yield (Warrington *et al.*, 1987) [9]. In addition to eating, these insects release a sticky substance called honey dew, which encourages the growth of sooty mould and hinders the plant's ability to photosynthesize. In light of the aforementioned, an evaluation of field pea genotypes against sucking pests in field settings has been attempted, and the findings are presented. The majority of the methods used to combat these pests include using insecticides. However, pesticides have negative side effects pollute the environment, and pose health risks. Because resistant genotypes are safe for the environment and work well with other approaches, growing them is a crucial part of integrated pest management.

Field pea germplasms were screened for their relative sensitivity to pests such as stem fly, aphids, leaf miner, and pod borer complex, which can infect the plant from the two-leaf stage and pod formation stages, while taking into account all of the aforementioned information.

Materials and Methods

In Rabi season 2021–2022, the current study, titled "Screening of Field Pea Germplasms against Their Major Insect Pests," was conducted at the Students Instructional Farm, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya, U.P. On November 10, 2022, total 50 germplasms total were sowed in two rows of four metres each in an upgraded design for screening key insect pests under field conditions. All advised agronomical practices were followed to ensure crop growth. Damage from stem fly and leaf miner was measured at weekly intervals beginning 20 days after sowing (DAS) and expressed as a percentage of the total leaves on the plants. Aphid population was determined by visually counting nymphs and adults on 2.5 cm top shoots on plants every week beginning with 20 DAS and also by volumetric approach; larval pod borer population was recorded on plants every week beginning with pod commencement and continuing until harvest.

Results and Discussion

The initial damage of stem fly and leaf miner calculated in percentage, population of aphid on 2.5cm top shoot of each selected plants from 20 days after sowing till harvesting and pod borer /plant from 50% flowering to till harvesting, recorded at weekly interval.

Stem fly damage

The damage of stem fly range was 00 to 6.30%. The maximum damage was recorded in germplasm RAU 21 (6.30%) followed by TRCP 8 HFP 4, NDP 12-102 and KPF 1036 (0.80%) and minimum damage was recorded 00% in germplasm RG 3, VL 59, KPMR 925, RFP 2009-2, HFP 5, KPF 1024, RAU 37, KPMR 853, IPFD 13-4, KPMR 928, IPFD 12-2, Prakash and Pant 24. The present studies are partial agreement with Mittal and Ujagir (2005) [5] screened 165 germplasm of pea (*Pisum sativum* L.) for resistance to major insect pests i.e., pea stem fly (*Melanagromyza*

phaseoli Tryon) at Pantnagar and found that out of 165 germplasm, 18 dwarf germplasm was least susceptible mainly to stem fly and leaf miner. Out of 18 dwarf germplasm, two germplasm viz., P-4039 and P-4107 were found resistant as they had stem fly damage of 3.12 and 4.97% compared with 13.52% damage in check c.v. HFP 4 and ten germplasm viz. P- 4053, P-4093, P-4086, P-4112, P-4041, P-4044, P-4001, P-4136, P-4037 and P-4049 proved to be moderately resistant with stem fly damage between 5.99 and 9.56% and damage rating of 2.

Leaf Miner damage

The damage of leaf miner range was 14.34 to 22.20%. The maximum damage was recorded in germplasm NDP 12-2 and T 163 (22.20%) and minimum in germplasm Adarsh, RFP 2009-2, KPF 1024, Rachna (S. Check), KPMR 853, IPF 11-15, IPFD 13-41, IPFD 12-2 and Pant P 402 (14.34%).

The present findings are similar with the finding of Mittal and Ujagir (2005) [5] screened 165 germplasm of pea (*Pisum sativum* L.) for resistance to pea leaf miner (*Chromatomyia horticola* Goureau). On the basis of leaf miner infestation index values only one germplasm (P- 4107).

Aphid damage

The incidence of aphid was recorded in range of 00 to 20.80 (Aphids/2.5cm long shoots/plants). The maximum population were recorded in germplasm Rachna (S Check) (20.80 aphids/2.5 cm long shoots/plant) and minimum in germplasm Vikas, HFP 8909, HFP 12, KPMR 925, PMT P 217, HFP 5, NDP 12-102, IPFD 13-2, Pant P 222, KPMR 851, IPF 11-15, Pant P 195 and T 163 (00 Aphids/2.5cm long shoots/plants).

The present studies are partial agreement with Bhople *et al.* (2017) [3] conducted an experiment to evaluate the mungbean genotypes against key pests, i.e., aphid, whitefly, spotted pod borer (*M. vitrata*), stem fly and pod weevil in mungbean, sown with spacing of 30 cm x 10 cm. Total ten genotypes were used and experiment was conducted in Randomized Block Design with three replications. The lowest mean aphid population was recorded on genotype, PHULE M-702-1 (2.78 aphids per inch of shoot per plant), while the highest (3.64) on genotype PKV AKM.

Table 1: Screen out the field pea germplasm against major insect pests during Rabi, 2021-22

S.R. No.	Entries	Mean insect pest incidence 2021-22			
		Stem fly Damage %	% leaf miner damaged leaf /plant	Aphids/2.5 cm long shoots/plant	Larval population of pod borers/plant
1	TRCP 8	0.80	15.17	20.00	2.20
2	Pant P74	2.60	15.26	13.40	1.09
3	Adarsh	3.60	14.34	20.00	0.37
4	HUDP 1302	4.10	16.66	12.80	0.00
5	Vikas	5.00	15.76	0.00	0.18
6	RAU 21	6.30	15.87	19.33	2.37
7	RG3	0.00	18.80	20.00	0.37
8	HFP 8909	2.60	15.26	0.00	0.00
9	HFP 12	3.50	15.87	0.00	0.00
10	HFP 4	0.80	15.17	19.53	0.18
11	HFP 9907	1.00	22.20	20.53	0.00
12	KPMR 400	2.00	14.84	19.33	0.00
13	HUDP 1301	5.00	15.35	20.00	0.93
14	VL 59	0.00	15.17	19.60	0.18
15	KPMR 925	0.00	16.66	0.00	0.93
16	Pant 243	3.00	15.76	19.60	0.00

17	PMT P 217	2.00	15.55	00.00	1.09
18	RFP 2009-2	0.00	14.34	19.87	2.20
19	HFP 5	0.00	14.84	0.00	2.20
20	IPF 13-13	2.80	15.76	19.60	0.00
21	KPF 1024	0.00	14.34	14.30	1.09
22	VL 58	5.00	14.84	19.53	4.26
23	HUDP 1209	3.00	15.26	20.00	2.37
24	NDP 12-102	0.80	22.20	0.00	0.00
25	RAU 37	0.00	18.80	13.20	0.00
26	IPFD 13-2	2.80	15.26	0.00	1.09
27	Pant P 223	1.00	15.17	20.00	0.93
28	HFP 6	1.00	18.80	19.33	1.09
29	RFP 2009-3	2.00	18.80	15.40	2.20
30	Pant P 200	5.00	15.35	20.00	0.18
31	KPMR 853	0.00	14.34	19.53	0.00
32	IPF 13-14	3.90	15.35	20.00	2.20
33	Pant P 222	2.80	15.76	0.00	0.18
34	KPMR 851	1.30	18.80	0.00	1.18
35	KPF 1036	0.80	14.84	11.30	0.00
36	Pant P 213	3.50	15.26	15.10	1.09
37	IPF 11-15	5.00	14.34	0.00	0.00
38	IPFD 13-4	0.00	14.34	15.10	2.37
39	RFG 79	3.50	16.60	19.33	0.00
40	IPF 12-17	1.30	14.84	20.00	2.20
41	KPMR 928	0.00	15.26	13.70	0.00
42	IPFD 12-18	3.60	14.84	19.53	0.93
43	Pant P 195	1.30	16.60	0.00	2.20
44	T 163	2.60	22.20	0.00	0.18
45	IPFD 12-2	0.00	14.34	20.00	1.09
46	Prakash	0.00	15.26	19.53	0.00
47	Pant 244	0.00	16.60	20.00	1.09
48	Pant P 402	3.00	14.34	20.47	2.20
49	HUDP 15 (R check)	2.60	15.76	19.33	1.09
50	Rachna (S check)	2.60	14.34	20.80	4.00

Pod borer damage

The incidence of pod borer was recorded in range of 00 to 4.26 pod borer per plants. The maximum damage was recorded in germplasm VL 58 (4.26 pod borer/plant) and minimum in germplasm HUDP 1302, HFP 8909, HFP 12, HFP 9907, KPMR 400, Pant 243, IPF 13-13, NDP 12-102, RAU 37, KPMR 853, KPF 1036, IPF 11-15, RFG 79, KPMR 928 and Prakash (00 pod borer per plant).

Similar studies are also done by Abhilasha *et al.* (2017) [1] screened 15 varieties of pea found that *Lyriomyza* spp. and pod borer (*Helicoverpa armigera*), the varieties Arka sampurna, A. Aarthika, A. Ajit and GS-10, were found to be moderately resistant with the infestation index of 0.36, 0.39, 0.45 and 0.47, respectively.

Conclusion

On the basis of results, which was obtained present experiment, the following conclusion are brought out, which may be useful for scientists, research workers and farmers. The maximum damage of stem fly was recorded in germplasm RAU 21 (6.30%) and minimum 00% in germplasm RG 3, VL 59, KPMR 925, RFP 2009-2, HFP 5, KPF 1024, RAU 37, KPMR 853, IPFD 13-4, KPMR 928, IPFD 12-2, Prakash and Pant 24. The maximum damage of leaf miner was recorded in germplasm NDP 12-2 and T 163 (22.20%) and minimum in germplasm Adarsh, RFP 2009-2, KPF 1024, Rachna (S. Check), KPMR 853, IPF 11-15, IPFD 13-41, IPFD 12-2 and Pant P 402 (14.34%). The maximum incidence of aphid was recorded in germplasm Rachna (S Check) (20.80 aphids/2.5 cm long shoots/plant) and minimum in germplasm Vikas, HFP 8909, HFP 12,

KPMR 925, PMT P 217, HFP 5, NDP 12-102, IPFD 13-2, Pant P 222, KPMR 851, IPF 11-15, Pant P 195 and T 163 (00 Aphids/2.5cm long shoots/plants). The maximum incidence of pod borer was recorded in germplasm VL 58 (4.26 pod borer/plant) and minimum in germplasm HUDP 1302, HFP 8909, HFP 12, HFP 9907, KPMR 400, Pant 243, IPF 13-13, NDP 12-102, RAU 37, KPMR 853, KPF 1036, IPF 11-15, RFG 79, KPMR 928 and Prakash (00 pod borer per plant).

Acknowledgements

Thank to ANDUAT, Kumargaj, Ayodhya for the facilities provided for the development of this work.

References

1. Abhilasha CR, Shekharappa. Field screening of pea, *Pisum sativum* L. varieties for resistance against major insect pests. The Bioscan. 2017;12(2):815-818.
2. Anonymous. Project Co-ordinator Report, AICRP on MULLARP crops, IIPR, Kanpur; c2017. p. 25-29.
3. Bhole SK, Dhandge SR, Aravindarajan G, Patange NR. Vertical screening of mungbean genotype for their resistance against pest complex of mungbean. AGRES. 2017;6(1):123-128.
4. Mihailovic V, Mikic A, Cupina B, Eric P. Field pea and vetches in Serbia and Montenegro. Grain Legumes. 2005;44:25-26.
5. Mittal Vishal, Ujagir Ram. Field screening of pea, *Pisum sativum* L. germplasm for resistance against major insect pests. J Plant Prot. Environ. 2005;2(1):50-58.

6. Pandey ND. Bionomics of *Melanagromyza phaseoli* (Coq.) (Diptera- Agromyzidae). Indian J Entomol. 1962;23:293-298.
7. Singh AK, Bhatt BP. Faba Bean, *Vicia faba* L. Potential leguminous crop of India. ICAR, E. R, Patna. 2012, p. 522.
8. Singh M, Mishra T. Seasonal incidence of pea leaf miner, *Chromatomyia horticola* infesting pea. Plant Archives. 2013;13(2):941-943.
9. Warrington S, Mansfield TA, Whittaker JB. Effect of So₂ on the reproduction of pea aphids, *Acyrtosiphon pisum* and the impact of So₂ and aphids on the growth and yield of peas. Environ. Poll. 1987;48:285-294.
10. Zohary D, Maria H. Domestication of Plants in the Old World. Third edition. Oxford: University Press; c2000. p. 106.