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National Academy of Agricultural Science (NAAS) Rating : 3.03

Screening of brinjal varieties for resistance to Epilachna beetle, *Henosepilachna vigintioctopunctata* Fab. in Eastern Gangetic plains of West Bengal

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ABSTRACT: *A field experiment was carried out during kharif season from June to October of 2012 and 2013 at Adisaptagram Block Seed Farm, Department of Agriculture, Govt. of West Bengal, Dist-Hooghly to screen the brinjal genotypes against epilachna beetle, Henosepilachna vigintioctopunctata Fab. (Coccinellidae: Coleoptera). The pest was active in the field throughout the crop season and all the seven germplasms were more or less infested by this coccinellid. The pest incidence was found maximum during full vegetative phase of the crop in August then gradually decreased. Among the seven germplasms, sada jhuri and soyla supported lower population of the pest and these two brinjal germplasms are less susceptible or tolerant to the pest, while remaining five brinjal genotypes were highly susceptible to beetle. The maximum infestation of coccinellid was recorded on five germplasms due to favourable weather condition prevailed during the period of season and also for the full vegetative phase of the crop. But the low infestation of coccinellid in sada jhuri and soyla was may be due to presence of dense hairs on the lower surface of leaves and also the rough surface of leaves.*

Keywords: *Brinjal, Epilachna beetle, Germplasm, Screening*

INTRODUCTION

Egg plant is one of the important vegetable crops in west Bengal for its high production capacity. Favourable weather condition and texture of soil in West Bengal play an important role for occupying a significant position by this crop for its higher production. Brinjal is grown in almost all the states in India. West Bengal, Orissa and Bihar are major brinjal producing states in the country [1]. This crop is grown all the year round in most of the districts in West Bengal. But the yield of brinjal fruits is reduced due to attack of many insect pests. About 44 species of insect pests have been found to damage this crop in India [2]. Among these epilachna beetle, *Henosepilachna vigintioctopunctata* is one of the most important pests of brinjal which causes 20-60% defoliation of the crop [3 and 4]. Application of hazardous and longer residual systemic insecticides to control the incidence of epilachna beetle, develop resistance in insects and also pollute the total ecosystem. Thus the present study was conducted on the screening of brinjal germplasms against epilachna in this region.

MATERIALS AND METHODS

The present study was undertaken during June to October of 2012 and 2013 on the screening of seven brinjal germplasms at Adisaptagram Block Seed Farm, Hooghly, Department of Agriculture, Govt. of West Bengal. Chhuli Makra, Kalo Jhuri, L-13 (Sourava), Muktakeshi, Pata Kanta, Sada jhuri and Soyla were the brinjal germplasms selected for the study. The seedlings of these germplasms were collected from the nursery at Chakdah, Nadia, W.B. The seedlings were transplanted during mid June in the plots, measuring 3.75 m x 4.50 m with 75 cm x 75 cm spacing and each germplasm was replicated thrice in an RBD. All the standard agronomic practices, recommended for this region, were thoroughly followed except spraying of insecticides to manage the pests on this crop.

Just after transplanting of seedlings, count on the number of epilachna beetle was noted on various germplasms at 10 days interval and continued till the

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maturity of the crop i.e. from fourth week of June to third week of October. The number of epilachna was recorded from one upper, one middle and one lower leaves of 10 plants in each plot, selected at random. The yield of marketable fruits was also noted during respective harvesting periods in each plot. Thus the data obtained were categorically transformed [5] and subjected to statistical analysis.

RESULTS AND DISCUSSIONS

During 2012, the infestation of epilachna was recorded in all the brinjal germplasms throughout the crop season, but they were not appeared at the same time in all the germplasms (Table 1). In chhuli makra, kalo jhuri, L-13 (sourava) and muktakeshi, the pest infestation was initiated by end June while in pata kanta and soyla, it was first observed during early July and in sada jhuri in mid July. Then the population of the beetle was gradually increased and reached the peak at the same time in between early to mid August in all the germplasms. During this time, the maximum population was recorded in chhuli makra (57.33 per 10 plants), followed by L-13 (sourava) (40.33), Muktakeshi (39.66), pata kanta (37.66), kalo jhuri (36.66), soyla (26.33) and sada jhuri (21.33). Thereafter, the population of beetle was started to decline till full maturity of the crop. Similar trend was also observed when the average population of beetle was considered and in this case, the populations were 29.11, 23.52, 22.13, 21.61, 20.11, 15.58 and 9.72 per 10 plants, respectively.

During 2013, the pest was first appeared on the crop by end July in chhuli makra, kalo jhuri, muktakeshi, pata kanta and soyla while in L-13 (sourava) and sada jhuri, it was first observed in early to mid July (Table 2). The pest population was not always significantly variable from one germplasm to another and attained the peak during mid to end August in all cases and then slowly decreased. During peak period of activity, the maximum population was found in pata kanta (50.33 per 10 plants) which was followed by chhuli makra (45.33), L-13 (sourava) (42.66), muktakeshi (41.33), kalo jhuri (38.33), soyla (28.00) and sada jhuri (27.66). Pata kanta stood first when the mean population of beetle (27.66 per 10 plants) was considered and then in order were chhuli makra (25.22), muktakeshi (24.61), L-13 (sourava) (20.58), kalo jhuri (18.24), soyla (16.11) and sada jhuri (12.25).

From the results of both years, it can be inferred that the pest was active in the field throughout the crop season and all the germplasms were more or less equally infested by the beetle. The pest population was found maximum during full vegetative phase of the crop in August and then gradually decreased. This was due to favourable weather conditions i.e. 31.60 – 34.0 (max.) and 24.50 – 26.0^{0}C (min.) temperature; 97.10-98.0 (max.) and 71.90-87.50% (min) R.H; 1.90-15.30 mm rainfall; 3.60-8.30 h sunshine duration and 0.60-1.90 km/h wind speed that prevailed during the period of crop season and also in the full vegetative phase of the crop. The findings of Grewal [6], Raghuraman and Veeravel [4] & Ghosh and Senapati [7] confirm the results of the present study. It may be concluded that among the seven germplasms, sada jhuri and soyla supported the lower population of beetle and hence both the brinjal germplasms, i.e. sada jhuri and soyla were tolerant or less susceptible, while other five brinjal germplasms were highly susceptible to beetle. The findings of Gangopadhyay *et. al.* [8], Mondal *et. al.* [9] and Ghosh and Senapati [7] were also corroborated with the results of present investigation to some extent.

Yield of different brinjal germplasms

Among seven brinjal germplasms L-13 (sourav) obtained the maximum fruit yield (24.49 – 26.03 t/ha) followed by pata kanta (17.03 – 17.35 t/ha), muktakeshi (15.75 – 15.91 t/ha), chhuli makra (13.95 – 14.60 t/ha), kalo jhuri (13.61 – 14.31 t/ha), soyla (11.38 – 12.72 t/ha) and sada jhuri (8.78 – 9.06 t/ha) (Table 3). L-13 (sourav) also gave highest percentage of marketable fruits (69.12%), which was followed by pata kanta (67.61%), kalo jhuri (62.06%), soyla (59.17%), chhuli makra (56.97%), sada jhuri (54.56%) and mukta keshi (53.71%). While in 2013, the maximum percentage of marketable fruits was obtained from pata kanta (69.04%) and then from L-13 (66.53%), kalo jhuri (61.03%), sada jhuri (58.83%), soyla (57.91%), chhuli makra (57.63%) and muktakeshi (54.54%) (Table 3).

The authors are grateful to the Farm Manager, Adisaptagram Block Seed Farm, Hooghly, West Bengal for providing a piece of land and other extended facilities to conduct this present trial.

REFERENCES

Singal, V. (2003), In: Indian Agriculture. 2003. Indian Economic Data Research Centre. New Delhi. pp. 262-286.

Lal, O. P. (1975), A compendium of insect pests of vegetables in India. *Bull. Ent.* **16(1)**: 52-88.

Bandopadhyay, T. K. (1985), Studies on the ecology of pest complex of brinjal in west Bengal. Ph. D. Thesis submitted to Calcutta University, Calcutta. pp. 207-232.

Table 1

Population dynamics of Epilachna beetle on different brinjal germplasms during 2012 at Adisaptagram Block Seed Farm, Hooghly, W.B. (Means of three replications)

Different germplasms	*Population of epilachna beetle per 10 plants on different dates of observation*												*Mean population*
	June		*July*			*August*			*September*			*October*	
	III	*I*	*II*	*III*	*I*	*II*	*III*	*I*	*II*	*III*	*I*	*II*	
Chhuli makra	4.66	12.33	27.33	42.66	57.33	48.33	40.66	37.33	31.33	24.66	13.33	9.33	29.11
	(12.13)	(20.10)	(31.36)	(40.70)	(49.32)	(44.02)	(39.49)	(37.43)	(33.84)	(29.64)	(21.13)	(17.31)	
Kalo jhuri	6.66	15.33	24.33	33.33	28.00	36.66	26.33	22.66	17.33	15.33	9.66	5.66	20.11
	(14.58)	(22.74)	(29.32)	(35.08)	(31.76)	(37.08)	(30.72)	(28.20)	(24.31)	(22.83)	(17.63)	(13.25)	
L-13 (Sourava)	5.00	10.66	29.66	38.33	40.33	32.66	35.66	26.33	20.33	18.33	14.66	10.33	23.52
	(12.49)	(18.62)	(32.77)	(38.11)	(39.27)	(34.71)	(36.53)	(31.74)	(26.55)	(25.00)	(22.27)	(18.31)	
Muktakeshi	3.66	13.66	21.33	28.33	34.33	39.66	32.66	29.00	24.33	19.33	12.33	7.00	22.13
	(10.48)	(21.18)	(27.14)	(32.00)	(35.70)	(38.91)	(34.66)	(32.42)	(29.30)	(25.80)	(20.35)	(14.89)	
Pata Kanta	0.0	8.66	16.33	30.33	27.33	37.66	33.33	30.66	26.66	22.33	16.33	9.66	21.61
	(0.0)	(16.65)	(23.49)	(33.29)	(31.31)	(37.76)	(35.08)	(33.45)	(30.91)	(27.99)	(23.58)	(17.63)	
Sada jhuri	0.0	0.0	4.33	9.33	15.66	21.33	18.33	14.66	10.33	11.33	7.66	3.66	9.72
	(0.0)	(0.0)	(11.23)	(17.26)	(23.00)	(27.25)	(25.07)	(22.19)	(18.36)	(19.34)	(15.60)	(10.48)	
Soyla	0.0	3.33	7.66	13.66	20.33	26.33	31.66	24.33	22.33	17.00	13.66	6.66	15.58
	(0.0)	(10.15)	(15.56)	(21.38)	(26.44)	(30.58)	(34.05)	(29.36)	(27.99)	(24.12)	(21.32)	(14.33)	

*Figures in parenthesis are angular transformed values

	Source of variation		
	Date of observation	*Variety*	*Date of observation x Variety*
SEM (±)	1.24	0.95	3.28
CD (p=0.05)	2.89	2.20	NS

Table 2

Population dynamics of Epilachna beetle on different brinjal germplasms during 2013 at Adisaptagram Block Seed Farm, Hooghly, W.B. (Means of three replications)

Different germplasms	*Population of epilachna beetle per 10 plants on different dates of observation*												*Mean population*
	June	*July*	*August*	*September*	*October*								
	III	*I*	*II*	*III*	*I*	*II*	*III*	*I*	*II*	*III*	*I*	*II*	
Chhuli makra	6.33	12.00	19.66	26.66	33.33	40.00	45.33	38.66	31.33	24.33	16.66	8.33	25.22
	(14.20)	(19.94)	(26.18)	(30.92)	(35.05)	(39.12)	(42.27)	(38.10)	(33.82)	(29.34)	(23.81)	(16.37)	
Kalo jhuri	3.66	8.66	15.33	21.66	29.66	38.33	31.66	24.33	18.66	13.33	9.33	4.33	18.24
	(10.48)	(16.65)	(22.74)	(27.48)	(32.85)	(38.17)	(34.06)	(29.34)	(25.41)	(21.13)	(17.31)	(11.67)	
L-13 (Sourava)	0.0	6.66	13.66	24.38	31.33	42.66	35.33	32.66	23.00	17.33	12.66	7.33	20.58
	(0.0)	(14.28)	(21.10)	(29.38)	(33.89)	(40.69)	(36.33)	(34.71)	(23.48)	(24.29)	(20.48)	(15.19)	
Muktakeshi	5.38	9.66	17.33	26.33	34.66	41.33	37.66	39.66	32.33	24.66	17.00	9.33	24.61
	(12.84)	(17.63)	(24.29)	(30.60)	(35.95)	(39.96)	(37.76)	(38.94)	(34.44)	(29.58)	(24.06)	(17.31)	
Pata Kanta	5.00	12.66	20.33	29.33	36.33	44.66	50.33	41.66	35.33	26.33	18.66	11.33	27.66
	(12.18)	(20.60)	(26.55)	(32.55)	(36.88)	(41.91)	(45.22)	(40.07)	(36.30)	(30.72)	(25.26)	(19.37)	
Sada jhuri	0.00	0.00	3.00	7.66	14.33	20.33	27.66	18.33	21.33	16.66	10.33	7.33	12.25
	(0.0)	(0.0)	(8.05)	(15.28)	(21.95)	(26.67)	(31.54)	(24.12)	(27.31)	(23.84)	(18.31)	(15.19)	
Soyla	2.66	7.66	12.33	19.33	24.66	28.00	26.33	22.66	17.33	14.33	11.66	6.33	16.11
	(9.08)	(15.56)	(20.24)	(25.75)	(29.60)	(31.78)	(30.69)	(28.25)	(24.31)	(21.95)	(19.60)	(14.20)	

*Figures in parenthesis are angular transformed values

	Source of variation		
	Date of observation	*Variety*	*Date of observation x Variety*
SEM (±)	1.22	0.93	3.22
CD (p=0.05)	2.83	2.16	NS

Table 3
Yield of different brinjal germplasms during 2012 & 2013

Different germplasms	*Number of fruits per plant*				*Percentage of marketable fruits*		*Percentage of unmarketable fruits*		*Total yield (t/ha)*	
	Marketable		*Unmarketable*							
	2012	*2013*	*2012*	*2013*	*2012*	*2013*	*2012*	*2013*	*2012*	*2013*
Chhuli makra	294.33 (2.47)	319.33 (2.50)	187.66 (2.27)	204.66 (2.31)	56.97	57.63	43.03	42.37	14.60	13.95
Kalo jhuri	518.66 (2.71)	561.33 (2.75)	338.66 (2.53)	321.33 (2.50)	62.06	61.03	37.94	38.97	13.61	14.31
L-13 (Sourava)	553.33 (2.74)	510.66 (2.71)	217.0 (2.33)	231.66 (2.36)	69.12	66.53	30.88	33.47	24.49	26.03
Muktakeshi	256.66 (2.42)	235.66 (2.37)	208.33 (2.31)	182.33 (2.25)	53.71	54.54	46.29	45.46	15.91	15.75
Pata Kanta	331.33 (2.52)	357.00 (2.55)	146.33 (2.16)	172.33 (2.23)	67.61	69.04	32.39	30.96	17.03	17.35
Sada jhuri	543.33 (2.73)	517.33 (2.71)	452.66 (2.65)	416.66 (2.61)	54.56	58.83	45.44	41.17	8.78	9.06
Soyla	229.66 (2.36)	246.00 (2.39)	158.66 (2.19)	171.33 (2.22)	59.17	57.91	40.83	42.09	11.38	12.72
SEM (±)	0.04	0.01	0.06	0.02	-	-	-	-	-	-
CD (p=0.05)	0.09	0.02	0.14	0.05	-	-	-	-	-	-

*Figures in parenthesis are logarithmic transformed values

Roghuraman, M. and Veeravel, R. (1999), Influence of abiotic factors on the incidence of spotted leaf beetle *Epilachna vigintioctopuntata* Fab. in brinjal. *Pest Manage. in Horti. Ecosystem*. **5(1):** 17-20.

Gomez, K. A. and Gomez, A. A. (1984), Data that violate some assumptions of the analysis of variance in: statistical procedures of Agri. Res. A Wiley Inter science publication, USA. pp. 296-309.

Grewal, J. S. (1988), Seasonal fluctuation in population of *Epilachna vigintioctopuntata* on brinjal (*Solanum melongena*) crop. *Bull. Ento.* New Delhi. **29(1):** 73-75.

Ghosh, S. K. and Senapati, S. K. (2001), Biology and seasonal fluctuation of *Henosepilachna vigitioctopunctata* Fab. on brinjal under Terai region of West Bengal. *Ind. J. of agri. Research.* **35 (3):** 149-154.

Gangopadhyay, C., Maity, T. K. and Mandal, S. K. (1997), Evaluation of brinjal germplasms for resistance to *Henosepilachna vigitioctopunctata* Fab. *Ind. Agriculturalist*. **41 (2)**: 139-143.

Mandal, S. K., Kumar, B. and Prasad, D. (2000), Varietal resistance against *Epilachna vigintioctopuntata* Fab. On brinjal. *J. Appl. Bio.* **10(1):** 66-68.