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Varietal Preference of Blue Beetle, *Leptis papygaea* Baly. Infesting Rice

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ABSTRACT: Among the eight varieties of rice tested for their preference for blue beetle, *L. pygmaea*, variety Phondaghat-1 recorded lowest (1.36 %) average blue beetle infestation, followed by Ratnagiri-2 (2.88 % infestation) and Karjat-6 (3.39 % infestation) which were statistically at par with each other. The increasing trend of blue beetle infestation was noticed in the screened varieties. Jaya recorded highest (16.80) mean per cent infestation by blue beetle followed by Karjat-8 (14.46) and both of these varieties were at par with each other. On the basis of overall mean per cent blue beetle infestation the descending order were Jaya > Karjat-8 > Karjat-10 > Suvarna > Palghar-1 > Karjat-6 > Ratnagiri-2 > Phondaghat-1. Variety Phondaghat-1 (mean % infestation of 1.36) was categorized as resistant (R). Varieties Karjat-6 (3.39 %) and Ratnagiri-2 (2.88 %) were categorized as moderately resistant (MR). Variety Palghar-1 (7.57 %) was categorized as moderately susceptible (MS). Variety Suvarna (11.59 %) was categorized as susceptible (S) variety. Remaining varieties Karjat-10 (13.17 %), Karjat-8 (14.46 %) and Jaya (16.80 %) reported higher infestation of blue beetle and were thus categorized as highly susceptible (HS) varieties.

Keywords: Varietal preference, *Leptispa pygmaea*, rice.

INTRODUCTION

Blue beetle, *Leptispa pygmaea* Baly. (Coleoptera: Chrysomelidae) is one of the major pests of rice mainly reported in Karnataka, Maharashtra, Tamil Nadu and Kerala states of India. Though it is been previously reported as a minor pest (Trehan, 1946; Patel and Patel 1970; David and Kumaraswami 1975; Dale, 1994) has recently assumed a serious status of an emerging pest with much concern to the rice cultivation in Ratnagiri district and it is said to occur mainly in heavy rainfall tracts of the Konkan region of Maharashtra (Dalvi *et al.,* 1985). It has been reported to appeared in epidemic form for the first time during *Kharif* 1978 and since then the severe losses are occurring in Konkan region of Maharashtra. The highest damage of blue beetle is at early tillering stage with damage ranging from 31.5 to 45.7 per cent (Karthikeyan and Jacob 2009). Damage during vegetative phase (50 %) contributed more to yield reduction than the reproductive (30 %) or ripening phase (20 %) (Gupta and Raghuraman 2003). Rice cultivation, especially in rainfed rice ecosystem of Maharashtra, now a day facing problem of *L. pygmaea* which is known to cause great loss in rice production. Since the blue beetle has been so far considered as a minor pest, a very meagre study on this pest has been carried out in Maharashtra. A very little information on this pest is available from elsewhere also. As the blue beetle is a recent emerging problem of considerable importance in rice, a systematic detailed investigation was carried out on this pest in order to protect the crop by evaluating effective resistant varieties against the pest. At present, though insecticides are widely recommended for the control of blue beetle, *L. pygmaea*, they fail to provide a permanent solution to this problem. But indiscriminate use of insecticides leads to the development of resistance, destruction of natural enemies, environmental pollution and residue problems in the produce. One of the essential tools of integrated pest management (IPM) is the use of insect resistant, commercially acceptable varieties (Dutta and Hazarika 1994). A system with a component of resistance to pest will be most economical, least complicated, socially sustainable and environmentally sound approach to protect the rice crop against pest damage which would be the host plant resistance. Host plant resistance is one of the reliable and sustainable components of integrated pest management (IPM). There has been substantial progress in this area and

number of paddy varieties/lines have been developed and required to be screened out for their major insect pest susceptibility (Kakde and Patel 2018).

MATERIAL AND METHODS

Eight promising varieties of rice viz., Karjat-6, Karjat-8, Karjat-10, Phondaghat-1, Palghar-1, Ratnagiri-2, Suvarna and Jaya were evaluated under field conditions for their preference against blue beetle, *L. pygmaea* at College farm, Department of Agronomy, College of Agriculture, Dapoli Dist. Ratnagiri. A statistically designed field experiment was laid out in Randomized Block Design (RBD) comprising of eight treatments of eight rice varieties replicated three times with plant spacing 20 cm × 15 cm and net plot size of 3.0 m × 2.5 m. The weekly observations on damage caused by blue beetles were recorded starting from 15 days after transplanting (30th SMW) and continued throughout the entire crop period till harvest (44th SMW). Jaya variety was planted as a susceptible check. The observations on damage caused by blue beetles were recorded by counting the number of damaged leaves and total number of leaves from randomly selected five hills replication-wise. The data thus obtained were converted to per cent infestation (Dalvi, 2020). Further, the data were converted into arc sine transformation and subjected to statistical analysis. The scale and reaction for resistance/susceptibility score were judged by using Standard Evaluation System of Rice (SES) for the insect pest as per suggested by Kakde and Patel (2018).

Per cent infestation of blue beetle =

$$\frac{\text{Total number of infested leaves}}{\text{Total number of leaves per hil}} \times 100$$

Standard Evaluation System of Rice (SES) (0-9 Scale):

Sr. No.	% damaged leaves	Scale	Reaction
1.	0	0	HR (Highly Resistant)
2.	1-10	1	R (Resistant)
3.	11-25	3	MR (Moderately Resistant)
4.	26-50	5	MS (Moderately Susceptible)
5.	51-75	7	S (Susceptible)
6.	76-100	9	HS (Highly Susceptible)

RESULTS AND DISCUSSION

A. Varietal preference of blue beetle, L. pygmaea

The results of the experiment conducted to study the varietal preference of blue beetle, *L. pygmaea* on different varieties of rice indicated that none of the rice varieties were found free from the attack of blue beetle (Table 1). Initially the infestation of blue beetle was low on all the varieties and increased gradually as the crop growth proceeded. The infestation started on all the varieties in 30th SMW (Fourth week of July) with minimum infestation (0.84 %) and maximum infestation (14.58 %) on Phondaghat-1 and Jaya, respectively. The gradual build up of infestation was started on all the varieties in 30th SMW (Fourth week of July) with varied degree of infestation.

The average peak infestation of *L. pygmaea* was recorded for varied periods for different varieties of rice in the months of August and September, respectively during the crop season. For Phondaghat-1 (2.79 % infestation) and Karjat-6 (7.85 % infestation) it was recorded in 35th SMW (Fourth week of August) and 36th SMW (First week of September), respectively. In case of Palghar-1 (17.44 % infestation) and Jaya (28.94 % infestation), it was observed in 37th SMW (Second week of September). For Karjat-8 (24.73 % infestation) and Ratnagiri-2 (6.57 % infestation), it was noticed in 38th SMW (Third week of September). For Karjat-10 (22.41 % infestation) and Suvarna (20.14 % infestation) the average peak infestation was reported in 39th SMW (Fourth week of September).

The overall mean per cent infestation of blue beetle on different rice varieties during the season showed significant differences among them and it was ranged from 1.36 to 16.80. Among the eight varieties of rice tested for their preference for blue beetle, variety Phondaghat-1 recorded lowest (1.36 %) average blue beetle infestation, followed by Ratnagiri-2 (2.88 % infestation) and Karjat-6 (3.39 % infestation) which were statistically at par with each other. The increasing trend of blue beetle infestation was noticed in the screened varieties. The fourth variety in order of merit was Palghar-1 (7.57 % infestation) followed by Suvarna (11.59 % infestation) and Karjat-10 (13.17 % infestation) which were again at par with each other. Jaya recorded highest (16.80) mean per cent infestation by blue beetle followed by Karjat-8 (14.46) and both of these varieties were at par with each other. On the basis of overall mean per cent blue beetle infestation the descending order were Jaya > Karjat-8 > Karjat-10 > Suvarna > Palghar-1 > Karjat-6 > Ratnagiri-2 > Phondaghat-1.

B. Categorization of rice varieties

The results based on mean per cent infestation by blue beetle indicated that the variety Phondaghat-1 (1.36) reported very low pest infestation with a score of 1 and was categorized as resistant (R) (Table 2). Varieties Karjat-6 (3.39 %) and Ratnagiri-2 (2.88 %) recorded a score of 3 and thus categorised as moderately resistant (MR). Variety Palghar-1 (7.57 %) showed a score of 5 and was categorized as moderately susceptible (MS). A score of 7 was observed in variety Suvarna (11.59 %) and it was categorized in group of susceptible (S) variety. Remaining varieties Karjat-10 (13.17 %), Karjat-8 (14.46 %) and Jaya (16.80 %) reported higher infestation of blue beetle and they were given a score of 9. Theses varieties were thus categorized as highly susceptible (HS) varieties.

Table 1: Varietal preference of blue beetle, *L. pygmaea* infesting rice.

Sr. No.	Varieties	Per cent infestation															
		30**	31	32	33	34	35	36	37	38	39	40	41	42	43	44	Mean per cent infestation
1.	Karjat-6	3.48 (10.75)*	4.12 (11.71)	4.52 (12.27)	4.68 (12.49)	5.62 (13.71)	6.54 (14.82)	7.85 (16.27)	3.56 (10.88)	2.89 (9.79)	2.50 (9.10)	2.12 (8.37)	1.95 (8.03)	0.86 (5.32)	0.21 (2.63)	0.00 (0.00)	3.39 (9.74)
2.	Karjat-8	12.44 (20.65)	13.48 (21.54)	15.44 (23.14)	16.71 (24.13)	19.78 (26.41)	21.48 (27.61)	21.67 (27.74)	22.45 (28.28)	24.73 (29.82)	19.67 (26.33)	10.69 (19.08)	9.59 (18.04)	8.59 (17.04)	7.70 (16.11)	6.91 (15.24)	14.46 (22.74)
3.	Karjat-10	7.67 (16.08)	9.67 (18.12)	10.33 (18.75)	11.75 (20.05)	13.48 (21.54)	16.58 (24.03)	17.67 (24.86)	19.75 (26.39)	20.36 (26.82)	22.41 (28.25)	19.76 (26.39)	14.14 (22.09)	6.34 (14.58)	5.00 (12.92	2.64 (9.35)	13.17 (20.68)
4.	Phondaghat-1	0.84 (5.26)	1.03 (5.82)	1.21 (6.32)	1.57 (7.20)	2.75 (9.55)	2.79 (9.62)	2.44 (8.99)	2.11 (8.35)	1.69 (7.47)	1.57 (7.20)	1.05 (5.88)	0.86 (5.32)	0.42 (3.72)	0.00 (0.00)	0.00 (0.00)	1.36 (6.05)
5.	Palghar-1	5.64 (13.74)	6.59 (14.87)	7.48 (15.87)	8.94 (17.40)	11.48 (19.81)	11.78 (20.07)	15.78 (23.41)	17.44 (24.68)	13.11 (21.23)	6.87 (15.20)	3.67 (11.04)	2.14 (8.41)	1.21 (6.32)	0.98 (5.68)	0.44 (3.80)	7.57 (14.77)
6.	Ratnagiri-2	2.03 (8.19)	2.39 (8.89)	2.54 (9.17)	3.57 (10.89)	3.84 (11.30)	4.12 (11.71)	4.69 (12.51)	5.67 (13.78)	6.57 (14.85)	3.19 (10.29)	1.67 (7.43)	1.44 (6.89)	0.89 (5.41)	0.57 (4.33)	0.00 (0.00)	2.88 (9.04)
7.	Suvarna	8.96 (17.42)	9.48 (17.93)	10.97 (19.34)	12.85 (21.01)	14.21 (22.15)	15.47 (23.16)	16.55 (24.01)	18.67 (25.60)	19.67 (26.33)	20.14 (26.67)	11.48 (19.81)	6.53 (14.81)	4.67 (12.48)	2.61 (9.30)	1.56 (7.17)	11.59 (19.14)
8.	Jaya	14.58 (22.45)	18.67 (25.60)	20.41 (26.86)	21.84 (27.86)	22.14 (28.07)	23.48 (28.98)	25.67 (30.44)	28.94 (32.54)	25.94 (30.62)	18.67 (25.60)	12.64 (20.83)	10.52 (18.93)	9.45 (17.90)	8.25 (16.69)	7.65 (16.06)	16.80 (24.63)
	S.Em(±)	**0.45**	**0.74**	**0.91**	**1.06**	**1.18**	**1.32**	**1.23**	**1.04**	**0.91**	**0.71**	**0.67**	**0.60**	**0.53**	**0.46**	**0.36**	**0.76**
	C.D. (0.05%)	**1.38**	**2.24**	**2.76**	**3.23**	**3.59**	**3.99**	**3.73**	**3.14**	**2.76**	**2.14**	**2.02**	**1.83**	**1.62**	**1.39**	**1.10**	**2.32**

* Figures in parenthesis are arc sine transformed values

**SMW – Standard Meteorological Week

Table 2: Categorization of different rice varieties for their susceptibility to blue beetle, *L. pygmaea*.

Sr. No.	Varieties	Mean Per cent infestation	Corrected per cent infestation	Scale	Reaction
1.	Karjat-6	3.39	20.19	3	Moderately Resistant (MR)
2.	Karjat-8	14.46	86.04	9	Highly Susceptible (HS)
3.	Karjat-10	13.17	78.38	9	Highly Susceptible (HS)
4.	Phondaghat-1	1.36	8.07	1	Resistant (R)
5.	Palghar-1	7.57	45.05	5	Moderately susceptible (MS)
6.	Ratnagiri-2	2.88	17.13	3	Moderately Resistant (MR)
7.	Suvarna	11.59	68.96	7	Susceptible (S)
8.	Jaya	16.80	100.00	9	Highly Susceptible (HS)

CONCLUSIONS

The studies on varietal preference of blue beetle, *Leptispa pygmaea* for different varieties of rice *viz.,* Karjat-6, Karjat-8, Karjat-10, Phondaghat-1, Palghar-1, Ratnagiri-2, Suvarna and Jaya revealed that none of the rice varieties were found free from the attack of the pest. The overall mean per cent infestation of blue beetle on different rice varieties during the season showed significant differences among them (Table 1). The differences observed in the pre cent infestation by blue beetle might be due to the differences in host food i.e., different rice varieties having different nutritional constituents in them. It may also be due to various morphological characters of the variety (leaf length, leaf width, leaf area, leaf trichome density and leaf colour) and biochemical constituents in the variety *viz.,* sugars, phenols, chlorophyll, silica etc. affecting the fecundity, growth and development of pest and damage caused by it. The present findings are more or less in agreement with the below given eminent scientists.

Shah and Patel (1980) reported that the blue beetle a potential weed pest in South Gujarat, causes extensive damage to rice. Screening tests conducted with 170 cultivars of rice showed that none of the varieties tested were found resistant to the pest. Studies conducted by Nadarajan and Skaria (1993) also showed that varieties Ptb.4, Ptb.10, Ptb.28, Ptd.36, H4 and GEB 24 were found resistant to blue beetle, *L. pygmaea*. Whereas, other varieties such as Ptb.2, Ptb.5, Ptb.8, Ptb.9, Ptb.15, Ptb.18, Ptb.20, Ptb.21, Ptb.22, Ptb.26, Ptb.29, Ptb.30, Ptb.31, Ptb.32, Ptb.33, Ptb.35, Ptb.38, Ptb.40, Ptb.42, Ptb.53, and KAU cultures such as 25331,25333,25336, 25337, 25315, 25316, IR 20 and Co-25 were moderately resistant to the pest. Karthikeyan and Jacob (2007) screened 150 varieties of rice against *L. pygmaea* and recorded that Ptb.1 (Eravanpandy), Ptb.4 (Vellari), PTB.7 (Parambuvatta), Ptb. 9 (Thavalakannan), Ptb.18 (Eravanpandy), ptb.19 (Anthikkiraya), Ptb.20 (Vadakkanchitteni), Ptb.25 (Thonnooran), ptb.26 (Chenkayamma) and a short duration high yielding variety of Mannuthy (Hraswa) were moderately resistant and 5 varieties/entries *viz.,* MO 12, IET 17895 (UTR -57), Ptb.39 (Jyoti), Ptb.41 (Bharathy) and Varna were found highly susceptible against blue beetle, *L. pygmaea*. Patel (2008) recorded minimum per cent damaged leaves due to *L. pygmaea* (0.17) in varieties IR-22 and GR-104 coincided with scale 1, followed by GR-102 (0.19), GR-103 (0.21), Ratna (0.33), GR-7 (0.36), GR-12

(0.40), IR-28 (0.45), GR-10 (0.67), GR-101 (0.68), Narmada (0.72), Masuri (1.29), Jaya (1.37), Gurjari (1.49), IR-66 (1.91) and GR-11 (2.25). Francies *et al*. (2013) found that the varieties Swarna Prabha, Kanchana and Samyukta were moderately susceptible (MS), whereas, varieties Jaya and Jyothi were susceptible (S) to the infestation of blue beetle, *L. pygmaea*. Patel *et al*. (2015) reported that out of eighteen varieties tested, IR-22, GR-102, GR-103 and GR-104 with scale-1 were considered as resistant, whereas, IR-28, GR-6, GR-7, Ratna and GR-12 with scale-3 were identified as moderately resistant to *L. pygmaea*. Kakde and Patel (2018) observed that seven varieties *viz.,* GAR-1, GR-102, IR-22, GAR-2, GR-103, GNR-2 and GR-104 were considered as resistant (R). However, varieties, Masuri and Gurjari were considered as susceptible (S), whereas, variety Jaya was considered as highly susceptible (HS) to blue beetle, *L. pygmaea*. Further, Dalvi (2020) revealed that the per cent infestation of the blue beetle, *L. pygmaea* in different varieties was in the range of 7.21 to 17.14. She further concluded that the highest (17.14) per cent infestation of *L. pygmaea* was recorded in Jaya and lowest per cent infestation of 7.21 was recorded in variety Karjat-3.

FUTURE SCOPE

The study on varietal preference will generate information on resistant and susceptible varieties of rice against blue beetle, *L. Pygmaea*. The information will be helpful for the farmer community while selecting the variety for planting particular location or region**.**

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REFERENCES

Dale, D. (1994). Insect pests of rice plant – their biology and ecology. In: Biology and management of Rice Insects (ed. Heinrichs EA). Wiley Eastern Limited and New Age International Limited. pp. 363-485.

Dalvi, C. S., Dumbre, R. B. and Khanvilkar, V. G. (1985). Bionomics, seasonal incidence and off season biology of rice blue beetle. *J. Maharashtra Agric. Univ., 10*(2), 185-187.

Dalvi, N. S. (2020). Effect of sowing time and establishment methods on pest complex of rice varieties. Ph.D. (Agri.) thesis submitted to Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli (Maharashtra). pp. 1-259.

David, B. V. and Kumaraswami, T. (1975). Elements of Economic Entomology. Popular Book Depot, Madras. pp. 1-514.

Dutta, B. C. and Hazarika, L. K. (1994). Screening of some rice cultivars for resistance to rice hispa, *Dicladispa armigera* (Olivier) (Coleoptera: Chrysomelidae). *JASS., 7*(1), 31-34.

Francies, R. M., Joseph, J., Zachariah, G., Leenakumary, S., Raji, P., Karthikeyan, S. and Rao, G. V. S. (2013). "PTB 59-'Samyuktha'a high yielding rice variety for kootumundakan system of cultivation in Kerala. *Journal of Tropical Agriculture, 15*(1-2), 66-73.

Gupta, G. P. and Raghuraman, M. (2003). Plant protection in suppressing for food security. *Indian Farming, 53*(7), 31-34.

Kakde, A. M. and Patel, K. G. (2018). Varietal screening of rice against blue beetle, *Leptispa pygmaea* (Baly). *Internl. J. Agri. Sci., 10(*11), 6298-6301.

Karthikeyan, K. and Jacob, S. (2007). Performance of rice varieties against the rice blue beetle, *Leptispa pygmaea* Baly (Coleoptera: Chrysomelidae). *Oryza, 44*(4), 368-371.

Karthikeyan, K. and Jacob, S. (2009). Influence of crop establishment methods on the incidence of rice blue beetle, *Leptispa pygmaea* Baly. *Oryza, 46*(1), 53-55.

Nadarajan, L. and Skaria, B. P. (1993). Insect resistance levels in traditional and new rice varieties cultivated in Kerela. *Indian J. Pl. Prot., 21*(2), 161-162.

Patel, G. A. and Patel, H. K. (1970). Krishikit vidya Part II, Government of Gujarat, pp. 57.

Patel, K. M. (2008). Studies on seasonal incidence, varietal screening and chemical control of rice blue beetle, (*Leptispa pygmaea* Baly.) under South Gujarat condition. M. Sc. (Agri.) thesis submitted to Navsari Agricultural University, Navsari (Gujarat), pp.45

Patel, K. M., Patel, K. G. and Patel, K. B. (2015). Varietal screening of rice against rice blue beetle, *Leptispa pygmaea* Baly. *Trends in Biosciences, 8*(18), 4813-4814.

Shah, A. H. and Patel, C. B. 1980. Screening breeding material against rice blue beetle. *Internl. Rice Commission Newsl., 29*(1), 62.

Trehan, K. N. (1946). Annotated list of crop pests in Bombay province. *J. Bombay Natural Soc., 46,* 139-153.

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