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VARIETAL PREFERENCE OF BLUE BEETLE, *LEPTISPA PYGMAEA* BALY. INFESTING RICE IN MALNAD REGION OF KARNATAKA, INDIA

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ABSTRACT

Among the thirty-five varieties and landraces of rice tested for their preference for blue beetle, *Leptispa pygmaea*, variety Abhilasha recorded lowest (2.57%) average blue beetle infestation, followed by saraswathi (2.68%) and Mo-4 (3.90% infestation) which were statistically at par with each other. The increasing trend of blue beetle infestation was noticed in the screened varieties. Anamika recorded highest (27.41) mean per cent infestation by blue beetle. Variety Abhilasha (mean percent infestation of 2.57) was categorized as Resistant (R) varieties. Anamika variety recorded higher infestation of blue beetle and was thus categorized as highly susceptible (HS) varieties.

Key words : Blue beetle, *Leptispa pygmaea*, Varietal preference.

Introduction

The 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. The region's unique agroclimatic conditions- characterized by high humidity, continuous rainfall and dense cloud cover favour the proliferation of several insect pests, among which the blue beetle, *Leptispa pygmaea* Baly, has recently gained importance as a pest of concern. Historically, *L. pygmaea* was considered a minor pest (Trehan, 1946; Patel and Patel, 1970; David and Kumaraswami, 1975), but recent reports indicate frequent outbreaks in humid and high rainfall tracts of southern India including Karnataka, Maharashtra, Kerala and Tamil nadu (Dalvi *et al*., 1985; Dale, 1994; Dalvi, 2020). 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 malnad region 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 meager study on this pest has been carried out. A very little information on this pest is available. 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).

Materials and Methods

The field experiment was conducted during *Kharif* 2025 at the Agricultural and Horticultural Research Station (AHRS), Madikeri, situated in the Malnad region of Karnataka. The experiment comprised thirty-five rice genotypes, including traditional landraces and improved varieties. The trial was laid out in a Randomized Block Design (RBD) with two replications. Each genotype was transplanted at a spacing of 20 cm × 15 cm with a net plot size of 3.0 m × 2.5 m. Standard agronomic practices were followed uniformly for all treatments, except plant protection measures against blue beetle. Observations on blue beetle infestation were recorded at 30, 45, 60, 75, 90 and 105 days after transplanting (DAT). Five hills were selected randomly from each plot in each replication, and the number of damaged and total leaves was counted.

The per cent leaf infestation was calculated using the formula:

$$\text{Per cent infestation} = \frac{\text{Total Number of infested leaves}}{\text{Total number of leaves per hill}} \times 100$$

The data thus obtained were converted into arc sine transformation before statistical analysis. Analysis of variance was carried out, and treatment means were compared using critical difference (CD) at 5 per cent significance. Varietal reaction was categorized based on mean infestation levels following the Standard Evaluation System (SES) for rice insect pests (Kakde and Patel, 2018). Susceptible checks Jaya and TN-1 were included for comparison.

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

% Damaged leaves	Scale	Varietal reaction
0	0	Highly Resistant (HR)
1-10	1	Resistant (R)
11-25	3	Moderately Resistant (MR)
26-50	5	Moderately Susceptible (MS)
51- 75	7	Susceptible (S)
76-100	9	Highly Susceptible (HS)

Results and Discussion

Varietal preference of blue beetle *L. pygmaea*

The study revealed substantial variation in the preference of blue beetle, *Leptispa pygmaea*, among the thirty-five rice genotypes evaluated under Malnad conditions. Observations made at 30, 45, 60, 75, 90 and 105 days after transplanting (DAT) indicated that while all genotypes experienced some degree of leaf damage, the intensity of infestation varied significantly across growth stages and genotypes. Early-stage observations (30 DAT) showed relatively low infestation levels, ranging from 1.73% in RP-2068 to 12.36% in susceptible varieties, indicating that the initial population buildup of *L. pygmaea* is slow. However, as the crop progressed, a steady increase in leaf infestation was noted, peaking between 60 to 90 DAT, which corresponds to the vegetative and early reproductive stages of rice growth. This trend aligns with earlier findings by Chari *et al.* (2024) and Karthikeyan and Jacob (2009), who reported that peak infestation of *L. pygmaea* typically occurs during tillering to early panicle initiation stages, likely due to the availability of succulent leaf tissue and favorable microclimatic conditions in high rainfall areas.

Among the tested genotypes, RP-2068 (1.73%), Saraswathi (2.57%), Abhilasha (2.68%), MO-4 (3.90%), PTB-33 (3.52%) and MTU-1001 (4.98%) consistently recorded the lowest mean leaf infestation across all observation periods, indicating their resistance or moderate resistance to the pest. These genotypes maintained significantly lower infestation levels compared to popular high-yielding varieties like Jaya (34.65%) and Swarna (29.89%), which were categorized as highly susceptible. Similar patterns of resistance in traditional landraces have been reported by Patel (2008) and Francies *et al.* (2013), highlighting the potential of certain traditional genotypes as valuable sources of host plant resistance.

Moderate infestation was observed in genotypes such as Kaveri Sona, Danaguri, Kaveri, Rajamani and RNR Paddy, which were classified as moderately susceptible. The intermediate response of these genotypes may be attributed to partial resistance traits, which reduce but do not completely prevent leaf damage. This phenomenon has also been noted in studies by Dalvi *et al.* (1985) and Dutta and Hazarika (1994), where partial resistance mechanisms slowed pest development but did not entirely suppress feeding.

Progression of infestation with crop age

The progressive increase in leaf damage with advancing crop age observed in the present study underscores the importance of temporal dynamics in pest management. High rainfall, prolonged cloud cover, and elevated humidity in the Malnad region create a conducive environment for rapid multiplication of *L. pygmaea* (Dalvi, 2020; Gupta and Raghuraman, 2003). Notably, the decline

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

S. no.	Genotypes	Leaf infestation (%)						
		30DAT	45 DAT	60 DAT	75 DAT	90 DAT	105 DAT	Over all mean (%)
1	Ratnachudi	7.18(15.54)	8.36(16.79)	10.66(19.04)	12.36(20.58)	9.19(17.63)	6.58(14.86)	9.05(17.41)
2	Rajamudi	8.11(16.54)	8.66(17.11)	10.33(18.74)	12.73(20.70)	7.30(15.62)	5.55(13.61)	8.78(17.05)
3	Swarna	29.38(32.82)	31.52(34.15)	32.07(34.49)	35.59(36.62)	26.60(31.04)	24.20(29.47)	29.89(33.10)
4	Anamika	25.04(30.02)	26.96(31.28)	27.84(31.84)	31.57(34.18)	27.65(31.72)	25.45(30.30)	27.41(31.56)
5	Jamba puri	16.34(23.84)	17.53(24.75)	20.21(26.71)	22.69(28.45)	17.12(24.43)	15.17(22.92)	18.18(25.18)
6	Hunase hoovina battha	8.20(16.63)	10.34(18.75)	11.44(19.75)	13.60(21.63)	9.43(17.86)	7.21(15.57)	10.03(18.37)
7	Mo-4	3.69(11.07)	3.94(11.40)	4.83(12.65)	5.59(13.67)	3.59(10.91)	1.81(7.73)	3.90(11.24)
8	IR-64	6.04(14.21)	10.66(19.05)	11.48(19.80)	12.93(21.07)	10.35(18.76)	7.82(16.20)	9.88(18.18)
9	Jyothi	10.11(18.54)	12.45(20.66)	14.27(22.19)	15.34(23.06)	13.58(21.61)	10.77(19.15)	12.75(20.87)
10	Intan	15.26(22.99)	15.63(23.28)	17.06(24.39)	19.62(26.29)	16.86(24.24)	14.69(22.53)	16.52(23.95)
13	B-20	7.87(16.29)	8.97(17.42)	10.57(18.96)	13.49(21.54)	8.63(17.06)	7.07(15.41)	9.43(17.78)
14	MTU-1010	9.05(17.49)	10.61(19.01)	12.37(20.59)	14.41(22.31)	10.72(19.11)	9.74(18.18)	11.15(19.45)
15	Mugadha sugandha	7.40(15.77)	8.25(16.69)	9.50(17.94)	10.15(18.58)	8.10(16.54)	6.92(15.25)	8.38(16.79)
16	Siri-1253	10.29(18.71)	10.80(19.18)	12.53(20.73)	14.55(22.42)	10.44(18.84)	7.30(15.67)	10.98(19.26)
17	MhD-103	9.74(18.18)	10.45(18.86)	11.76(20.05)	12.36(20.58)	8.60(17.02)	8.77(17.22)	10.28(18.65)
18	Abhilasha	1.39(6.76)	2.67(9.37)	3.68(11.05)	4.25(11.89)	2.35(8.76)	1.12(6.01)	2.57(8.97)
19	Sri Ramasena	6.16(14.36)	7.95(16.36)	8.59(17.03)	10.25(18.67)	7.56(15.96)	6.76(15.07)	7.88(16.24)
20	No 64 paddy	8.77(17.22)	10.54(18.93)	12.47(20.67)	14.51(22.39)	11.15(19.47)	7.90(16.32)	10.89(19.17)
21	RNR Paddy	6.14(14.34)	8.83(17.27)	10.35(18.75)	11.54(19.85)	7.47(15.86)	5.17(13.14)	8.25(16.54)
22	Kaveri	5.84(13.98)	6.66(14.96)	7.38(16.75)	11.15(19.50)	7.19(15.54)	5.42(13.73)	7.27(15.57)
23	Gangavathi	9.15(17.60)	10.54(18.94)	11.84(20.12)	12.31(20.54)	11.66(19.96)	8.81(17.84)	10.72(19.17)
24	Rajamani	6.97(15.29)	8.30(16.74)	9.68(18.12)	11.11(19.47)	8.13(16.53)	8.98(17.44)	8.86(17.27)
25	Kaveri Sona	4.85(12.69)	6.63(14.91)	7.65(16.05)	9.20(17.65)	6.09(14.27)	4.73(12.56)	6.52(14.69)
26	MTU-1001	3.50(10.78)	4.82(12.64)	6.27(14.50)	7.43 (15.81)	5.03(12.95)	2.85(9.48)	4.98(12.69)
27	Dappa (Halaga)	6.19(14.38)	7.33(15.70)	8.48(16.92)	10.95(19.31)	7.53(15.92)	7.53(15.93)	8.00(16.36)
28	Dappa Jaddu	9.31(17.75)	10.58(18.97)	11.99(20.25)	12.22(20.45)	8.26(16.70)	7.73(16.14)	10.01(18.38)
29	Danaguri	4.87(12.75)	6.48(14.74)	7.94(16.35)	9.33(17.77)	5.78(13.89)	4.55(12.31)	6.49(14.64)
30	Saraswathi	1.68(7.43)	2.71(9.45)	3.07(10.08)	4.60(12.38)	2.89(9.76)	1.16(6.18)	2.68(9.21)
31	TN-1	8.33(16.76)	9.39(17.80)	11.80(20.08)	13.11(21.23)	9.45(17.90)	7.46(15.85)	9.92(18.27)
32	Ptb-33	3.36 (10.55)	4.1 (11.67)	4.51(12.25)	5.28(13.28)	2.32(8.73)	1.58 (7.23)	3.52(10.62)
33	RP- 2068	1.13(6.01)	1.79(7.57)	2.08(8.29)	2.18(8.48)	1.65(7.38)	1.54(7.13)	1.73(7.48)
34	Kanaka	7.88(16.29)	9.20(17.66)	10.64(19.04)	12.30(20.53)	7.74(16.15)	6.77(15.08)	9.09(17.46)
35	Jaya	31.80(34.32)	33.65(35.45)	35.77(36.73)	40.24(39.37)	34.15(35.76)	32.33(34.65)	34.65(36.05)
	CD @5%	**1.29**	**1.72**	**1.55**	**0.64**	**1.73**	**0.88**	**1.30**
	CV	**3.78**	**4.66**	**3.90**	**1.49**	**4.76**	**2.70**	**3.55**
	SEM	**0.45**	**0.60**	**0.54**	**0.22**	**0.60**	**0.31**	**0.45**

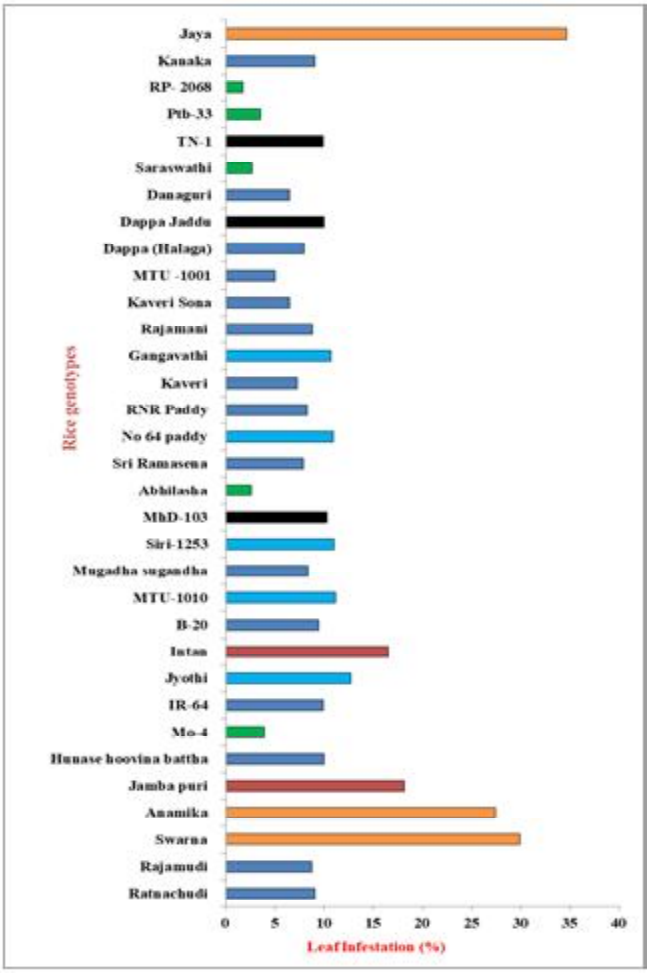

Fig. 1 : Per cent leaf infestation (mean) in different rice genotypes.

Fig. 2 : Damage due to rice blue beetle.

in infestation after 105 DAT observed in most genotypes may be linked to leaf senescence, natural predator activity, or reduced palatability of older leaves (Shah and Patel, 1980). These observations emphasize that timing of pest monitoring and management interventions is critical to minimize crop losses, especially during the vulnerable vegetative and early reproductive stages.

Categorization of rice varieties

The results based on mean per cent infestation by blue beetle indicated that the variety Ptb-33 (3.52), RP-2068 (1.73), Abhilasha (2.57) reported very low pest infestation with a score of 1 and was categorized as Resistant (R) (Table 2). Varieties Mo-4 (3.90%), Sahyadri panchamukhi (8.74%), Mugadha Sugandha (8.38%), Sri Ramasena (7.88%), RNR Paddy (8.25%), Kaveri (7.27%), Kaveri Sona (6.52%), MTU-1001(4.98%), Dappa (Halaga) (8.00%), Danaguri (6.49%) recorded a score of 3 and thus categorized as moderately resistant (MR). Variety Ratnachudi (9.05%), Rajamudi (8.78%), Hunase hoovina battha (10.03%), IR-64 (9.88%), Jyothi (12.75%), Intan (16.52%), RNR-15048 (17.04%), B-20 (9.43%), MTU-1010 (11.15%), Siri-1253 (10.98%), MhD-103 (10.28), No-64 paddy (10.89%), Gangavathi (10.72%), Rajamani (8.86%), Dappa jaddu (10.01%) showed a score of 5 and was categorized as moderately susceptible (MS). A score of 7 was observed in variety Jambapuri (18.18%) and it was categorized in group of susceptible (S) variety. Remaining varieties Swarna (29.89%), Anamika (27.41%), Jaya (34.65%) reported higher infestation of blue beetle and they were given a score of 9. These varieties were thus categorized as highly susceptible(HS) varieties.

The studies on varietal preference of blue beetle, *Leptispa pygmaea* for different varieties and landraces of rice revealed that none of the rice varieties were found free from the attack of the pest. The overall mean percent infestation of blue beetle on different rice varieties during the season showed significant differences among them. The differences observed in the percent infestation by blue beetle might be due to the differences in host food. The variation in varietal response to *L. pygmaea* is likely influenced by morphological and biochemical traits of the rice genotypes. Resistant genotypes often possess thicker leaves, higher trichome density, greater leaf waxiness, and increased silica content, which impede insect feeding and oviposition (Nadarajan and Skaria, 1993; Kakde and Patel, 2018). In addition, biochemical constituents such as phenols and secondary metabolites may deter feeding and reduce pest survival, as suggested by earlier reports (Patel and Patel, 1970; Dale, 1994). The combination of these physical and chemical traits likely explains the lower infestation levels in RP-2068, Saraswathi, and Abhilasha, whereas susceptible varieties like Jaya and Swarna lack these defensive mechanisms, resulting in higher pest preference. 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

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

S. no.	Genotypes	Over all mean percent infestation	Corrected percent infestation	Damage score	Varietal reaction
1	Ratnachudi	9.05	26.13	5	MS
2	Rajamudi	8.78	25.34	5	MS
3	Swarna	29.89	86.27	9	HS
4	Anamika	27.41	79.12	9	HS
5	Jamba puri	18.18	52.46	7	S
6	Hunase hoovina battha	10.03	28.96	5	MS
7	Mo-4	3.90	11.27	3	MR
8	IR-64	9.88	28.51	5	MS
9	Jyothi	12.75	36.81	5	MS
10	Intan	16.52	47.67	5	MS
11	Sahyadri panchamukhi	8.74	25.21	3	MR
12	RNR-15048	17.04	49.18	5	MS
13	B-20	9.43	27.21	5	MS
14	MTU-1010	11.15	32.17	5	MS
15	Mugadha sugandha	8.38	24.20	3	MR
16	Siri-1253	10.98	31.70	5	MS
17	MhD-103	10.28	29.66	5	MS
18	Abhilasha	2.57	7.42	1	R
19	Sri Ramasena	7.88	22.73	3	MR
20	No 64 paddy	10.89	31.42	5	MS
21	RNR Paddy	8.25	23.80	3	MR
22	Kaveri	7.27	20.98	3	MR
23	Gangavathi	10.72	30.93	5	MS
24	Rajamani	8.86	25.57	5	MS
25	Kaveri Sona	6.52	18.82	3	MR
26	MTU-1001	4.98	14.38	3	MR
27	Dappa (Halaga)	8.00	23.08	3	MR
28	Dappa Jaddu	10.01	28.90	5	MS
29	Danaguri	6.49	18.73	3	MR
30	Saraswathi	2.68	7.73	1	R
31	TN-1	9.92	28.63	5	MS
32	Ptb-33	3.52	10.17	1	R
33	RP-2068	1.73	4.98	1	R
34	Kanaka	9.09	26.22	5	MS
35	Jaya	34.65	100.00	9	HS

Ptb.4, Ptb.10, Ptb.28, Ptb.36, H4 and GEB 24 were found resistant to blue beetle, *L. pygmaea*. Whereas, other varieties such as Ptb.2, Ptb.5 and KAU cultures such as 25331,25333,25336, IR 20 and Co-25 were moderately resistant to the pest. Karthikeyan and Jacob(2009) 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

Chari, M.V.S., Mule R.S., Jalgaonkar V.N., Sanap P.B., Thorat T.N., Gurav S.S., Rakshit K.P., Lakshana R., Dalvi N.S. and Reddy K.R. (2024). Varietal preference of blue beetle, *Leptispa pygmaea* Baly infesting rice. *Biological Forum – An Int. J.*, **16(1)**, 333–336. https://doi.org/10.47799/bfio.16.1.333

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

Dalvi, N.S. (2020). Seasonal dynamics and management of rice blue beetle, *Leptispa pygmaea* Baly. *Int. J. Agricult. Sci.*, **12(3)**, 112–118.

Dale, D. (1994). Insect pests of rice plants – their biology and ecology. In : *Biology and Management of Rice Insects* (pp. 363–485). Wiley Eastern Ltd.

David, B.V. and Kumaraswami T. (1975). Insect pests of rice in India and their control. *Indian J. Entomol.*, **37(3)**, 245–252.

Dutta, B.C. and Hazarika L.K. (1994). Screening of rice cultivars for insect resistance. *J. Appl. Sci.*, **7(1)**, 31–34.

Francies, M.M., Kumar S. and Reddy K.R. (2013). Evaluation of rice genotypes for resistance to blue beetle, *Leptispa pygmaea*. *Rice Sci.*, **20(4)**, 310–316.

Gupta, G.P. and Raghuraman M. (2003). Plant protection 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*. *Int. J. Agricult. Sci.*, **10(11)**, 6298–6301.

Karthikeyan, K. and Jacob S. (2009). Influence of crop stage on incidence of rice blue beetle. *Oryza*, **46(1)**, 53–55.

Nadarajan, N. and Skaria B.P. (1993). Insect pest management through host plant resistance. *J. Plantation Crops*, **21(1)**, 12–18.

Patel, K.M. (2008). Studies on seasonal incidence and varietal screening of rice blue beetle (*Leptispa pygmaea*). *M.Sc. Thesis*, Navsari Agricultural University, Navsari, India.

Patel, K.M. and Patel J.J. (1970). Annotated list of insect pests of rice in India. *Indian J. Entomol.*, **32(2)**, 145–159.

Shah, P.J. and Patel K.G. (1980). Host plant resistance in rice against insect pests. *Indian J. Agricult. Sci.*, **50(12)**, 819–824.

Trehan, K.N. (1946). Annotated list of crop pests in Bombay province. *J. Bombay Nat. Hist. Soc.*, **46**, 139–152.