Indian Journal of Agricultural Sciences **78** (12): 1095–97, December 2008

Influence of spacing and non-edible oil cakes on the incidence of rice blue beetle (*Leptispa pygmaea*)*

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Received: 8 May 2008

Key words: Blue beetle, Plant oilcakes, Spacings

Rice blue beetle (*Leptispa pygmaea* Baly) earlier considered as a minor pest (Dale 1994) was reported to cause pest outbreaks and much concern in rice (*Oryza sativa* L.) cultivation during both rainy and winter seasons in Kerala, India (Nadarajan 1996). Recently, it has emerged as a serious problem by causing great concern to rice cultivators in the districts of Palakkad, Kannur and Kasargod in Kerala. In this context, an investigation was carried out to assess the role of plant spacing and effect of application of oil cakes for the management of rice blue beetle.

The effect of 3 spacings, viz (20 cm × 15 cm, 10 cm × 15 cm and 10 cm × 10 cm) and 3 types of plant oil cakes, viz neem (*Azadirachta indica* A.Juss), castor (*Ricinus communis* L.) and pungam (*Pongamia pinnata* (L.) Pierre) cakes @ 150 kg/ha on the incidence of *Leptispa pygmaea* was studied through 2 field experiments during the rainy and winter seasons, 2005–06 at the Regional Agricultural Research Station, Pattambi, Kerala Agricultural University, India. The experiments were laid out in a factorial randomized block design with 9 treatments and 3 replications with the rice (*Oryza sativa*) variety 'Jyothi'. The combinations of treatments are given below:

T1, neem cake @ 150 kg/ha and 20 cm × 15 cm spacing;
T2, castor cake @ 150 kg/ha and 20 cm × 15 cm spacing;
T3, pungam cake @150 kg/ha and 20 cm × 15 cm spacing;
T4, neem cake @ 150 kg/ha and 10 cm × 15 cm spacing;
T5, castor cake @ 150 kg/ha and 10 cm × 15 cm spacing;
T6, pungam cake @15 0 kg/ha and 10 cm × 15 cm spacing;
T7, neem cake @ 150 kg/ha and 10 cm × 10 cm spacing;
T8, castor cake @ 150 kg/ha and 10 cm × 10 cm spacing and
T9, pungam cake @150 kg/ha and 10 cm × 10 cm spacing

Field experiments were conduced during rainy and winter seasons, 2005–06, at the Regional Agricultural Research Station, Pattambi, to asses the role of plant spacing and oil cake application in the management of blue beetle (*L. pygmaea* Baly) in rice (*O. sativa* L.). Three plant oil cakes, viz neem (*A. indica* A.Juss), castor (*R. communis* L.) and pungam (*P. pinnata* (L.) Pierre) cakes and three spacings were tested .The results showed that closer spacing (10 cm×15 cm and 10 cm × 10 cm) in rice significantly reduced the damage incidence of *L. pygmae*. Higher damage was observed in the recommended wider spacing of 20 cm × 15 cm. Leaf damage was found to be reduced by 59.02 % in closer spacing of 10 cm × 10 cm over 20 cm ×15 cm spacing. Application of plant oil cakes showed no significant effect on the incidence of *L. pygmaea*. But the interaction effect of closer spacing (10 cm × 10 cm) with neem cake, castor cake and pungam cake showed significant reduction in the damage of rice blue beetle.

Twenty-two-days old rice seedlings were transplanted @ 2/hill in 21 m^2 plots with different spacing as mentioned above. Similarly, different non-edible oil cakes were applied in the plots 7 days after transplanting and each plot was provided with bunds to restrict the movement of water from one plot to the other. The N : P : K were applied @ 70 : 35 : 35 kg/ha as per the package of practices. Observations on blue beetle damaged leaves/hill in 10 randomly selected hills/plot were recorded at 10, 20 and 30 days after transplanting. The data were pooled and analyzed statistically by factorial randomized block design and Duncan Multiple Range Test was worked out.

Pooled analysis of rainy (*kharif*) and winter (*rabi*) seasons of 2006 results (Table 1) indicated a significant effect of spacing on the incidence of leaf damage by *L. pygmaea*. At 10 days after transplanting, the leaf damage was 13.05% in 20 cm × 15 cm spacing while it was 5.36% in 10 cm × 10 cm spacing thus showing 59.02% reduction of damage in closer spacing. At 20 days after transplanting, blue beetle damage varied from 6.12 to 13.91 in different spacings.The leaf

*Short note

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Table 1 Effect of spacing on the incidence of *L. pygmaea* (pooled analysis of winter and rainy seasons 2005–06)

Treatment spacing	Per cent damaged leaves		
	Days after transplanting		
	10	20	30
20 cm × 15 cm	13.08 (0.37^{b})	13.91 (0.38^{b})	9.22 (0.31^{a})
10 cm × 15 cm	9.15 (0.30^{ab})	7.46* (0.27^{a})	9.46 (0.31^{a})
10 cm × 10 cm	5.36* (0.23^{a})	6.12* (0.24^{a})	8.16 (0.29^{a})

• Figures in parentheses are arc sine transformed values
• Figures followed by different letters are significantly different at P=0.05

Table 2 Effect of oil cakes on the incidence of *L. pygmaea* (pooled analysis of winter and rainy seasons, (2005–2006)

Treatment (oil cakes)	Per cent damaged leaves		
	Days after transplanting		
	10	20	30
Neem cake	10.70 (0.32 ^{a})	10.13 (0.31^{a})	9.20 (0.31 ^{a})
Castor cake	8.30 (0.28 ^{a})	9.60 (0.31 ^{a})	8.87 (0.30 ^{a})
Pungam cake	8.60 (0.29^{a})	7.77 (0.28^{a})	8.78 (0.30 ^{a})

• Figures in parentheses are arcsine transformed values
• Figures followed by different letters are significantly different at P=0.05

damage was significantly reduced in 10 × 15 and 10 × 10 cm spacings resulting in 46.37 and 56% reduction of damage respectively. At 30 days after transplanting, spacing showed no effect on leaf damage probably due to the lower incidence of damage at this stage of the crop. It is thus evident that infestation was significantly higher in wider spacing (20 cm × 15 cm) than in closer spacing of 10 cm × 10 cm and it was significantly superior over the other 2 spacings of 10 cm × 15 cm and 20 cm × 15 cm in reducing the leaf damage at 10 days after transplanting. However at 20 days after transplanting, spacings of 10 cm × 15 cm and 10 cm × 10 cm were at par. This finding is in accordance with Dhaliwal *et al.* (1979) who reported that widely spaced rice plants were damaged severely than closely planted rice plants by hispa, *Dicladispa armigera*. This might be because of the ovipositional site on the leaves were better exposed in widely spaced planting. The lower incidence of damage in closer spaced rice plants has been reported in other rice pests also such as stem borer (Israel and Prakash Rao 1969), green leaf hopper and whorl maggot (Kalode and John 1982, Singh and Dhaliwal 1994). The influence of plant spacing on the incidence of rice pests was also reported by Pandey (2000).

Application of oil cakes showed no significant effect on the incidence of rice blue beetle (Table 2).The leaf damage varied from 8.3 to 10.7, 7.77 to 10.13 and 8.78 to 9.2% at 10, 20 and 30 days after transplanting respectively in different oil cake treated plots. This corroborates with the findings of Krishnaiah and Kalode (1984) who reported that non-edible cakes showed no toxicity to brown plant hopper in rice and oil cakes were not effective against gall midge in the field. But Rezaul-karim and Hoque (1999) observed that incorporation of neem cake in rice seed bed nursery reduced rice hispa and green leaf hopper significantly.

The effect of interaction between oil cakes and spacing indicated (Table 3) that the interaction effect of neem cake with 3 spacings showed no significant at 10 days after transplanting. But at 20 days after transplanting, interaction between neem cake and 10 cm × 10 cm spacing was found significant. But at 30 days after transplanting there was no significant interaction effect.

Interaction effect of castor cake and 10 cm × 10 cm spacing (Table 3) was significantly effective at 10 and 20 days after transplanting. However, the interaction effects of castor cake with 10 cm × 15 cm and 10 cm × 10 cm were at par with 20 days after transplanting. The treatments showed no significant effect at 30 days after transplanting. Pungam cake showed significant interaction effect with 10 cm × 10 cm spacing at 10 days after transplanting. But at 20 days after transplanting, the interaction effects of 10 cm × 10 cm and 10 cm × 15 cm with pungam cake were significantly superior to the wider spacing of 20 cm × 15 cm similar to the castor cake interaction effect.

Table 3 Effect of interaction between spacing and oilcakes on per cent leaf damage of *L. pygmaea*

Treatment	Neem cake			Castor cake			Pungam cake		
	10 DAT	20 DAT	30 DAT	10 DAT.	20 DAT	30 DAT	10 DAT	20 DAT	30 DAT
20 cm × 15cm	14.80 (0.40^{g})	15.91 (0.41^{d})	10.13 (0.32^{a})	11.99 (0.35^{def})	14.89 (0.40^{d})	8.62 (0.30 ^{a})	12.47 (0.36^{f})	10.94 (0.41^{d})	8.93 (0.30^{a})
10 cm × 15 cm	9.92 (0.31^{cde})	6.50 (0.26^{ab})	9.05 (0.30 ^{a})	8.99 (0.30^{cde})	8.87* (0.30^{ab})	9.94 (0.32^{a})	8.55 (0.29^{cde})	7.01 (0.26^{ab})	9.40 (0.31 ^{a})
10 cm × 10 cm	7.40 (0.26^{abc})	7.98* (0.27^{ab})	8.41 (0.29 ^{a})	3.90* (0.20 ^{a})	5.02* (0.23 ^{a})	8.06 (0.29 ^{a})	4.78* (0.22^{ab})	5.37* (0.23^{a})	8.01 (0.29 ^{a})

Figures in parentheses are arc sine transformed mean values
*Figures followed by different letters are significantly different at P=0.05
DAT, Days after transplanting

The study shows that incidence of rice blue beetle damage was lower in closely spaced (10 cm × 10 cm and 10 cm × 15 cm) plants than widely spaced (20 cm × 15 cm). Application of neem cake, castor cake and pungam cake in the field caused no significant effect on the leaf damage by *L. pygmaea*. But the interaction between closer spacing of 10 cm × 10 cm with neem cake, castor cake and pungam cake resulted in significant reduction of the blue beetle damage at 10 and 20 days after transplanting of rice. Hence closer spacing could be recommended in the endemic pockets of rice blue beetle.

SUMMARY

Two field experiments in rice (*Oryza sativa* L.) were carried out at the Regional Agricultural Research Station, Pattambi, Kerala Agricultural University during rainy and winter seasons of 2005–06 to evaluate the effect of plant spacing and plant oil cakes against the incidence of rice blue beetle, *Leptispa pygmaea* Baly. The results showed that closer plant spacings (10 cm × 15 cm and 10 cm × 10 cm) significantly reduced the incidence of *L.pygmaea* than wider spacing of 20 cm × 15 cm. Application of plant oil cakes, viz neem (*Azadirachta indica* A. Juss), castor (*Ricinus communis* L.) and pungam (*Pongamia pinnata* (L.) Pierre) cakes @ 150 kg/ha showed no significant effect on the rice blue beetle incidence.However, the interaction effect of closer spacing (10 cm × 10 cm) with the three oil cakes showed significant reduction in the damage of rice blue beetle.

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