Pest Management in Horticultural Ecosystems,
Vol. 15, No. 2 pp 155-157 (2009)

SHORT NOTE

EVALUATION OF INSECTICIDES AND A SEX PHEROMONE FOR MANAGEMENT OF BRINJAL SHOOT AND FRUIT BORER, *Leucinodes orbonalis* Guen

L. GEETHHA LAKSHMI*, S. K. SINGH and K. SRINIVASAN

J farm research centre, Tractors and Farm Equipment Limited, Pudupakkam, Kelambakkam, Kanchipuram district 603 103, Tamil Nadu, India
*E-mail : geethha@tafe.co.in

Brinjal (*Solanum melongena* Linn.) is one of the most popular vegetables in India. The shoot and fruit borer, *Leucinodes orbonalis* Guen. (Lepidoptera: Pyralidae) is a major pest attacking the crop which defies control with most of the commonly available insecticides. Its infestation, causes considerable economic loss all round the year. Fruit damage as high as 92.5% and yield reduction upto 60% are reported (Mall *et al.*, 1992). This note is an outcome of a field trial conducted to evaluate consistent reports made by farmers around peri-urban areas of Chennai that they have failed to control shoot and fruit borer infestation, with insecticide intervention. Standard farmers practice consisting of calendar sprays of insecticides and a pheromone impregnated lure (Leucinlure™) mounted on a portable water trap were evaluated for management of *L. orbonalis* at the J farm research centre, Pudupakkam, Tamil Nadu (12^{O}48'N latitude and 80^{O} 13'47E longitude) during January to June 2008.

Brinjal cv. *Bulldozer and Ravaiya* (Mahyco) was planted as an intercrop in a two year old mango orchard in an area of 3000 m^2. The crop was raised for commercial purpose and it received calendar sprays with a mixture of cypermethrin 25 EC (1.5 ml/l) and chlorpyriphos 20 EC (2.5 ml/l) at 10 days interval beginning from 15 days after planting (DAP) and until 80 DAP. Neem cake @ 35 kg was also applied at 30 DAP at the time of top dressing. At 45 DAP commensurate with flowering, pheromone impregnated lures were set up on a water trap. Water trap was specifically chosen since it is reported to attract maximum moths as compared to other designs (Kumar *et al.*, 2006). The pheromone lure and the traps were supplied by Pest Control (India) Pvt. Ltd., Bangalore. Nine traps were placed at equidistance. The pheromone consisted of two active compounds *viz.*, (E)-11-hexadecenyl acetate and (E)-11-hexadecen-1-ol in a ratio of 100:1 impregnated in polyethylene vials. The lures are reported to persist and attract moths for more than nine weeks under farmers' field condition (Bhanu *et al.*, 2007). Hence the lure once installed was not changed during the entire observation period. Water was added to the traps on alternate days with a few drops of oil so as to increase the surface tension. This prevented the trapped moths from escaping. The traps were always kept at the maximum crop canopy. Trap catches were recorded at weekly intervals. Each trap was considered as a replication. The data on weekly moth catch were subjected to square root transformation and ANOVA was done.

The fruits were harvested at weekly interval beginning from 60 DAP. During each harvest, the damaged and healthy fruits were recorded. Plants were maintained in three blocks and each block was considered as one replication. The data on per cent fruit damage was subjected to arc sin transformation and ANOVA was performed. Brinjal planted at a distance of 200 m from the experimental plot in a 100 m^2 area within the premises of farm served as untreated control. During the crop period, the mean and absolute maximum temperature was 34.1^0 and 42.0^0C, respectively. The mean and absolute minimum temperature was 25.1^0 and 19.0^0C, respectively, and he mean relative humidity was 65%.

The trap catches of male moths of *L. orbonalis* are presented in Table 1. The mean number of moths trapped per day was less than 1. There was no significant difference in the number of moths trapped during different weeks of crop growth (Table 1). Bhanu *et al.*,(2007) have also reported a low catch of 1.20 moths/trap/day under farmers' field condition in Bangalore and Belgaum. In spite of calendar sprays and setting up of pheromone traps, the crop recorded fruit damage ranging from 16.67% at 60 DAP to 86.25% at 95 DAP which was significantly different from each other (Table 2). The percentage fruits bored had also increased in successive harvest. In the control plot, the crop had to be uprooted at 40 DAP due to very heavy shoot and fruit damage. The shoot damage was so intense that it had affected even the new flush and did not allow the crop to grow.

Table 1. Trap catches of male *L. orbonalis* with sex pheromone 'Leucinlure'

Week after Installation	Mean number of moths/trap/week	Mean number of moths/trap/day
1	5.56 (2.12)[a]	0.79
2	5.44 (2.20)[a]	0.78
3	8.33 (2.71)[a]	1.19
4	3.56 (1.86)[a]	0.51
5	7.44 (2.63)[a]	1.06
6	3.78 (1.88)[a]	0.54
7	4.67 (2.02)[a]	0.67
CD (P = 0.05)	**NS**	

Figures in parentheses are √x+0.1 transformed values

Table 2. Brinjal fruit damage due to *L. orbonalis* in different harvests

Harvest	Damage (%)
I	16.67 (24.08)[a]
II	25.00 (29.98)[b]
III	35.00 (36.26)[c]
IV	82.00 (64.93)[c]
V	76.92 (61.30)[d]
VI	86.25 (68.29)[f]
CD (P=0.05)	**2.96**

Figures in parentheses are arc sin transformed values

This shows that pheromone traps did attract a few male moths when set up in a field receiving calendar sprays (i.e. once in 10 days interval). But both insecticide and pheromone trap were ineffective in reducing the borer damage. The third author who was personally involved in the evaluation and standardization of the sex pheromone blend for this insect also recorded low catches throughout the study period (Cork *et al.*, 2001). The authors opine that this tool has little use in monitoring the pest, since this is easily done by visual estimation of shoot and fruit damage in the field. A nylon net barrier to physically prevent moths from entering the field and ovipositing is suggested as an effective

method to prevent borer damage (Sandeep *et al.*, 2004; AVRDC, 2008). This management method is to be evaluated for its cost effectiveness when the crop is raised in a large area considering the fluctuating farm gate price the produce might fetch during each harvest.

The results of this study showed that combination of insecticide sprays and the use of sex pheromone lures could not check the incidence of *L. orbonalis* satisfactorily in the peri-urban areas of Chennai during summer moths.

REFERENCES

AVRDC. 2008. Fact sheet eggplant fruit and shoot borer, *Leucinodes orbonalis.* http://www.avrdc.org/LC/eggplant/borer.html. Accessed on June 19, 2008.

Bhanu, K.R.M., Prabhakara, M.S. and Jayanth, K.P. 2007. Field evaluation of indigenously developed sex pheromone lures for mass trapping brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenee (Lepidoptera: Pyralidae). *Pest Management in Horticultural Ecosystems,* **13**(2) : 115-121.

Cork, A., Alam, S.N., Das, A., Das, C.S., Ghosh, G.C., Farman, D.I., Hall, D.R., Maslen, N.R., Vedham, K., Phythian, S.J., Rouf, F.M.A. and Srinivasan, K. 2001. Female sex pheromone of brinjal fruit and shoot borer, *Leucinodes orbonalis* blend optimization. *Journal of Chemical Ecology,* **27**(9): 1867-1877.

Kumar, N. K. K., Krishna Kumari, B., Singh, H.S., Ranganath, H.R., Shivakumara, B. and Kalleswaraswamy, C.M. 2006. Pheromone trapping protocols for brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenee (Lepidoptera: Pyralidae) : Evaluation of trap design, quantity and dispenser. *Journal of Horticultural Sciences* : 39-43.

Mall, N.P. Pande, R.S., Singh, S.V. and Singh, S.K. 1992. Seasonal incidence of insect pests and estimation of losses caused by shoot and fruit borer on brinjal. *Indian Journal of Entomology,* **54**(3) : 241-247.

Sandeep, K., Bal, S.S., Gulshanjit, S., Sidhu, A.S. and Dhillon, T.S. 2004. Management of brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenee through net house cultivation. *Acta Horticulturae,* **659**(1) : 345-350.