

FEMALE SEX PHEROMONE OF BRINJAL FRUIT AND SHOOT BORER, *Leucinodes orbonalis* BLEND OPTIMIZATION

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Abstract—The brinjal fruit and shoot borer, *Leucinodes orbonalis* is the major pest of eggplant in South Asia. Analysis of female pheromone gland extracts prepared from insects of Indian and Taiwanese origin confirmed (*E*)-11-hexadecenyl acetate (E11-16:Ac) as the major pheromone component with 0.8 to 2.8% of the related (*E*)-11-hexadecen-1-ol (E11-16:OH), as previously reported from Sri Lanka. The average quantity of E11-16:Ac extracted per female was estimated to be 33 ng, with a range of 18.9 to 46.4 ng when collected 2 to 3 hr into the scotophase. In field trials conducted in India, blends containing between 1 and 10% E11-16:OH caught more male *L. orbonalis* than E11-16:Ac alone. At the 1000 μ g dose, on white rubber septa, addition of 1% E11-16:OH to E11-16:Ac was found to be more attractive to male *L. orbonalis* than either 0.1 or 10% E11-16:OH. Trap catch was found to be positively correlated with pheromone release rate, with the highest dose tested, 3000 μ g, on white rubber septa catching more male moths than lower doses. Field and wind tunnel release rate studies confirmed that E11-16:OH released from white rubber septa and polyethylene vials at approximately twice the rate of E11-16:Ac and that the

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release rate of both compounds was doubled in polyethylene vials compared to white rubber septa. This difference in release rate was reflected in field trials conducted in Bangladesh where polyethylene vial dispensers caught more male moths than either black or white rubber septa, each loaded with the same 100 : 1 blend of E11-16:Ac and E11-16:OH in a 3000 μg loading.

Key Words—*Leucinodes orbonalis*, brinjal, sex pheromone, (*E*)-11-hexadecenyl acetate, (*E*)-11-hexadecen-1-ol.

INTRODUCTION

The brinjal fruit and shoot borer, *Leucinodes orbonalis* Guenée (Lepidoptera: Pyralidae: Pyraustinae) is the major insect pest of eggplant, *Solanum melongena*, throughout Asia (Purohit and Khatri, 1973; Kuppuswamy and Balasubramanian, 1980; Allam et al., 1982). Larvae of *L. orbonalis* bore into shoots during the vegetative growth stage and later into flowers and fruits rendering fruit unfit for human consumption. Larvae block their bore holes with frass which protects them from natural enemies and most topically applied insecticides. Indigenous parasitoids of *L. orbonalis* have been recorded, notably *Trathala flavoorbitalis* Cameron (Hymenoptera: Ichneumonidae), *Eriborus argenteopilosus* Cameron (Hymenoptera: Ichneumonidae), *Phanerotoma* sp. (Hymenoptera: Braconidae) and *Campyloneura* sp. (Diptera: Cecidomyiidae) (Tewari and Krishna Moorthy, 1984; Tewari and Sardana, 1987). However, under field conditions, the level of parasitism recorded is often low (<2%) (Srinivasan, 1994), in part because of exposure to excessive amounts of insecticide used for control of *L. orbonalis*.

Eggplant is regarded as a cheap vegetable, available throughout most of the year, but production is seriously affected in many parts of the Indian sub continent because of the high cost and low efficacy of insecticide needed to ensure production of a viable crop. In West Bengal, for example, insecticide applications frequently exceed three per week. Alternative control strategies are needed but, to be effective, they require a sound understanding of the biology and ecology of the insect. As part of this process the need for an adult population monitoring system was recognized by the authors.

Adult *L. orbonalis* are not attracted to light traps but Zhu et al. (1987), working with insects from China, identified (*E*)-11-hexadecenyl acetate (E11-16:Ac) as the major component of the female sex pheromone and suggested that it was attractive to male moths in the field, although no data were presented. Subsequently, Attygalle et al. (1988) confirmed the presence of E11-16:Ac in calling virgin females using insects from Sri Lanka and, in addition, found trace amounts of (*E*)-11-hexadecen-1-ol (E11-16:OH). However, they did not report the results of any field studies to ascertain the behavioral significance of either of these two compounds. This paper reports the results of laboratory and field work