

ELECTROANTENNOGRAM (EAG) OF *HOPLOCERAMBYX SPINICORNIS* TO THE VOLATILES OF *SHOREA ROBUSTA*

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ABSTRACT

An EAG response of Sal heartwood borer *Hoplocerambyx spinicornis* were studied against the volatiles of *Shorea robusta* such as leaf oil, bast oil, Heartwood oil and ethereal extract of resin. The present study showed that male and female beetles responded differently due to the possession of varied number of chemoreceptor sites in both the sexes as revealed from the 3-Dimensional SEM.

Keywords : Electroantennograms, *Hoplocerambyx spinicornis*, Volatiles, of *Shorea rubsuta*-3-Dimension SEM.

INTRODUCTION

Hoplocerambyx spinicornis is a major pest of Sal which causes extensive damage to the green standing trees. Stebbing (1914), Beeson and Bhatia (1939) have also emphasized the immediate response of *H. spinicornis* to the fresh sap of *S. robusta* to which the adult fly at considerable distances. Atkinson (1927) stated that it is a chemotropic attraction that brings beetle to the Sal trees. It is the odour which guides insects to their food and help them to locate their mate and appropriate places for oviposition (Dethier, 1947, Schoonhoven, 1968). Visser, (1979) stated the plant volatiles (A components) as potential kairomones, which are being perceived by an insect, act as chemical cue in host plant selection. BAG studies has also used in studies of pheromones reception (Hummel and Miller, 1984) which is the results of the summation of the receptors potential of all the excited chemosensory cells in the antenna between the recording electrodes (Mayer *et al*, 1984). In the present study, the chemosensory response of the beetle is tested against the volatiles of the host tree upon which the beetle feeds.

Kaur *et. al.* (2001) suggested that the fresh sap of the volatiles in the bast secondary phloem+cambium) which when exposed broadcast attraction on all sites. T-cadinol and α -cadinol constituting (37.72%) of bast oil was found responsible in influencing host location for the Sal heartwood borer (Kaur *et al.* 2003).

MATERIAL AND METHODS

An electroantennograph (EAG) study was conducted at Indian Institute of Chemical Technology (IICT), Hyderabad. The adult beetles of both the sexes were collected at in the peak period of emergence i.e. in the month of July from the Sal heartwood borer infested forest and were caged and were fed on fresh bast (cambium + secondary phloem).

Preparation of stimulus pipettes

Extracts were prepared from leaf, bast and heartwood. Essential oils of leaves (LO), bast (BO) and heartwood (HO) and ethereal extract of resin (HER) diluted with ethyl ether were used to produce test stimuli. Test stimuli (100 μ l) were absorbed on a filter paper of 8X60 folded longitudinally into V shape. After evaporating the solvents this piece of filter paper with stimulus contents was slowly and carefully inserted into a standard Pasteur pipette with the help of forceps. At the same time, a control pipette with filter paper of same size treated with 100 μ l of diethyl ether (control) was also prepared so that the measurement of EAG response due to the solvent would be corrected.

Antennal preparation

Excised antenna (male/female) was fixed between two electrodes with the help of conducting gel. The electrode holder is directly connected to amplifier of EAG unit, which in turn connected to the monitor where the signals are displayed. After ensuring the continuous contact with all the required care and available sophisticated adjustment provisions with EAG equipment, the antenna was continuously bathed in a stream of charcoal filtered humidified air through the stainless steel flow tube of the stimulus applicator. Then the stimulus pipette prepared with the test material was inserted in the pipettes holder and tip of the pipette into the side hole of the flow tube. By pressing the pedal, the air was allowed to go through the stimulus pipettes on to the antenna and the obtained signal for negative amplitude was recorded. Responses from the tip, middle and base of antenna of male and female beetle were measured. At least 60 seconds were allowed between two continuous stimuli for recovery of the EAG. Response to control was measured and subtracted from the responses to each stimulus.

Electroantennogram (EAG) of *Hoplocerambyx spinicornis* to the volatiles of *Shorea robusta*

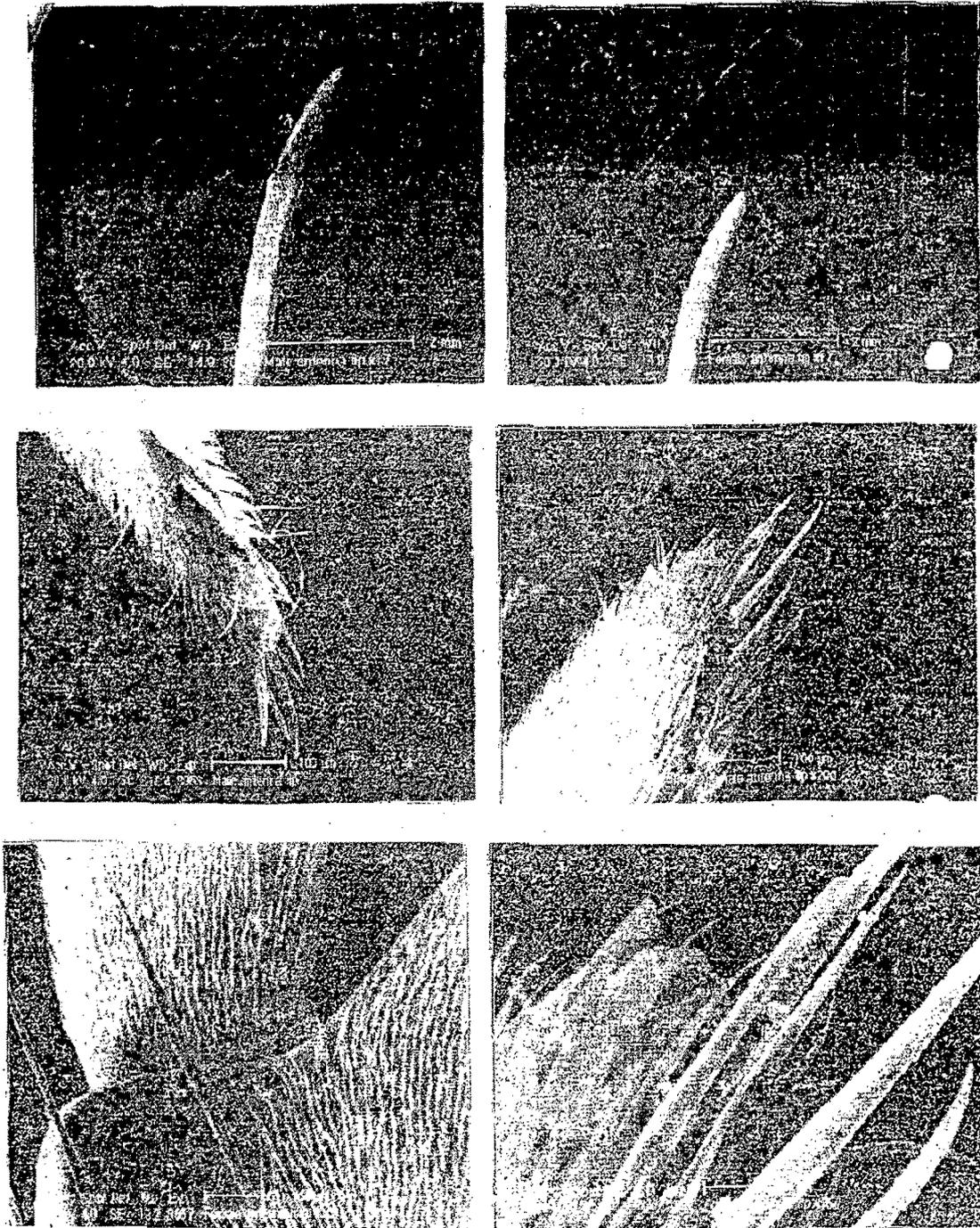


Fig-1 Scanning electron microphotograpse of respons of male and female Sal heart wood borer to different volatiles.

REFERENCES

- Atkinsen, D.J. 1927 *Hoplocerambyx spinicornis*. An Important Pest of sal. *For. Bull.* No. 70: 24 pp. 1926.
- Beeson, C.F.C. and Bhatia, B.M. 1939: On the biology of the Cerambycidae (Coleoptera). *Indian For. Rec. (Ent. Ser. new)* 5 (1)-235 pp.
- Dethier, U.G 1947: *Chemical insect attractants and repellent*, Maple Press Company, York, P.A 289.pp.
- Dickens J.C, Gutman A, Payne T L, Ryker L C, Rudinsky J A 1983: Antennal olfactory responsiveness of Douglas fir beetle, *Dendrocalamus pseudotsugae* Hopkins (Col: Scolytidae) to pheromone and host odors *J.Chem Ecol.* 9: 1383-1395.
- Hummel HE, Miller TA (eds) 1984: *Techniques in pheromone research*. Springer Series in Experimental Entomology Springer-Verlag, New York.
- Kaur, S., Dayal, R., Varshney, V.K., Bartley, J.P. 2001: GC-MS analysis of Essential oils of Heartwood and resin of *Shorea robusta*. *Planta medica* 67, 883-886.
- Kaur, S., Varshney, V.K. Dayal, R. 2003: GC-MS analysis of essential oil of *Shorea robusta* bast. *Journal of Asian natural products Research*, Vol. 5(3), pp.231-234.
- Mayer MS, Mankin RW, Lemine C.F 1984: Quantification of the insect electroantennogram: measurement of sensillar contributions, elimination of background potentials, and relationships to olfactory sensation. *J Insect Physiol* 30: 757-763.
- Schoonhoven, L.M 1968: Chemosensory basis of host plant selection. *Ann. Rev. of Entomol/No.13*. Pp.115-136.
- Stebbing, E.P. 1914: *Indian Forest Insects of Economic Importance (Coleoptera)* : 648 pp. London.
- Visser J.H 1979: Electroantennogram responses of the Colorado beetles *Leptinotarsa decemlineata* to plant volatiles. *Entomol Exp. Appl* 25:86-97.