CHAPTER : 6

INVESTIGATION ON RESIDUAL ACTIVITY OF THE OVIPOSITION DETERRING PHEROMONE OF L. SERRICORNE UNDER AMBIENT LABORATORY CONDITIONS

A system that relies on a chemical stimulus, such as a pheromone, in order to prevent intensive oviposition leading to overcrowding, may be influenced by a diversity of factors such as the rate of production and its release, its proper reception, and, residual properties of the stimulus involved. With regard to the last mentioned factor, persistence of a pheromonal activity may vary with the lapse of time and also the species of the insect under investigation, nature of message conveyed and the nature of active chemicals involved. The studies aimed at understanding the ecological significance of these chemical stimuli are of interest. The present work was, therefore, undertaken to determine the probable duration of the oviposition deterring activity of the hexane female body-wash over a certain period of time, while it retains its biological activity.

MATERIAL AND METHODS

To determine the residual activity of the hexane female body-wash for ODP like activity, it was first

coated over tobacco leaf disc-stacks with the help of a micropipette. Such leaf disc-stacks were stored under ambient laboratory conditions over a period of 25 days. These leaf disc-stacks were then tested for pheromonal activity at regular intervals of 5 days, starting from day 0 to day 25. In all 192 tobacco leaf disc-stacks were prepared as described earlier. Ninety six of them were "treated" with the hexane female body-wash, each at a dose of 15 FE (0.075 ml). The rest ninety six were coated with appropriate amount of the solvent as "control" stacks. After drying, the "treated" and "control" leaf disc-stacks were stored in the laboratory under ambient conditions of temperature and humidity by keeping the "treated" and "control" samples in separate beakers. The beakers were covered with gauze to prevent any contamination. For each time interval, 16 of the "treated" and 16 of the "control" stacks were utilized. The arrangements of the leaf disc-stacks in the "choice dishes" and other procedural details for the determination of the oviposition response in case of each set of experiments were essentially same as described in chapter 5.

RESULTS AND DISCUSSION

A relatively good linear increase in acceptance of "treated" leaf disc-stacks for oviposition was apparent with lapse of time under storage conditions, as depicted

graphically in text Fig. 6.a. The pheromonal activity of the body-wash proved to be moderately stable with some activity persisting even after 25 days (Y = 35.27 + 1.76 X). It was found that the deterrent effect decreased steeply between 0 day to 5 day interval of storage (32.62% loss of deterrent activity). Subsequent rate of loss was slow upto 15 days, which indicated a fair degree of persistence of ODP (Table 6.1). Another marked drop of deterrent activity occured between 15 to 20 days of storage (11.45%) but, thereafter the deterioration of ODP was again comparatively slow, still retaining about 26% activity on 25th day of storage. There are several reports that many of the phytophagous insects respond to oviposition deterring pheromones (either of plant or insect origin); the activity persisting for few days to weeks. The ODP of sorghum shoot fly, Atherigona soccata lasts for at least 7 days (Raina, 1981). Dittrick et al. (1983) found that the oviposition deterring pheromone of european corn borer, Ostrinia nubilalis lasts for at least 73 hours when exposed to air under laboratory conditions. Under laboratory conditions, 12 days persistence of the oviposition deterring/male arresting/fruit marking pheromone in Rhagoletis cerasi was reported by Katsoyannos (1975). Among some phytophagous insects, that utilize ODP to signal recognition of previously infested plants or plant parts, such deterrent activity from occupied resources may be emitted

until completion of larval development (Prokopy et al.1984). On the other hand, so far as is known, the ODP's produced by over a dozen different species of Tephritid fruit flies are characterised by moderate residual activity (Averill and Prokopy, 1987a). Later, the same authors (1987b) described that under dry laboratory conditions ODP of the apple maggot fly, Rhagoletis pomonella was effective for atleast three weeks. They also described that there were no differences in decline of residual activity under lab vs field conditions or between fly deposited ODP vs an application of water extract of ODP. If that be the case also applicable to the presently described ODP of L. serricorne, then it becomes clear that this finding may prove to be a comparatively stable yet effective tool in the hands of common man for the control of infestation by cigarette beetle of stored commodities. The oviposition deterring pheromone, which promotes an even spatial distribution of eggs in many insect species, should be expected, to remain active for number of days rather than a few minutes (Prokopy, 1981). Schoonhoven et al. (1981) reported that the ODP of P. brassicae remains effective for more than 14 days in field yet it was effective for 7 weeks under laboratory conditions. Later, Klijnstra and Schoonhoven (1987) reported that the ODP of P.brassicae persists only for 5 days in field. However, it can be seen that comparatively, the ODP of L. serricorne showed

a relatively satisfactory degree of stability. In the present experiment, only 15 FE dose of body-wash was used per disc-stacks. Probably at higher dose levels or its further purification may give much longer persistence. It can also be said that the hexane female L. serricorne body-wash can be used as a potent oviposition deterrent tool for control of this beetle. However, practical applicability of such a deterrent for L. serricorne control will depend on, among other factors, identification and isolation of the active compound(s) combined with further extended tests under storage conditions.

SUMMARY

The residual activity or persistence of ODP of the L. serricorne female body-wash in hexane against the conspecific females was tested after storage under ambient laboratory conditions from day 0 to day 25. A relatively linear decline in the oviposition deterring activity of the wash over the time of storage was observed. The ODP was found to be moderately stable at laboratory temperature and humidity conditions with some activity persisting even after 25 days.

Table 6.1. Residual activity of oviposition deterring pheromone prepared as hexane body-wash at different intervals of storage

Days after treatment	Percentage eggs distribution		% deterrence
	Treated	Control	
0	11.47	88.53	77.06
5	27.78	72.22	44.44
10	29.17	70.83	41.67
15	30.14	69.86	39.73
20	36.36	63.64	27.28
25	36.89	63.11	26.22

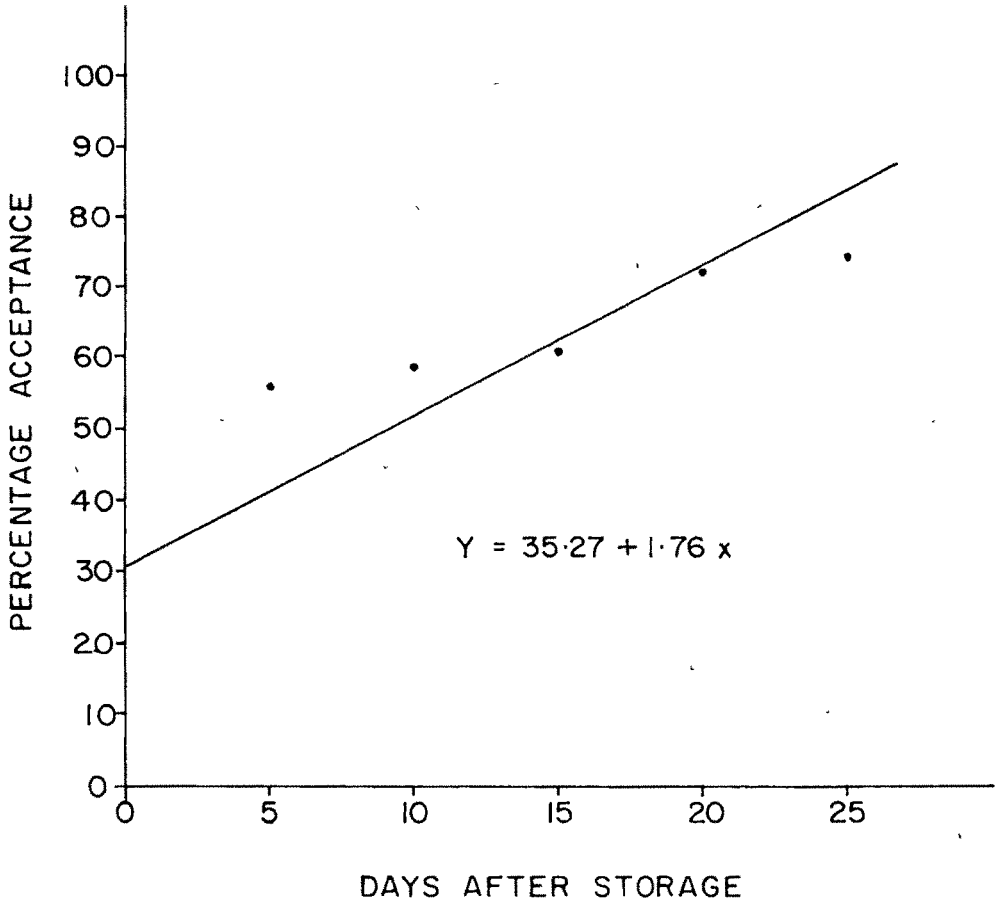

Fig. 6.a. Residual oviposition deterrent activity (lapse of time after treating the tobacco leaf discs stacks) of the hexane female body wash.