SUMMARY

_Dacus cucurbitae_ Coq. is distributed throughout India and is commonly found attacking a wide variety of plants, especially the cucurbit. It is a pale white insect whose wings are conspicuously marbled with dark markings. The larvae are commonly found attacking fruits of _Luffa aegyptiaca_ at Aligarh and the present author succeeded in developing a laboratory colony of _D. cucurbitae_ by collecting infested fruits from field and rearing the flies at a temperature of 28 ± 1°C and 70.0 to 80.0 percent relative humidity on a diet containing sucrose and Protinex. The females readily oviposited on pieces of spanish gourd which were then transferred to glass jars 8" x 4" in size and containing sand. Pupation occurred in the sand. The newly formed pupae were picked up after filling the jars with water and stirring them gently.

The susceptibility level of the adult flies to different formulations of DDT, γ-HCH, dieldrin, trichlorfon, DDVP and fenthion was determined by applying measured drops of the desired insecticide solution on the dorsum of the individual flies by means of a hypodermic syringe. The size of the drop was kept constant throughout the test. Two solvents, acetone and alcohol were used for making different concentrations of the insecticides. Mortality counts were made after 24 hours of the treatments and LC50 values were derived from the dosage mortality regression
lines as fitted by eye. It was found that the males were more susceptible to the insecticides than the females. Also the organophosphate compounds, DDVP and fenthion were more toxic than the organochlorine compounds DDT, HCH and dieldrin. Dieldrin however proved to be more toxic than trichlorfon, γ-HCH, DDVP and fenthion can therefore be recommended for the control of field populations of the melon fly.

The susceptibility of *D. cucurbitae* to toxic baits was evaluated by allowing the adults to feed on diet treated with sodium arsenite, sodium arsenate, dieldrin, malathion and Sevin. It was found that baits containing dieldrin were most effective.

The effects of different toxicants on the reproductive potential of the species were also studied. Sublethal doses of baits containing sodium arsenite, sodium arsenate, dieldrin, malathion and Sevin were given to the flies for three days after emergence. The survivors were paired in 3" x 3" cages. The eggs laid in pieces of *Cucurbita maxima* were counted and their rate of hatching was determined.

The effects of pesticides on the oviposition period of the species were also investigated. A significant increase in preoviposition period in the case of sodium arsenite, sodium arsenate and malathion treated flies was noticeable. Females which survived exposure to sodium arsenite, sodium arsenate,
dieldrin, malathion and Sevin laid 76.54, 45.20, 52.38, 84.10 and 41.88 per cent less eggs than the normal ones. Reduced fertility was observed in treatments with sodium arsenite and sodium arsenate.

Studies were also made to find out the effects of certain chemosterilants on adults belonging to different age groups and sucrose treated with thiotepa, metepa and apholate was fed to one, twenty and forty day old flies for three consecutive days. Reciprocal crosses were then made between the treated and the untreated flies as also between treated males and the females. The eggs obtained were observed for their rate of hatching. The results indicated that when both the sexes were treated, 0.0625 per cent thiotepa could bring about 100.0 per cent sterility in adults of all age groups and it was much more effective than apholate or metepa. Metepa was the least effective of the three chemosterilants tested. A concentration of 0.125 per cent apholate which produced 100.0 per cent sterility in one day old flies, produced 94.57 and 80.00 per cent sterility in 20 and 40 day old flies respectively when only the males were treated. In case of metepa where only the males were treated a concentration of 0.25 per cent induced 100.0, 54.90 and 50.0 per cent sterility in one, twenty and forty day old flies respectively. This showed that one day old flies were more sensitive to the effects of the chemosterilants than when they were 20 or 40 day old.
An attempt was made to study the biological changes which may be induced by thiotepa, metepa and apholate. The adults were fed on diet treated with these chemosterilants for three days after emergence and the flies thus treated were kept in 3" x 3" cages. The eggs obtained were placed on moist black cloth. The duration of the incubation period was determined and the newly hatched larvae were placed on pieces of Cucurbita maxima in glass jars containing sand. None of the chemosterilants used had any significant effect on the incubation period or on the larval duration of the species. The pupal duration was however found to have increased by 34.61, 30.76 and 26.92 per cent when treatments were made with thiotepa, apholate and metepa respectively. Exposure to chemosterilants also resulted in reduced rate of hatching of the eggs. The percentage emergence of the adults was also adversely affected.

The effect of sodium arsenite, sodium arsenate and metepa on the reproductive tissues of D. cucurbitae were determined by feeding the flies on treated diet for three days after emergence. The normal and the treated flies were then dissected when 16 day old to remove the reproductive organs. These were fixed in alcoholic bouins for 24 hours, washed in several changes of alcohol and were embedded in wax. Sections were stained in Heidenhein's Iron haemotoxylin and counterstained with eosin. Histological examination showed well developed nurse cells, nurse-cell nuclei and thick follicular epithelium in case of the normal
ovaries but where these were treated with sodium arsenate or sodium arsenite there was a disintegration of the follicular epithelium and the nurse cells. Vacuolation and clumping of chromatin could also be seen. In case of treatments with metepa an almost complete destruction of ovary with big vacuoles could be seen. No distinct histological changes could be seen in the case of testes treated with the arsenical compounds. However with metepa 'zone of transformation' became comparatively smaller when compared with that of the normal testes.

Studies on the geotactic behaviour of *D. cucurbitae* were made in a 6 feet long cylindrical cage of 1 foot diameter. Cage was constructed of nylon georzette with outlets at different levels. The flies were released into the cage from the middle outlet and left as such for three hours. Geonegative and geo-positive flies were then separated and reared separately. While 56.45% per cent of the parental flies were found to be geonegative, this behaviour pattern became more pronounced in succeeding generations and 65.32 and 83.82 per cent populations belonging to the first and the second filial generations showed a geonegative behaviour. It could therefore be concluded that a negative geotaxis was an inherent feature of the species.