

STUDIES ON THE BIOLOGY AND CONTROL METHODS OF FLOWER FEEDER BEETLES

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During the last year new citrus orchards have been developed by leveling the earth in the northern part of Iran. These conditions made hibernation much easier for flower feeder beetles and the distribution and population of these insects increased. The damage due to their activities was also increased.

As the biology and control of *Oxythyrea* and *Epicometis* had not been studied, we began such studies in 1963 and they have been taken up to two main stations.

1. Saghi-kelayeh between Chalus and Shahsavar
2. Venush between Nowshahr and Mahmood abad

A Summary of the results is as follows:

Before going into details we must mention that *Oxythyrea cinctella* Schaum and *Epicometis (Tropinota) hirta* poda from scarabeidae, Cetoniinae are present in the northern part of Iran.

DISTRIBUTION

These insects occupy the citrus growing area of the north starting from Gorgan up to Tavalesh. They attack different host plants such as fruit trees, weeds, ornamentals, etc . . .

BIOLOGY

These two polyphage insects hibernate either in cells made with the soil particles or free in the adult stage. The best soils for the hibernation of *Oxythyrea* are decade organic materials (humus, decaying wood); but more or less clay soils which are covered by lawn or an upper layer with decayed organic materials are suitable for *Epicometis* hibernation. The depth at which these two insects hibernate is about 20 Cm when they are in earthen cells and 10 to 20 Cm when they are in the free stage. In spring when the temperature increases the insects gradually come up to the surface of the soil. The period of emergence is gradual; the daily appearance of these insects has a close relation to the temperature. The meteorological data obtained from S.

station between 1963 and 1965 indicates that emergence (*O. cinctella*) occurs when the temperature is between a medium of 12 to 13 C° and a maximum of 16 to 17 C°. It takes about 50 days and lasts from the second half of April to early June. In Venush the appearance of *Epicometis* starts in the early April and emergence takes place about a fortnight. In both species (*Epicometis* and *Oxythyrea*) the majority of early emerged insects were males.

FEEDING ACTIVITY, COPULATION AND EGG LAYING

Soon after emergence, the beetles are found over plants and gradually the population increased and moves over fruit trees such as cherries, pears, apples and then citurs. They feed on different parts of plants including the terminal buds thus preventing flowering. These insects have been seen attacking different plant groups such as Cruciferae, Rosaceae, Leguminosae, Compositae, Graminae, Aurantiaceae.

Copulation usually occurs between 9 to 11 A.M. and 3 to 5 P.M.

The duration of copulation differs from 15 minutes to two hours and averages one half hour. It is closely related to the temperature, and usually occurs over the host plants. Under laboratory conditions we have seen copulation in *Epicometis* four times.

The interval between copulation and egg laying is usually between 4 and 6 days. The eggs are laid gradually one by one over a period of from 3 to 25 days. The majority of eggs are laid between 5 and 10 days in *Epicometis* and from 8 to 12 days in *Oxythyrea*. The eggs are laid under the soil about 20 Cm below the surface for *Oxythyrea* and 3 to 8 Cm for *Epicometis*. *Oxythyrea* averages about 12 eggs and *Epicometis* about 8.

The average incubation for *Oxythyrea* takes 12 days and for *Epicometis* 16 days. The larval stage lasts 88 days for *Oxythyrea* and 80 days for *Epicometis* and consists of three stages.

When the larvae mature they begin to make up oval cells and pupate inside. The pupals stage takes about 12-15 days during which the adult emerges, but stays in the same cell for at least about two months. A few adults come out from the cells in the fall if the climatic conditions are suitable, but the majority overwinter in their cells; we have seen *Epicometis* in cells up to March and *Oxythyrea* up to May.

Beetles emerging gradually from the soil in the spring, live about 45 days to two months and have only one generation per year. The incubation, larval and pupal stages for *Oxythyrea* takes 4 months and for *Epicometis* nearly 4 months.

THE BEHAVIAR AND HOSTS RELATION OF FLOWER FEEDER BEETLES

These beetles are social and live together; they feed mostly during the day time. On sunny days they are more active and feed more. In spring during the cold and rainy days they hide themselves under the soil. In general they feed as long as they are over the host plants. They remain stationary in the same place if The food materials are available, and migrate if the food materials

are scarce. The flight distance does not exceed two to three Kilometers, they usually move from the forest to the orchards.

As we have mentioned previously *Epicometis* and *Oxythyrea* are polyphage but *Oxythyrea* attacks many more plants compared to *Epicometis*. The list of the different host plants for *Oxythyrea* is as follows:

Prunus cerasus	Populus nigra
Prunus domestica	Populus sp.
Malus communis	Alnus glutinosa
Mespilus germanica	Robinia pseudoacacia
Cydonia vulgaris	Rosa sp.
Citrus spp.	Laurus nobilis
Pyrus communis	Magnolia grandiflora
Persica vulgaris	Rubus spp.
Crataegus spp.	Syringa vulgaris
Funica granatum	Deutzia sp.
Nasturtium officinalis	Iris germanica
Veronica persica	Foeniculum vulgare
Trifolium sp.	Daucus carota
Medicago sativa	Raphanus sativus
Urtica dioica	Zea mays
Centaurea sp.	Helianthus spp.
Anchusa italica	Triticum vulgare
Convulvulus arvensis	Allium cepa
Cirsium arvensis	Fragaria vesca
Mimosa sp.	

ECONOMIC IMPORTANCE AND DAMAGES

Through the attack of the beetles reproduction parts of plants will be damaged. This stops pollination and consequently causes flower dropping. Less frequently they will attack the flower buds too. The field experiments in cages show that each beetle (*O. cinctella*) can daily damages 1-2 flowers and 30 flowers during its activity on citrus trees. when it damages 5-6 flowers in a day the damage is minor because the flowers are not completely destroyed. As the population increases the amount of feeding and damage rises proportionately. The blossom on citrus mostly coincide with the end of the *Epicometis* insect activities so the amount of damage is not so important except when we have early blossom. The feeding stage of *Oxythyrea* coincides with the blooming season of the citrus and for this main reason the latter species is more destructive for citrus orchards than *Epicometis*.

CONTROL MEASURES

FIELD TRIALS WITH INSECTICIDES

During 1963 and 1965 some experiments were carried on Maize and Citrus in the flowering stage. These were infested by the beetles both in cages and

in the field. The following insecticides were used:

Malathion, Lindane, Guthion, Sevin, Diazinon which were applied as dust and spray; Malix-Combi, Thiodan, Diptrex, Toxaphen, Roxion, Sumithion as spray. Insecticides at the given rates were promising:

- 1) Dusting with Guthion (at the rate of 3% active ingredient) and its emulsion of 20% (at the rate of 0.2%).
- 2) Dusting with Lindane (at the rate of 3% a. i.)
- 3) Spraying with Sevin 85% (W. P. at the rate of 0.2%).
- 4) Spraying with Roxion 40% E. C. (at the rate of 0.1%).
- 5) Dusting Malathion with 4% Powder.

CONCLUSION AND RESULTS

Due to some factors such as harmful effects on beneficial insects (Parasites and predators), honey bees and Citrus sensitivity to some of the above mentioned insecticides, our recommendations are based on dusting or spraying with Guthion or dusting with Malathion powder. Data obtained from experimental work carried out against adult beetles and their larvae in the soil showed that B. H. C. and Aldrin were better than Dieldrin and Telodrin.

The feasibility of chemical control against adult beetles and their larvae is poor due to the most infected area and cultural methods such as plowing against pupal stage.

TIMING

Chemical control should be carried out as soon as the insect population reaches the feeding stage which normally is after Citrus blooming. One application in most cases is sufficient. In case of new migration another application is required.

REFERENCES

- 1) Medvedev, S. I. (1952) Scarabacus larvae. Fauna U. S. S. R (in Russian) Moscow Leningrad, 1952, P.P. 169-173.
- 2) Balchowsky, A. S. (1962). Entomologie appliquée à l'agriculture Tome 1, Coléoptères, Premier volume. Paris 1962, P.P. 187-195.