

PROGRESS AND EXPERIMENTS IN THE BIOLOGY OF THE SOUN PEST EURYGASTER INTEGRICEPS PUT.

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Biological control of the soun pest was first started at Varamin in 1947. Later, because of the unfavorable climatic conditions and scarcity of trees, parasite rearing was stopped in this area, and in 1950 the operations were transferred to Isfahan where favorable conditions existed.

In 1951 the population of soun pests in infested wheat fields of Isfahan was 8 per sq.m. During 10 years of rearing and releasing approximately 778,998,065 *Asolcus* (*Microphanurus*) *semistriatus* Nees, a Hymenoptera which parasitizes the eggs of soun pest, this number was decreased to 1 per 4 sq. m.

Comparison of Biological Control with Chemical Control

Some advantages of biological control of soun pest over their chemical control are listed below :

1. Biological control usually costs 10 times less than chemical control.
2. A comparatively small group can carry out biological control, while chemical control requires a well equipped organization to fill the needs of many thousand hectares of infested fields.
3. Chemicals used in soun pest control may have some bad residual effects for consumers.
4. Chemicals, especially those which contain chlorinated hydrocarbons, eradicate beneficial insects; thus the natural biological equilibrium is destroyed and new pests (aphids, thrips, mites, etc.) may develop more severely.
5. The lack of good roads between mountainous villages causes great difficulty

in transportation of chemicals and sprayers, while in biological control it is always possible to transport a few boxes containing parasites by horses or mules.

6. Using local technicians and workers for biological control is much more economical than the cost of importing chemicals and sprayers, plus hiring technicians and workers to use them.

7. Operations for biological control are mostly carried on during the winter and the first part of April when the farmers have less work to do and the labor is cheaper, while the chemical control occurs during the spring when the labor and operations are more expensive due to the time involved in other agricultural works.

8. In areas where biological control has been carried out for a few years, the number of parasites will increase so that the cost of control will decrease.

9. The scarcity of water in some areas causes difficulties in chemical spraying.

10. After the harvesting of wheat and barley *E. integriceps* migrates, and the parasites which remain attack eggs of other species of *Pentatominae* as well as *Scutellerinae*.

Present Operations of Biological Control

The operations begin by collecting hibernating soun pests in the mountains and transporting them to rearing houses, where they feed and produce eggs.

These eggs are parasitized with *A. semistriatus* and the emerging parasites are released in the soun infested fields in the spring.

Because of the collection of soun pests in mountains and the releasing of parasites in fields the population of soun pests in hibernating areas decreases gradually from one year to another, so that future collections to start rearing of parasites will become more and more uneconomical. Snow on the mountains makes the collection still more difficult, and an even greater problem is that female soun lay less eggs under artificial conditions than in the field.

To overcome these inconveniences, as was recommended by Dr. Remaudière, a series of experiments were carried out in the Laboratory at Varamin to get more eggs from field collected *Dolycoris baccarum*, *Aelia* spp., *Eurydema* spp. and *E. integriceps*.

New Experiments on Rearing of the Soun Pest

An experiment which was accomplished successfully was with artificial diapause

of soun pests on wheat. For this experiment a large number of soun pests were collected in the fields on July 27, 1959, just before their migration to the mountainous hibernating areas. For comparison, on July 29 a collection was made in the mountains soon after the soun pests reached these areas. During the daytime, both collections were placed in cages on cultivated wheat plants. At night they were removed to a refrigerator at 10° C. Daylight was gradually shortened (by placing the cages in the refrigerator earlier), so that the experiment began with a «day» of 15 hours and ended with a «day» of 9 hours. This process was continued during the whole month of July.

Because of much handling, the mortality of soun pests, both male and female, was about 35%. The second experiment started on August 14. Soun pests from both collections were placed in a refrigerator at 5° C. At intervals of several days they were removed from the refrigerator and fed a solution. Pieces of cotton soaked in the solution were used for this purpose. The humidity in the boxes was also controlled. Here the mortality was only about 5%, and the dead soun were mostly males.

The third experiment started on August 15. Twenty males and 20 females from each of the original collections were removed from the refrigerator and placed on wheat plants in two separate cages in an attempt to get eggs. Neither copulation nor laying of eggs was observed.

On September 15, 1959, the above process was repeated, with again no copulation and no egg laying being observed.

On October 15, the mortality of the remaining original collections in the refrigerator was very high (the dead were mostly males). In nature the mortality is also highest during October.

On December 30, the remaining soun pests from both collections were removed from the refrigerator to a greenhouse of 27° C. and 60% relative humidity.

The first copulation from the field collected specimens was observed on January 14, 1960. Soon afterward, copulation was observed among the soun pests which were collected from the mountainous hibernating areas.

The first laying eggs in the first collection was seen on January 31, 1960 and later the soun pests from the second collection laid eggs.

The same type of experiment, with some changes, was repeated at the Agricultural College at Karadj in 1960. Here the results seemed to be more successful, but the

mortality of soun pests during these six months (June-December) was very high. This high rate of mortality seems to be due to inefficiency and variability of humidity and temperature in the refrigerator at Varamin.

CONCLUSION

It was seen from the experiments that the flight of soun pests to the mountains has no influence on sexual maturity. These experiments will be repeated on a larger scale in 1961, and it is hoped that more exact results will be obtained.

In the future it will be possible, instead of collecting hibernating soun pests, to collect only in the field before migration the amount of soun needed for raising parasites. A worker can collect in the field about 3 kilos of soun pests per day.