
E. KAPATOS (1), B.S. FLETCHER (1), S. PAPPAS (1), Y. LAUDEHO (2)

Releases of Opius concolor SZEPL. and O. concolor var. siculus MON. were carried out in the spring to determine if they could be used as a biological control agent against the heavy infestation of Dacus oleae GMEL. which occurs on Corfu at that time. At an initial density of 300-400 parasites per tree the mean parasitism rates of 3rd stage larvae ranged from 30-50 % in the 1st week following the release, indicating that Opius could work well in the spring in the tall trees with large numbers of ripe and heavily infested fruits that are found on Corfu.

The fruits of the principal variety of olive grown on Corfu, Lianolia, are not harvested in the autumn but are left to fall naturally and collected from the ground. Because of this practice, fruits which are protected from Dacus oleae GMEL. infestation by the application of insecticidal sprays in late summer and autumn remain on the trees in large numbers until the following May or even June. These fruits become heavily infested with D. oleae in the spring and give rise to a generation of adults which emerge in late May and June. It is the adults of this generation, which pass the summer in an immature state, that are largely responsible for producing the infestation of the new fruits in late July and August (FLETCHER, unpublished results).

The situation on Corfu, therefore, is different from most other parts of Greece where the olive fruits are harvested in the autumn and breeding of D. oleae is greatly restricted in the spring by the shortage of fruit. Despite the heavy spring infestation of fruit on Corfu, insecticidal control is not carried out because this would prolong the time the olives remained on the trees and might also lead to undesirable levels of insecticide residues in the olive oil.

Preliminary experiments have been carried out, therefore, to see if Opius concolor SZEPL. could be used effectively as a biological agent against the spring generation of D. oleae. Experiments carried out during late summer and autumn in Sicily (MONASTERO, 1967) have demonstrated the potential of Opius concolor as a biological control agent against D. oleae, and trials in Greece in autumn (STAVRAKI, 1966) also gave promising results. However, spring releases of O. concolor against D. oleae have not been made previously and, therefore, their effectiveness in a situation like Corfu, where the trees are tall with extensive canopies and heavily laden with ripe fruit, was not known.

(1) FAO Olive Pest Project; Olive Institute, Corfu, Greece.
(2) FAO Olive Pest Project; P.O. Box 6, Kifissia, Athens, Greece.
METHODS AND MATERIALS

ORIGIN OF THE PARASITES

Two different strains of the parasite were released during these experiments: Opius concolor SzEPL. and O. concolor var. siculus Mon. The O. concolor strain originated from wild stock collected in Tunis and had been colonized for a number of generations at the “Institut de Recherches Agronomiques Tropicales” (I.R.A.T.), Saint-Denis de la Réunion. The O. concolor var. siculus came from the “Istituto di Entomologia Agraria”, Palermo, Sicily.

The parasites used in the experiments reported here were mass reared on Ceratitis capitata larvae at the FAO Olive Pest Project Headquarters and at the Likovrissi Insectarium in Athens using the standard techniques (Delanoue, 1962, Genduso, 1967).

RELEASE SITES

For the 1st experiment when both strains were released, 2 similar areas about 1 km apart were selected in Sinies in the north-east part of the island. These 2 areas were located near the coast approximately 70 m above sea level. At both sites the trees were tall (8-10 m) and still carried a large olive crop. At the time of the release it was estimated that there were 15-20,000 fruits on each tree and the dissection of fruit samples indicated that approximately 75% of them contained living 2nd or 3rd stage larvae of D. oleae.

For the 2nd release of O. concolor a new site was used near Episkepsis. This was located in the more mountainous north-central part of the island, approximately 500 m above sea level. Here also, the site contained tall trees bearing a heavy crop of fruit (approximately 15,000 per tree). Here, the spring infestation of the fruit by D. oleae did not start until the beginning of June and at the time of the release (16th June) over 70% of the fruits contained 2nd or 3rd stage larvae.

DETAILS OF THE RELEASES

The parasites used in the releases were air freighted from Athens to Corfu while still in the pupal stage. On arrival, they were transferred to the laboratory, placed in holding cages (20 × 20 × 20 cm), allowed to emerge naturally and fed on a mixture of sugar and honey until the time of the release.

The 1st release took place at Sinies on 20th May 1976. At one site 2,500 O. concolor were released fairly uniformly onto 8 adjacent trees in the centre of a grove of similar trees. At the other site, 5,000 O. concolor var. siculus were released onto 16 trees.

In the 2nd release near Episkepsis on 16th June, 4,000 O. concolor were released onto 10 trees arranged in 2 rows of 5 in the centre of a large grove.

SAMPLING PROCEDURES

To determine the percentage of D. oleae larvae that were parasitised, fruit samples were taken from the trees every few days after the release. Also, because in the spring the larvae leave the fruit either while it is still on the trees or after it has fallen, larval traps were placed beneath the trees to catch the falling fruit and larvae. These traps had an upper opening 1 m² and sloping sides so that anything falling into them came to rest in a deep-sided tray filled with sand and with a fine mesh bottom for drainage. These traps were placed out one per tree and the fruit and pupae they contained were collected at the same time as the fruit samples were taken from the trees.