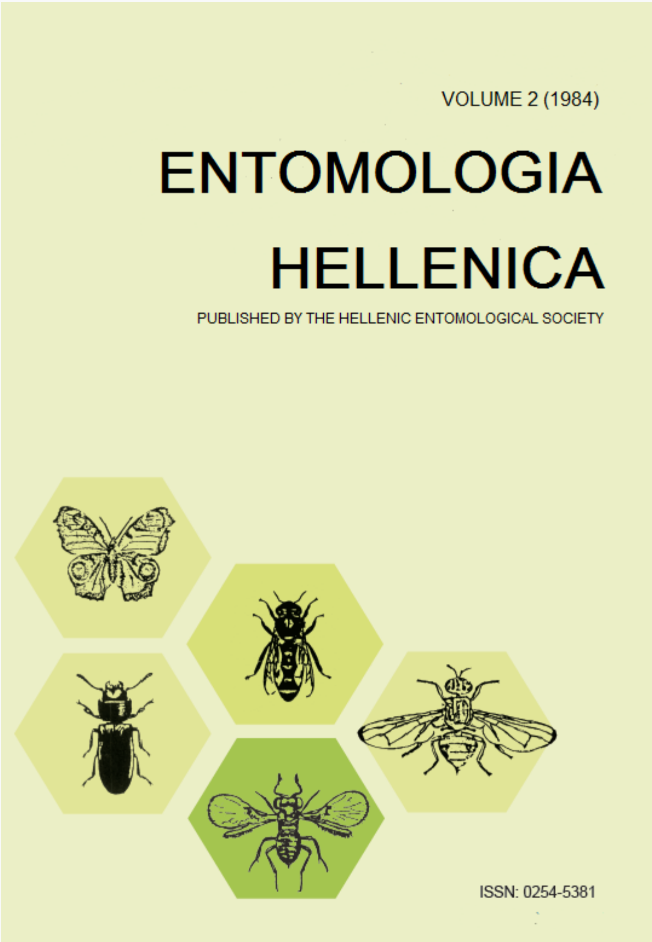
ENTOMOLOGIA HELLENICA

Vol 2 (1984)



Preliminary results for the evaluation of the action of Saissetia oleae parasites in Corfu.

E.T. Stratopoulou, E.T. Kapatos

doi: 10.12681/eh.13909

ENTOMOLOGIA HELLENICA **2** (1984): 3 - 9

Preliminary Results for the Evaluation of the Action of *Saissetia oleae* Parasites in Corfu[1]

E.T. STRATOPOULOU and E.T. KAPATOS

The Olive Institute of Corfu, Corfu, Greece

ABSTRACT

The action of parasites of *Saissetia oleae* (Oliv.) (Homoptera-Coccidae) is studied in Corfu from 1980 in the framework of an ongoing project on the population dynamics of *Saissetia oleae*.

Results obtained during the period 1980-1983 from 17 experimental sites indicate the following: a) the population of *S. oleae* increased in 1981 but from 1982 it declined to very low levels; following the overall decline of the host population, parasitization rates of third instar larvae (mainly by *Metaphycus helvolus* Comp.) were relatively low and ranged from 2.1% to 6.7% for the autumn period and from 14.6% to 29.4% for the spring period; this does not minimize the possibility that *Metaphycus helvolus* plays an important role on the regulation of *S. oleae* populations; b) a considerable proportion of females of *S. oleae* is attacked during summer by *Metaphycus lounsburyi* How. (an internal parasite on preovipositing females), *Moranila californica* How. and *Scutellista cyanea* Motsch. (egg predators), but their significance upon the population system of *S. oleae* is not expected to be great. The action of *Metaphycus lounsburyi* in spring, when the peak of the suitable stage occurs (i.e. fourth instar larvae), appears to be very low, at least for these three years. Its action is delayed and most of the specimens of this parasite emerge from ovipositing females in early summer. Among the species attacking *S. oleae* females, *M. californica* (recently introduced in Corfu) was the most abundant and it might be worthy to be introduced to other parts of Greece too.

Introduction

Biological control of *Saissetia oleae* (Oliv.) (Homoptera-Coccidae) has become an important aspect of pest management system on olives, and much effort has been given for the study of the natural enemies of this coccid as well as for the introduction and rearing of exotic parasites (Viggiani 1978). The population of *Saissetia oleae* is usually kept at low levels but occasionally outbreaks of this pest occur, at a local or a regional base, causing considerable economic damage. These outbreaks have been partly attributed to the side effects of insecticides, applied against other pests of olives, causing detrimental effects upon the natural enemies of the coccid (Feron and D'Aguilar 1962). However, entirely different opinions have been expressed (Orphanidis and Kalmoukos 1970) considering the abiotic (climatic) factors, mainly temperature, as the key-factor responsible for the main fluctuations of the *S. oleae* population.

Regardless of the known universal controversy about the factors determining the size of the population of an animal (Andrewartha 1963, Nicholson 1933) the possible role of the natural enemies on the population system of *S. oleae* may be, broadly, of two kinds: a) natural enemies can become a key-factor, i.e. causing an outbreak when their density is considerably decreased due to various reasons, including in-

[1] Received for publication May 10, 1984.

secticides; b) the natural enemies of *S. oleae* act mainly as a regulating mechanism pushing the population of *S. oleae* to its equilibrium (after an outbreak or a major decline caused by other factors, i.e. temperature) through a density dependent relationship (Southwood 1978). However, precise quantitative information that could be used to investigate the role of the natural enemies is limited (Paraskakis et al. 1980).

Corfu provides favourable conditions (high relative humidity, not very hot summer, mild winter, tall trees with insufficient ventilation) for the development of *S. oleae*. The last large outbreak of *S. oleae* in Corfu occurred in 1967/68 and it was attributed to an overuse of air sprays against *Dacus oleae*. For this reason the use of aerial applications was suspended in Corfu, but a decision was made in 1980 to start using air sprays again.

In order to establish a scientific base for the development of a pest management system on olives and to design the best strategy for the activities of the local insectary, it was considered necessary to evaluate quantitatively the action of the parasitic complex of *S. oleae* and to determine the relative importance of each parasite. The complex of the natural enemies of *S. oleae* in Corfu comprises several species of parasites and predators. The species involved have been described by many authors (Viggiani et al. 1975, Argyriou and Katsoyannos 1976, Tzoras et al. 1979). Among the predators, only the egg predators, *Scutellista cyanea* Motsch. (Hymenoptera-Pteromalidae) and *Moranila californica* How. (Hymenoptera-Pteromalidae) which can be characterized as parasites on the ovipositing females, were included in the study. Although a full quantitative study for the action of the *S. oleae* parasites in Corfu is missing, earlier work (Argyriou and Katsoyannos 1976, Stratopoulou et al. 1981) indicated high percentages of parasitism of *Saissetia oleae* mainly by *Metaphycus helvolus* Comp. (Hymenoptera-Encyrtidae) in spring and autumn, and *Scutellista cyanea* and *Moranila californica* in summer.

The work reported here is a part of an ongoing study on the population dynamics of *S. oleae* in Corfu and presents the data on the parasitization rates obtained during the years 1980-1983.

Materials and Methods

The study was carried out at 17 experimental sites distributed all over the island (Barbati, Sikies, Nissaki, Xathates, Klimatia, Zygos, Sgourades, Kavadates, Macrades, Lakones, Gardelades, Poulades, Kontokali, Vouniatades, Agios Matheos, Linia, Kavos). The experimental sites were selected to represent a wide range of population densities of *Saissetia oleae*.

Sampling was carried out in late autumn, winter and spring in order to estimate the action of parasites acting on the third larval instar (i.e. *Metaphycus helvolus)* and in summer for estimating the parasitization rate by *Metaphycus lounsburyi*, *Scutelista cyanea* and *Moranila californica*. In 6 of the experimental sites, at which the population dynamics of *S. oleae* is studied in more detail, sampling was carried out more frequently. In each site, 10 trees were randomly selected for sampling (six in 1981) and from each tree 8 samples were taken from two levels and the four aspects of the tree. Each sample was consisted of one branch of two years growth including the new vegetation (Kapatos and Stratopoulou unpublished). The samples were examined under the binocular microscope and living, dead and parasitized scales were recorded separately.

The rate of parasitization was expressed as the ratio of parasitized scales to the total number of living plus parasitized scales (active parasitism). It must be indicated that this estimate does not express the overall action of the parasite on a generation basis (percent parasitism on a generation basis) which would be the most adequate parameter to evaluate precisely the action of the parasite. The calculation of the rate of active parasitism is based on the number of living individuals (of the stage whose parasitism is being estimated) which still have the chance to be parasitized and does not take into account the later stage found in the same sampling date which, anyway, escaped parasitism. Therefore, active parasitism does not express the proportion of scales of a particular stage which are parasitized during the generation or a period of time but simply the ratio of parasitized to non parasitized scales at a particular moment. For this reason, the time of sampling for estimating active parasitism becomes very critical and the samples must be taken when the peak of the stage, whose parasitism is being estimated, occurs. For the third stage larvae the direct estimation of percent parasitism on a generation basis is almost impossible because the parasitized scales are lost after a period of time. For parasitism on the adult stage (i.e. *Metaphycus lounsburyi, Scutelista cyanea, Moranila californica*) the two estimates (active parasitism and percent parasitism on a generation basis) are almost the same.

TABLE 1. The proportion (%) of each stage in the total population of *S. oleae* at different times of the year during 1980-1983.

Season/Year	Sampling period	L.1	L.2	L.3	Fo	Fm
Autumn/1980	23/10-21/11	28	57	14	1	–
Winter1981	26/1-17/3	10	47	38	5	–
Spring/1981	18/5-10/6	100*	–	26	45	29
Summer/1981	21/7-24/8	99*	1*	–	–	100
Autumn/1981	22/9-15/10	67	27	6	–	–
Autumn/1981	9/11-3/12	9	50	40	1	–
Winter/1982	12/1-25/2	4	28	67	1	–
Spring/1982	27/4-28/5	–	3	82	8	8
Summer/1982	17/6-6/7	100*	–	–	5	95
Summer/1982	24/8-6/9	81	18	1	–	–
Autumn/1982	24/9-8/11	38	55	6	1	–
Autumn/1982	8/11-13/12	8	60	30	2	–
Winter/1983	21/2-17/3	–	9	88	3	–
Spring/1983	4/4-18/4	–	12	55	33	–
Spring/1983	30/5-9/6	–	–	2	5	93
Summer/1983	25/7-8/8	96*	1*	–	–	100
Autumn/1983	12/10-20/10	18	73	9	–	–
Autumn/1983	30/11-20/12	6	59	34	1	–

L.1 = first instar larvae, L.2 = second instar larvae, L.3 = third instar larvae, Fo = preovipositional stage, Fm = ovipositing females, * = new generation.

Results

In order to investigate the action of the parasites of *S. oleae* during a particular period of time, firstly the phenology of the host must be determined for the same period. Table 1 gives the proportion of each stage of *S. oleae* in the total population at different times of the year from the autumn of 1980 until the autumn of 1983. During late autumn (i.e. November) the greatest proportion of the living individuals of *S. oleae* are at the second and third larval instar (57% for the second stage, 14% for the third stage in 1980, 50%-40% in 1981, 60%-30% in 1982 and 59%-34% in 1983, respectively). In winter, development goes on slowly and in April the greater proportion of the population is at the third stage larva while a considerable proportion of the population has entered the preovipositional stage (immature female). By late spring (i.e. end of May-beginning of June) almost the total population of scales occurs as ovipositing females. These are in agreement with earlier observations on the phenology of *S. oleae* (Viggiani et al. 1975) in Corfu.

During these years (1980-1983) an insignificant number (i.e. less than 1% of the total population) of ovipositing females was found in November-December but in all cases in the 17 experimental sites a partial second generation was not observed to occur at a relatively high proportion. These data do not contradict earlier observation according to which in certain cases the partial second generation of *S. oleae* was found to occur at a much higher proportion (Viggiani et al. 1975), because the relative importance of the partial second generation may vary in time and space depending upon many factors and may be linked to a certain extent with the size of the population. This, however, is outside of the scope of this paper where the phenology of the coccid, as recorded in these three years, is presented only for a better understanding of the action of the parasites during the same period.

a. The autumn and spring period

Table 2 gives the population density of *Saissetia oleae,* expressed as number of living individuals of all stages per 100 branches of two years growth and the percentage of active parasitism for the third stage larvae for autumn and spring of 1980/81, 1981/82 and 1982/83. *Metaphycus helvolus,* introduced by Argyriou in 1968 (Argyriou and Katsoyannos 1976), is the main parasite which acts upon the third stage larva and represented 93% of the cases examined.

TABLE 2. Parasitization rates of third instar larvae of *Saissetia oleae* in autumn and spring (expressed as proportion of scales of that stage parasitized) and population density of *S. oleae* (expressed as number of living scales of all stages per 100 samples) during the years 1980-1983.

Year	Autumn			Spring		
	Sampling period	Population density	% L.3 parasitized	Sampling period	Population density	% L.3 parasitized
1980/81	23/10-21/11	1754	2.1	18/5-10/6	739	29.4
1981/82	9/11-3/12	2730	2.3	27/4-28/5	246	14.6
1982/83	8/11-13/12	108	6.7	4/4-26/4	135	18.5
1983/84	30/11-20/12	132	2.1			

The density of the population of *S. oleae* increased in 1981 and this was evident in almost all the experimental sites, but from then on population density was reduced to very low levels apart from a few sites where it remained relatively high.

The results indicate that the level of parasitism of third stage larvae in autumn in these years was very low (2.1% in 1980, 2.3% in 1981, 6.7% in 1982). An insignificant number of parasitized second stage larvae was found at the same period although that stage is the most abundant during autumn. Therefore, both living and parasitized second stage larvae were not included in the calculations. Had these been included, the parasitization rate would be much lower.

The parasitization rate of third stage larvae in spring was 29.4% in 1981, 14.6% in 1982 and 18.5% in 1983. In 1981, the sampling was carried out later (after the middle of May) than normal (end of April) and it is possible that the rate of parasitism for that period was underestimated.

b. The summer period

Table 3 gives the number of ovipositing females and the proportion (%) of them attacked by *Metaphycus lounsburyi* How. (Hymenoptera-Encyrtidae), *Scutelista cyanea* and *Moranila californica*. *M. lounsburyi* is an internal parasite acting on the fourth larval instar (preovipositional stage). Although during spring a considerable proportion of immature females occurs, parasitization rate of that stage by this parasite was insignificant. Its action is delayed and in most cases the specimens of the parasite emerged from scales which had reached the stage of ovipositing female and had produced a number of crawlers. This is why this parasite is considered for the summer period and not for the spring period. On some annual plants developing underneath the olive trees, where *S. oleae* develops at a faster rate than on olive trees, high parasitization rates of immature females of *S. oleae* by *M. lounsburyi* have been recorded during autumn (Viggiani et al. 1975, Tzoras et al. 1979). *S. cyanea* and *M. californica* are egg predators but they can be considered as parasites on the ovipositing females.

In 1981, when population density of *S. oleae*

TABLE 3. Population density of females of *S. oleae* (expressed as number of individuals per 100 samples), the proportion of scales attacked during summer by *M. lounsburyi*, *S. cyanea* and *M. californica* and the relative frequency of these species, expressed as percentage in the total number of identified parasitic stages, during the years 1981-1983.

Year	Sampling period	Population density	% scales attacked	Relative frequency of parasites		
				M. lounsburyi	*S. cyanea*	*M. californica*
1981	21/7-24/8	292	22	8	23	69
1982	19/7-6/9	246	44	11	15	74
1983	25/7-6/9	13	47	32	22	46

was high, 22% of the females were attacked by the parasites while in 1982 and 1983 the parasitization rate was 47% and 44%, respectively. Table 3 gives also the relative frequency of the three species. *M. californica* which was accidentally introduced in Corfu (Viggiani 1978) represented the greater proportion of the identified parasitic stages (69% in 1981, 74% in 1982 and 46% in 1983). The relevant figures for *S. cyanea* for the three years were 23%, 15% and 22%, respectively. *M. lounsburyi* was the less abundant in 1981 and 1982 (8% and 11%) but in 1983 represented the 32% of the identified parasitic stages.

The relationship of the proportion of scales attacked during summer by the parasites and the density of *S. oleae* is shown in Figure 1 where the percentage of attacked scales estimated for each study site was plotted against the population density of females of *S. oleae* (expressed as log number of scales per 100 branches). The relationship, though not very clear, can be interpreted as an inverse density dependent relationship (Varley et al. 1973) i.e. the proportion of attacked scales decreases as the density of the population of *S. oleae* increases.

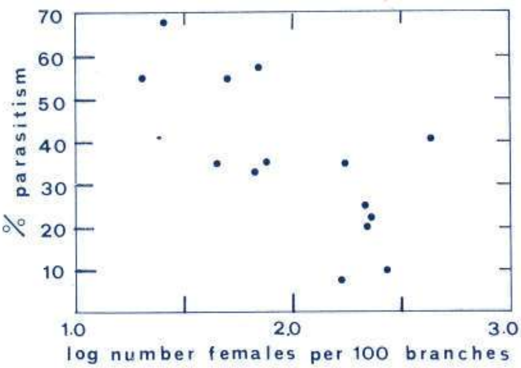


FIG. 1. The relationship between the proportion of *Saissetia oleae* females parasitized during summer and the population density of *S. oleae*.

Discussion

Previous evidence for the rate of parasitism of *S. oleae* in Corfu during autumn and spring indicate very high estimates (Argyriou and Katsoyannos 1976, Tzoras et al. 1979, Tzoras unpublished). Particularly, during a routine sampling programme of the Olive Institute for monitoring olive pests carried out during 1976-1977, very high estimates of parasitization rate of third larval instar in spring were obtained (up to 90%) when the density of *S. oleae* was high (Tzoras unpublished). The present study, however, indicate that in 1980-1983 the parasitization rate was much lower even in cases where the population of *S. oleae* was relatively high (six sites in 1981, three sites in 1982, one site in 1983). This may be due to a number of factors, including the overall decline of the population of the host after 1981 (a similar decline was observed in 1979-80), the use of air treatments against *D. oleae* and also factors which act upon the populations of both the host and its natural enemies.

During late spring and summer, a considerable proportion of the adult population of *S. oleae* is attacked by *M. lounsburyi, S. cyanea* and *M. californica* but their action does not seem to have a significant effect upon the population of *S. oleae*. This is because the attacked scales produce a more or less significant number of crawlers and because the crawlers and the first stage larvae suffer a very high mortality, anyway. *M. lounsburyi* could be, theoretically, the most important parasite as acting during late spring on the last larval instar, i.e. acting after the population of *S. oleae* has been considerably reduced from other factors and just before the pest passes to the reproductive stage. The action of this parasite, however, is delayed in the field due to unknown reasons and this reduces the significance of this parasite. Preliminary results from mass releases of this parasite in the field indicate that when released in April it can successfully parasitize the population of preovipositional females and the parasitized scales do not pass to the next stage (Macropodi personal communication).

Moranila californica was recently introduced (accidentally) in Corfu (Viggiani 1978) and it was spread rapidly all over Corfu (Stratopoulou et al. 1981). In all cases it appears more abundant than *S. cyanea* and it might be worthy to be introduced also to other parts of Greece.

The present results are not sufficient for a full evaluation of the role of parasites because of the low population of *S. oleae*. Studies in Crete (Paraskakis et al. 1980) have indicated a delayed density-dependent relationship for the parasites acting in autumn and spring (i.e. mainly *Metaphycus helvolus),* and a direct density dependent relationship when comparing peak parasitization rates during summer and autumn from different localities in the same year. For the latter case, however, it is not clear which parasites were considered to calculate the parasitization rate for the summer-autumn period, as the parasitized individuals of *S. oleae* in these periods may represent two different stages from two consecutive generations (ovipositing female of the previous generation, second and third stage larvae from the present generation) attacked by different species of the parasitic complex. Our data indicated that the functional response of the parasites attacking the later stages of *S. oleae* in summer is possibly expressed by an inverse density dependent relationship. After all, it would be surprising if *M. lounsburyi* and the egg predators constitute the regulating factor for the population system of *S. oleae* since their action, which practically is to reduce the number of crawlers produced, is minimized by the strong environmental pressures acting upon the stages of *S. oleae* later in the generation (high mortality of crawlers and young larvae, parasitism of second and third stage larvae, winter mortality, falling of older leaves, predators, etc.).

On the other hand, *Metaphycus helvolus* acts mainly upon the third larval instar in spring, on the part of the population of *S. oleae* which survived from the various mortality factors. Therefore, the significance of this parasite as a part of the regulating mechanism of *S. oleae* population must be greater and a direct (or delayed) density dependent relationship more possible to occur. This can explain the low rate of parasitization observed during these years, after the overall decline of the population of *S. oleae*.

M. helvolus has to survive a long blank period i.e. from May until the next October-November before suitable hosts (second and third instar larvae) in considerable numbers are again available. The faster developing scales on annual plants, mainly on *Carduus pycnocephalus* (Tzoras et al. 1979), provide a number of breeding sites for the parasite from August onwards but their quantitative significance is unknown and it is not expected to be great. It is possible, therefore, that during the blank period the parasites suffer heavy mortality which is possibly magnified by the air-treatments against *Dacus oleae*. This is probably why the parasitization rate in autumn is very low. From October-November onwards, when plenty of hosts are available, the parasite recovers and its action in spring, which probably represents a second generation of the parasite, is always greater.

The possibility that parasites act as a key-factor, when their population is reduced from various causes (including insecticides), causing immediate outbreaks of *S. oleae,* must be considered more in the cases where under normal circumstances the overall population level of *S. oleae* is not low and the parasites kill a considerable proportion of the scales. In the other cases, i.e. in the cases where under normal circumstances the level of *S. oleae* population is very low, the relationship of *S. oleae* outbreaks and the use of wide spectrum insecticides (or the application of insecticides over large areas, i.e. air treatments), if it occurs, must be considered as a quantitative process (not necessarily a short term one) where the regulating action of the parasites rather than their action as key-factors has the central role.

It appears from the data obtained so far that the best strategy for biological treatments against *S. oleae* populations on a local base (for reinforcement of the action of parasitic complex) would be the mass rearing and release of *Metaphycus helvolus* for the following reasons: a) the period of action of this parasite extends from October until the next April and therefore successive releases can be made during this period, b) in spring, when the main action of *M. helvolus* occurs, the population of *S. oleae* has been already considerably reduced by other factors and moreover the action of *M. helvolus* during this period is not minimized by the action of other serious mortality factors later in the season, because in a relatively short time the scales passe to the reproductive stage.

Metaphycus lounsburyi, also, may be used for the same purpose but it must be released early so that the parasitized scales will not produce offsprings.

Acknowledgment

We wish to thank Mr G. Carvounis, Director of the Olive Institute, for providing facilities. Thanks are also due to Mrs. E. Logara, Mrs. Th. Revi and Mrs. K. Doumarapi for helping in examining the samples.

References

Andrewartha, H.G. 1963. Introduction to the Study of Animal Populations. University of Chicago Press, Chicago, 283 pp.

Argyriou, L.C. and P. Katsoyannos. 1976. Establishment and spreading of *Metaphycus helvolus* Compere, parasite of *Saissetia oleae* (Olivier) in Corfu. In Greek, Ann. Phytopath. Inst. Benaki 11: 215-224.

Feron, M. and J. D'Aguilar. 1962. Observations on olive tree insect populations in some olive producing areas in Greece and the effect of applications with wide spectrum insecticides. Ann. Phytopath. Inst. Benaki 4: 57-75.

Nicholson, A.J. 1933. The balance of animal populations. J. Anim. Ecol. 2: 132-178.

Orphanidis, P.S. and P.E. Kalmoukos. 1970. Observations on the mortality of *Saissetia oleae* Bern., from non parasitic causes, in the field. (Comparison with the effect of some biotic factors). In Greek, Ann. Phytopath. Inst. Benaki 9: 195-212.

Paraskakis, M., P. Neuenschwander and S. Michelakis. 1980. *Saissetia oleae* (Oliv.) (Hom., Coccidae) and its parasites on olive trees in Crete, Greece. Z. ang. Ent. 90: 450-464.

Southwood, T.R.E. 1978. Ecological Methods with Particular Reference to the Study of Insect Populations. Chapman, London, 2nd ed. 524 pp.

Stratopoulou, E.T., E.T. Kapatos and G. Viggiani. 1981. Preliminary observations on the distribution and the action of *Moranila californica* (How.) (Hymenoptera: Pteromalidae) in Corfu, a possible case of competitive displacement. Boll. Lab. Ent. Agr. "F. Silvestri" 38: 139-142.

Tzoras, A., S. Pappas and G. Viggiani. 1979. Osservazioni fenologiche comparate relative a *Saissetia oleae* (Oliv.) e i suoi nemici naturali su *Oleae europaea* L. e *Carduus pycnocephalus* L. nell'isola di Corfu. Boll. Lab. Ent. Agr. "F. Silvestri" 36: 3-12.

Varley, G.C., G.R. Gradwell and M.P. Hassel. 1973. Insect Population Ecology. Blackwell, Oxford, 212 pp.

Viggiani, G. 1978. Current state of biological control of olive scales. Boll. Lab. Ent. Agr. "F. Silvestri" 35: 30-38.

Viggiani, G., S. Pappas and A. Tzoras. 1975. Osservazioni su *Saissetia oleae* (Oliv.) e i suoi entomofagi nell'isola di Corfu. Boll. Lab. Ent. Agr. "F. Silvestri" 32: 156-167.

KEY WORDS: *Saissetia oleae*, Parasitism of *S. oleae*, *Metaphycus helvolus*, *Metaphycus lounsburyi*, *Moranila californica*, *Scutelista cyanea*

Προκαταρκτικά Αποτελέσματα για την Αξιολόγηση της Δράσεως των Παρασίτων του *Saissetia oleae* στην Κέρκυρα

Ε.Θ. ΣΤΡΑΤΟΠΟΥΛΟΥ και Ε.Θ. ΚΑΠΑΤΟΣ

Ινστιτούτο Ελιάς Κέρκυρας

ΠΕΡΙΛΗΨΗ

Η δράση των παρασίτων του λεκανίου μελετιέται στην Κέρκυρα απ' το 1980 στα πλαίσια ενός συνεχιζόμενου προγράμματος μελέτης της δυναμικής του πληθυσμού του λεκανίου.

Αποτελέσματα που λήφθηκαν στην περίοδο 1980-1983 σε 17 πειραματικούς ελαιώνες δείχνουν τα παρακάτω: α) Ο πληθυσμός του λεκανίου αυξήθηκε το 1981 αλλά απ' το 1982 μειώθηκε σε πολύ χαμηλά επίπεδα. Ακολουθώντας τη γενική μείωση του πληθυσμού του λεκανίου, ο παρασιτισμός στις νύμφες τρίτου σταδίου (κυρίως από *Metaphycus helvolus)* ήταν σχετικά χαμηλός και κυμάνθηκε από 2,1 μέχρι 6,7% για την περίοδο του φθινοπώρου και από 29,4 μέχρι 14,6% για την περίοδο της άνοιξης. Αυτό δεν μειώνει την πιθανότητα ότι το *M. helvolus* παίζει σημαντικό ρόλο σαν ρυθμιστικός παράγοντας του πληθυσμού του λεκανίου. β) Ένα σημαντικό ποσοστό των ακμαίων του *S. oleae* προσβάλλεται το καλοκαίρι από *Metaphycus lounsburyi* (παράσιτο στο στάδιο προ-ωτοκίας), *Scutelista cyanea* και *Moranila californica* (ωοφάγα αρπακτικά) αλλά η σημασία αυτών των φυσικών εχθρών σαν ρυθμιστικός παράγοντας του πληθυσμού του λεκανίου δεν αναμένεται να είναι σημαντική. Η δράση του *M. lounsburyi* την άνοιξη όπου παρατηρείται και το μεγαλύτερο ποσοστό των νυμφών 4ου σταδίου (προ-ωτοκίας) εμφανίζεται να είναι πολύ χαμηλή, τουλάχιστον γι' αυτά τα τρία χρόνια. Φαίνεται ότι η δράση του καθυστερεί να εκδηλωθεί και τα περισσότερα άτομα του παρασίτου εξέρχονται από ωτοκούντα θηλυκά.

Απ' τα παραπάνω είδη η *M. californica* εμφανίζεται το πιο άφθονο και αξίζει να εισαχθεί και σε άλλες ελαιοκομικές περιοχές της Ελλάδας.