V. Summary

1. Taxonomic Studies:

1.1. Hosts and Distribution of genus *Aphytis* in Egypt:

Samples of Aphytis species collected were associated with 26 armored scale insects on 20 host plants in 19 governorates in Egypt.

The present work showed that *A. lingnanensis* to be the most effective species of genus *Aphytis*, followed by *A. diaspidis* and *A. mytilaspidis*. *A. lingnanensis* was collected from 11 species of armored scale insects on 6 plant hosts distributed over 4 governorates; A. diaspidis was collected from 6 species of armored scale insects found on 6 plant hosts distributed over 7 governorates and A. mytilaspidis was collected from 6 species of armored scale insects on 5 plant hosts found in 5 governorates. governorate. The remaining Aphytis species were each associated with one species of armored scale insect on 1 to 2 plant hosts, in 1 to 2 governorates.

A. chilensis is associated with 4 species of armored scale insects on 5 host plants found in 5 governorates. *A. africanus*, *A. aonidiae*, *A. hispanicus* and *A. melinus* are associated with 2 to 3 species of armored scale insects each. *A. africanus* and its host insects were collected from 5 host plant species in 5 governorates, *A. aonidiae* and its host insects were found on 3 plant hosts distributed over 3 governorates, *A. hispanicus* and its host insects were collected from 4 host plant species in 4 governorates and *A. melinus* and its host insects were found on 2 plant hosts in only 1.

1.2. Taxonomy:

In the present work, 18 species of the genus *Aphytis* Howard were collected, identified, described, and illustrated. These species are: *Aphytis africanus* Quednau*, *Aphytis aonidiae* (Mercet)*, *Aphytis chilensis* Howard*, *Aphytis chrysomphali* (Mercet), *Aphytis coheni* DeBach,

Aphytis diaspidis (Howard), *Aphytis hispanicus* (Mercet), *Aphytis holoxanthus* DeBach*, *Aphytis lepidosaphes* Compere, *Aphytis libanicus* Traboulsi*, *Aphytis lingnanensis* Compere, *Aphytis melinus* DeBach, *Aphytis mytilaspidis* (LeBaron), *Aphytis opuntiae* (Mercet)*, *Aphytis paramaculicornis* DeBach & Rosen*, *Aphytis philippinensis* DeBach & Rosen*, *Aphytis phoenicis* DeBach & Rosen* and *Aphytis vandenboshi* DeBach & Rosen*. Ten of these species are recorded in this work for the first time in Egypt, and are marked in the forementioned list with an asterisk (*).

The most important characteristics of the genus *Aphytis* Howard are summarized in the following: Number of setae on mesoscutum; setae of submarginal vein and parapsis; presence or absence of overlapping crenulae; length of propodeum; variation in the relative lengths of propodeum, scutellum, and metanotum ;number of sensilla on club; length of ovipositor and sheath and the variation in the relative lengths of the midtibia and basitarsus.

A key is provided for the identification and differentiation of Egyptian *Aphytis* species based on the characteristics of the adult female.

2. Population dynamics of the genus *Aphytis* Howard in Egypt:

The population dynamics of 18 species of the genus *Aphytis* in Egypt were observed on ten host plants infested by eleven armored scale insect species in seven governorates between 1997 and 2000.

2.1. *Aphytis africanus* associated with *Aonidiella aurantii* on *Citrus* sp. in Qalyubiya:

The results indicated that this species had two peaks occurring in January and November of the first year (1997). In the second year (1998),

the population of *A. africanus* followed the same trend and also had two peaks of abundance occurring in January and November.

Statistical analysis indicated that D.Mx.T., D.Mn.T., and D.M.R. H. had insignificant effect on the rate of parasitism in the first year. In the second year, the effects of D.Mx.T. and D.M.R.H. were highly significant, while D.Mn.T. did not show any significant effect on the rate of parasitism.

2.2. *Aphytis aonidiae* associated with *Aonidia lauri on ALaurus nobilis* in Alexandria:

This species is a rare parasitoid. The population was very low and only three individuals were collected during 1997 and five individuals during 1998, respectively.

2.3. *Aphytis chilensis* associated with *Chrysomphalus dictyospermi on Ficus nitida* in El-Minya:

This species had four peaks during the two years of 1997 and 1998. The average rates of parasitism were 0.7% and 0.5% during the first and second years, respectively.

Statistical analysis indicated that D.Mx.T., D.Mn.T. and D.M.R.H. were of insignificant effect on the rate of parasitism in the first year. In the second year, the effect of D.Mn.T. was highly significant, while those of D.Mx.T. and D.M.R.H. were insignificant.

2.4. *Aphytis chrysomphali* associated with *Chrysomphalus dictyospermi on Ficus nitida* in Qalyubiya:

In the present work, the rates of parasitism of this species experienced four peaks during the first and second years (1997 and 1998). The highest peak was 41.4%, achieved in November of 1997.

Statistical analysis indicated that during the first year, D.M.R.H was of highly significant effect on the rate of parasitism, while D.Mx.T. and D.Mn.T. were of insignificant effect. In the second year, the same was observed once more, with D.M.R.H. being of significant effect on the rate of parasitism, while D.Mx.T. and D.Mn.T. were of insignificant effect.

2.5. *Aphytis coheni* associated with *Aonidiella aurantii* on *Citrus* sp. in Alexandria:

This species experienced four peaks during the present work in 1997 and 1998. The highest rates of parasitism were 3.9% and 5.3% during the first and second years, respectively. The average rates of parasitism were 0.6% and 0.8% during the first and second years, respectively.

Statistical analysis indicated that during both the first and second years, the effects of D.Mx.T., D.Mn.T. and D.M.R.H. on the rates of parasitism were insignificant.

2.6. *Aphytis diaspidis* associated with *Parlatoria oleae* on *Olea* sp. on the Northern Coast:

In this work, this species experienced two peaks during May and December of the first year (1999). It also experienced two peaks during May and November of the second year (2000).

Statistical analysis indicated that during the first year, the effect of D.Mn.T. on the rate of parasitism was highly significant, while those of D.Mx.T. and D.M.R.H. were insignificant. In the second year, D.Mn.T. again had a highly significant effect on the rate of parasitism, while D.Mx.T. and D.M.R.H. were once more of insignificant effect.

2.7. *Aphytis hispanicus* associated with *Insulaspis pallidula* on *Mangifera indica* in Ismailia:

In 1999, *A. hispanicus* experienced peak rates of parasitism of 4.2% and 9.4%. In 2000, there were also two peak rates of parasitism, these being 5.7% and 6.4%.

Statistical analysis indicated that D.Mx.T., D.Mn.T. and D.M.R.H. were of insignificant effect on the rate of parasitism during the first year. However, in the second year, the effect of D.Mx.T. on the rate of parasitism was highly significant, while those of D.Mn.T. and D.M.R.H. were insignificant.

2.8. *Aphytis holoxanthus* associated with *Chrysomphalus aonidum* on *Citrus* sp. in Giza:

In the present work, the parasitism rate of this species experienced four peaks during 1997 and 1998. The highest peak was 70.9%, achieved during November of 1997.

Statistical analysis indicated that during the first year, the effects on the rate of parasitism of D.Mn.T. and D.M.R.H. were significant, while that of D.Mx.T. was insignificant. In the second year, the inverse is true, with the D.Mx.T. being of significant effect on the rate of parasitism, while D.Mn.T. and D.M.R.H were insignificant.

2.9. *Aphytis lepidosaphes* associated with *Lepidosaphes beckii* on *Mangifera indica* in Ismailia:

This species was abundant all throughout 1999 and 2000, these being the two years during which it was subjected to study in the present work. Its maximum rates of parasitism were 59.2% and 49.9% during 1999 and 2000, respectively.

Statistical analysis indicated that during both years, the effects of D.Mx.T., D.Mn.T. and D.M.R.H. on the rates of parasitism were insignificant.

2.10. *Aphytis libanicus* associated with *Lucaspis riccae* on *Olea* sp. in Fayoum:

This species was observed to achieve two peaks in its rate of parasitism during 1999, these occurring in April and November, respectively. In 2000, two peaks were also recorded, these occurring in May and October of that year.

Statistical analysis indicated that in 1999, D.Mx.T., D.Mn.T. and D.M.R.H. had insignificant effect on the rate of parasitism of this species. In 2000, however, D.Mn.T. was of highly significant effect on the rate of parasitism, while D.Mx.T. and D.M.R.H. remained of insignificant effect.

2.11. *Aphytis lingnanensis* associated with *Parlatoria ziziphi* on *Citrus* sp. in Giza:

In the present work, this species was studied during 1997 and 1998. During the first year, it achieved three peaks in its rate of parasitism, these occurring in March, July, and November. During the second year, three peaks were once again recorded, these being observed during March, August, and November of that year.

Statistical analysis indicated that during both years, the effects of D.Mx.T., D.Mn.T. and D.M.R.H. on the rates of parasitism were insignificant.

2.12. *Aphytis melinus* associated with *Aonidiella aurantii* on *Citrus* sp. in Minya:

This species was abundant all throughout 1997 and 1998, these being the two years during which it was subjected to study in the present work. *A. melinus* experienced two peaks in its rate of parasitism during each of these two years. During 1997, these peak rates were 34.9% and 66.4%, while in 1998 they were 41.3% and 56.5%, respectively.

Statistical analysis indicated that D.Mx.T., D.Mn.T. and D.M.R.H. were of insignificant effect on the rate of parasitism during the first year. However, in the second year, the effects of D.Mx.T. and D.M.R.H on the rate of parasitism were highly significant, while that of D.Mn.T. was insignificant.

2.13. *Aphytis mytilaspidis* associated with *Parlatoria oleae* on *Prunus armeniaca* in Qalyubiya:

In the present work, this species was studied during 1997 and 1998. During the first year, it achieved three peaks in its rate of parasitism, these occurring in January, June, and November. During the second year, three peaks were once again recorded, these occurring in the same months as the previous year, namely January, June, and November.

Statistical analysis indicated that during both years, the effects of D.Mx.T., D.Mn.T. and D.M.R.H. on the rates of parasitism were insignificant.

2.14. *Aphytis opuntiae* associated with *Aonidiella aurantii* on *Psidium guajava* in Alexandria:

This species was observed to achieve four peaks in its rate of parasitism during 1997 and 1998. The highest peak rate of parasitism experienced was 9.8%, achieved during December of 1998.