IV. RESULTS AND DISCUSSION

1. Taxonomic Studies:

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

Available information about the genus *Aphytis* in Egypt was collected from literature generated during the years 1940 -1988 recording the infestation of 11 armored scale insects found on 16 host plants located in 6 governorates.

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

Data on the hosts and distribution of genus *Aphytis* are listed in Table (2). The table shows the number of host armored scale insects, the host plant of each species and their distribution in Egypt.

After collecting and analyzing this data, 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* and these species were 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.

A. chilensis was 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* were 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

Table (2): Hosts and distribution of genus *Aphytis* in Egypt:

species	Diaspidid species	Host plant	Distribution	Date
A.africanus	*A. aurantii*	*C. sinensis*	Beni-Suef	Feb.,1997
	A. aurantii	*Citrus* sp.	Qalyubiya	Dec.,1996
	A. aurantii	*Citrus* sp.	Sharqiya	April ,1998
	A. aurantii	*Ficus carica*	Matruh	July,1997
	C. aonidum	*Citrus* sp.	Giza	Aug.,1997
	C. aonidum	*Citrus* sp.	Minya	April,1997
	C. aonidum	*P. dactylifera*	Arish	Sep.,1998
	Lindingaspis floridana Ferris	*Ficus nitida*	Cairo	June,1999
A. aonidiae	*A. lauri*	*L. nobilis*	Alexandria	May,1997
	A. citrina	*Citrus* sp.	Qalyubiya	March,1998
	A. aurantii	*Rosa* sp.	Cairo	Aug.,1999
	H. latania	*M. indica*	Behira	Sep.,1997
	H. latania	*M. indica*	Sharqiya	Oct.,1999
	H. latania	*Olea* sp.	Ismailia	March,1998
A.chilensis	*A. hedrae*	*P. malus*	Alexandria	Oct.,1997

Table (2): Cont'd.

species	Diaspidid species	Host plant	Distribution	Date
	C. dictyospermi	*F. nitida*	Minya	Dec.,1996
	C. dictyospermi	*P. guajava*	Minya	Sep.,1998
	D. echinocati	*Cactus* sp.	Qalyubiya	Dec.,1998
	H. latania	*M. indica*	Ismailia	Aug.,1997
A. chrysomphali	*A. aurantii*	*Citrus* sp.	Kafr El- Shikh	Feb.,1997
	C. dictyospermi	*F. nitida*	Qalyubiya	Nov.,1996 Dec.,1997
	L. beckii	*M. indica*	Garbiya	Jan.,1997
	L. floridana	*F. nitida*	Qalyubiya	Dec.,1998
	Parlatoria ziziphi (Lucas)	*Citrus* sp.	Giza	March,1998
A. coheni	*A. aurantii*	*Citrus* sp.	Alexandria	Dec.,1996
	A. aurantii	*P. oleae*	Arish	Oct .,1998
	A. aurantii	*F. carica*	Northern Coast	Nov.,1998
A. diaspidis	*A. aurantii*	*C. sinensis*	Behira	Sep.,1997
	A. aurantii	*Olea* sp.	Alexandria	March,1997
	A. aurantii	*P. communis*	Qalyubiya	Sep.,1998

Table (2): Cont'd.

species	Diaspidid species	Host plant	Distribution	Date
	A. nerii	*Oleander* sp.	Giza	Aug.,1998
	D. echinocacti	*Cactus* sp.	Beni-Suef	Feb.,1997
	H. latania	*Cactus* sp.	Minufiya	Jan.,1998
	H.latania	*M. indica*	Sharqiya	Sep.,1998
	H. latania	*P. guajava*	Alexandria	July,1997
	L. beckii	*C. sinensis*	Alexandria	Dec. ,1996
	P. oleae	*F. nitida*	Assiut	Dec.,1998
	P. oleae	*F. nitida*	Kafr El- Shikh	Feb.,1997
	P. oleae	*Olea* sp.	Northern Coast	April,1998
	P. oleae	*Oleander* sp.	Giza	Aug.,1998
	P. oleae	*P. armeniaca*	Ismailia	Jan.,1998
	P. oleae	*P.communis*	Qalyubiya Minufiya	Sep.,1997
	P. oleae	*Rosa* sp.	Cairo	Aug.,1999
A. hispanicus	*P.oleae*	*Olea* sp.	Matruh	March,1998
	P. oleae	*P. malus*	Sharqiya	May,1997

Table (2): Cont'd.

species	Diaspidid species	Host plant	Distribution	Date
	C. dictyospermi	*F. nitida*	Sharqiya	Oct.,1998
	C. dictyospermi	*F. nitida*	Qalyubiya	Dec.,1998
	Insulapis pallidula (Green)	*M. indica*	Suez	July,1997
	I. pallidula	*M. indica*	Ismailia	Dec.,1997
A.holoxanthus	*C. aonidum*	*Citrus* sp.	Giza	Jan.,1997
	C. aonidum	*Citrus* sp.	Beni- Suef	Dec.,1997
A. lepidosaphes	*L. beckii*	*M. indica*	Ismailia	March,1997
	L. beckii	*M. indica*	Sharqiya	Oct.,1998
	L. beckii	*M. indica*	Minufiya	Jan.,1998
	L. beckii	*M. indica*	Behira	Feb.,1997
	L. beckii	*M. indica*	Daqahliya	March, 1998
	L. beckii	*C. sinensis*	Beni-Suef	Feb.,1997
	L. beckii	*C.sinensis*	Alexandria	July,1997
A. libanicus	*L. riccae*	*Olea* sp.	Fayoum	June,1997
A. lingnanensis	*A. aurantii*	*F. nitida*	Giza	Dec.,1996

Table (2): Cont'd.

species	Diaspidid species	Host plant	Distribution	Date
A. melinus	*A. aurantii*	*P. communis*	Qalyubiya	Sep.,1998
	A. nerii	*Oleander* sp.	Giza	Aug.,1998
	C. aonidum	*Citrus* sp.	Qalyubiya	Dec.,1998
	C. dictyospermi	*F. nitida*	Cairo	Aug.,1999
	H. latania	*M. indica*	Behira	Sep.,1997
	I. pallidula	*M. indica*	Sharqiya	Sep.,1998
	P. ziziphi	*Citrus* sp.	Giza	March,1998
	P. pentagona	*P. vulgaris*	Alexandria	May,1997
	A. aurantii	*F. nitida*	Giza	March,1998
	A. aurantii	*Citrus* sp.	Minya	Jan.,1997
	A. citrina	*Rosa* sp.	Alexandria	Sep., 1998
	A. nerii	*Oleander* sp.	Giza	Aug.,1998
	D. echinocacti	*Cactus* sp.	Beni – Suef	Feb.,1997

Table (2): Cont'd.

species	Diaspidid species	Host plant	Distribution	Date
	H. latamia	*P. guajava*	Alexandria	Sep.,1998
A. mytilaspidis	*Chionaspis stantophri* Cooley	*Imperta cylindrica*	Fayoum	Apr.,1997
	H. latania	*M. indica*	Alexandria	Sep.,1998
	H. latania	*M. indica*	Ismailia	Aug.,1997
	H. latania	*M. indica*	Sharqiya	Sep.,1997
	Lepidosaphes ficus (Signoret)	*F. carica*	Matruh	July,1998
	L. ulmi	*F. carica*	Northern Coast	July,1997
		Lebbak sp.	Minya	Nov.,1997
		V. vinifera	Beni- Suef	July,1998
	P. oleae	*P. armeniaca*	Qalyubiya	Nov.,1996
A. opuntiae	*A. aurantii*	*P. communis*	Qalyubiya	Sep.,1998
	A. aurantii	*P. communis*	Arish	Nov.,1997
	A. aurantii	*P. guaiava*	Alexandria	Aug.,1997

Table (2): Cont'd.

species	Diaspidid species	Host plant	Distribution	Date
	A. aurantii	*P. guajava*	Giza	Sep.,1998
	H. latania	*M. indica*	Ismailia	Aug.,1997
	H. latania	*M. indica*	Behira	Sep.,1997
	H. latania	*M. indica*	Sharqiya	Oct.,1999
A. paramaculicornis	*D. echinocacti*	*Cactus* sp.	Beni- Suef	Feb.,1998
	D. echinocacti	*Opuntia* sp.	Beni -Suef	March,1997
	L. ulmi	*V. vinifera*	Beni- Suef	June,1997
	P. oleae	*Olea* sp.	Northern Coast	Dec., 1996
	P. oleae	*P.communis*	Ismailia	Aug.,1997
	P. oleae	*P. malus*	Fayoum	June,1998
A. philippinensis	*C. aonidum*	*Jasminum* sp.	Giza	Dec.,1996
	Quadraspidiotus pyri (Lichtenstein)	*F.carica*	Minufiya	June,1997

Table (2): Cont'd.

species	Diaspidid species	Host plant	Distribution	Date
A. phoenicis	*P. blanchardi*	*P. dactylifera*	Beni-Suef	Jan.,1998
	P. blanchardi	*P. dactylifera*	Arish	Nov.,1997
	P. blanchardi	*P. dactylifera*	Ismailia	Sep.,1998
A. vandenboshi	*A. nerii*	*Oleander* sp.	Qalyubiya	Jan.,1997

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.

The study of the hosts and distribution of genus *Aphytis* in Egypt was first begun by Preisner and Hosny (1940). They recorded ten armored scale insects associated with four species of *Aphytis* on 14 host plants in different localities in Egypt. Since then, a further three species have been recorded along with their host plants and distribution, mostly in economic literature (i. e. Abdel-Fattah and El-Saadany (1979), Moursi and Hegazi (1983), Moursi and Mesbah (1985) and Hafez *et al.* (1987a).

A. lepidosaphes was recorded for the first time in Egypt by Abdel-Fattah and El-Saadany (1979). It is an effective parasitoid of *L. beckii* on *Citrus* sp. in Alexandria (Hafez *et al.*, 1987b).

During this study, *A. lepidosaphes* and its armored scale insect hosts were collected in seven governorates (Alexandria, Behira, Beni-Suef, Daqahliya, Ismailia, Min.ufiyaand Sharqiya) on two host plants, *Citrus* sp. and *M. indica*.

Preisner and Hosny (1940) recorded *A. diaspidis* associated with *P. oleae* on five host plants all over the Delta and in Qena. Later, Hafez (1988) recorded this species associated with *A. aurantii* on *Citrus* sp. in Alexandria. During this work, four host species of armored scale insects of *A. diaspidis* have been newly recorded, namely *A. nerii*, *H. latania*, *Hemiberlesia* sp. and *D. echinocacti* in Beni-Suef, Giza, Min.ufiyaand Sharqiya. These were found on *Cactus* sp., *Oleander* sp., *M. indica*and *F. nitida*, respectively.

A. mytilaspidis was recorded for the first time in Egypt by Preisner and Hosny (1940) associated with seven armored scale insects on nine host plants in Fayoum, Min.yaand all over the Nile Delta.

In the present work, two host species of armored scale insects are new records for *A. mytilaspidis* namely, *A. lauri* and *C. stantophri*.

Moursi and Hegazi (1983) and Moursi and Mesbah (1985) observed the important role of *Aphytis* sp. in controlling *L. riccae* in Egypt on *Olea* sp. In the present work the specific *Aphytis* species was identified as *A. libanicus*and was collected in Fayoum.

Hafez (1988) mentioned that *A. hispanicus* infested *L. beckii* in Alexandria. During the present work this species was recorded on three new species of armored scale insects, namely *P. oleae, C. dictyospermi, I. Pallidula*. These were found on *Olea* sp., *P. communis, F. nitida* and *M. indica* in Matruh, Sharqiya, Qalyubiya, Suez and Assiut, respectively.

No systematic countryside survey of hosts and distribution of genus *Aphytis* has been conducted in Egypt, therefore, the hosts and distribution of *A. africanus*, *A. aonidiae*, *A. chilensis*, *A. holxanthus*, *A. libanicus*, *A. opuntiae*, *A. paramaculicornis*, *A. philippinensis*, *A. phoenicis*and *A. vandenboshi* (Table 2) are all recorded here for the first time in Egypt.

1. 2. Taxonomy:

Order Hymenoptera

Suborder Apocrita

Superfamily Chalcidoidea

Family Aphelinidae

Genus *Aphytis* Howard

In Egypt, no work previously carried out on the taxonomy of genus *Aphytis* (Fig. 1). Therefore the main purpose of the present work is to collect, describe and revise the species of genus *Aphytis* as known to occur in Egypt.

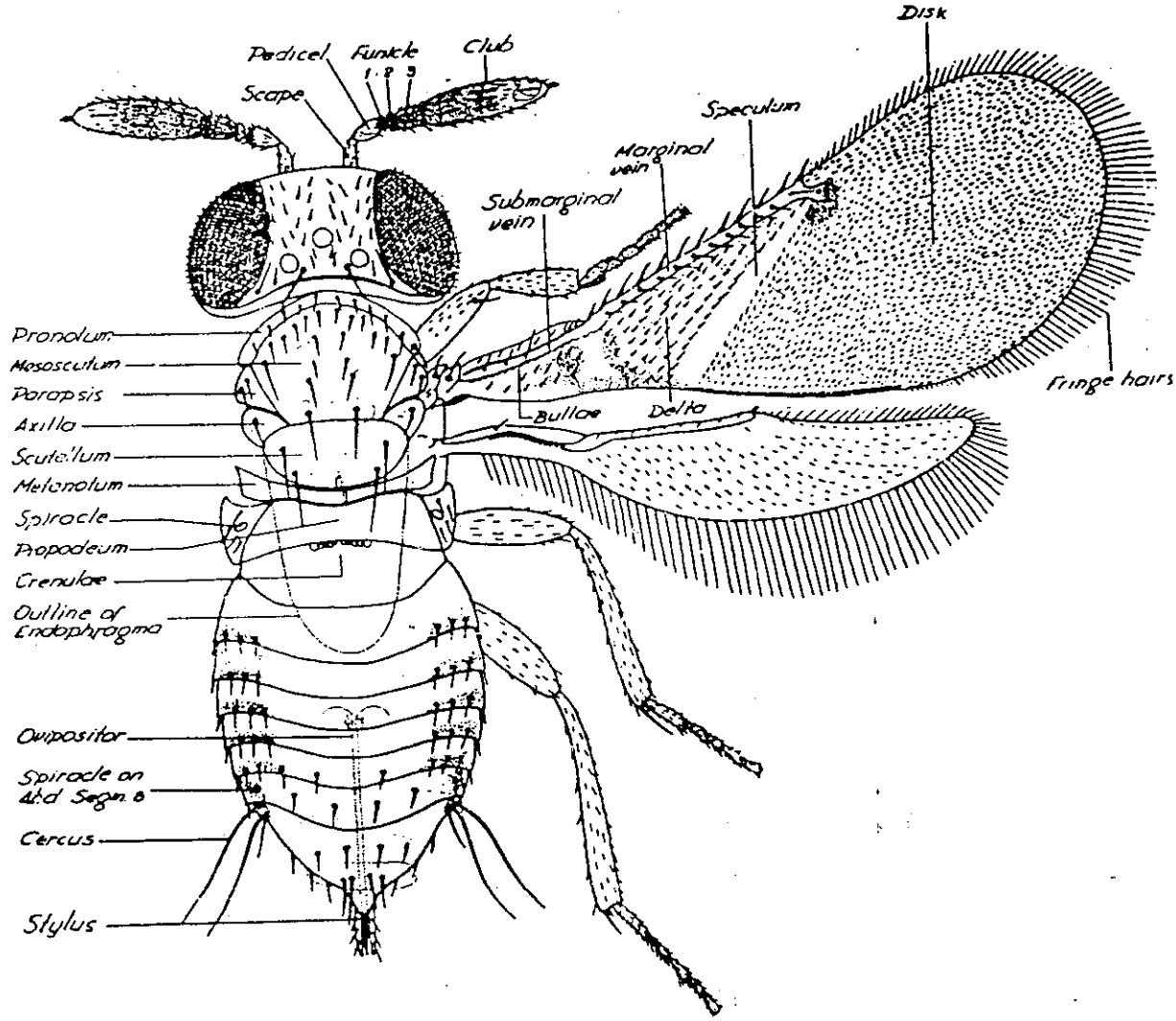


Fig. (1) : General morphology of genus *Aphytis* (after Rosen and DeBach, 1

This work is planned to throw light upon the high level of the *Aphytis* species categories as recently going on key is here constructed to helpin differentiation among the species under consideration. The following key deals with 18 species collected from different localities from Egypt.

Key to *Aphytis* species attacking armored scale insects in Egypt:

1. Female and male antennae 6-segmented, first funicle segment not triangular..... 2

   .Female antennae 6-segmented, first funicle segment triangular, setae on head and thorax readily visble, male antennae 4-segmented..... *Aphytis chilensis* Howard 3

2 (1). Head with a distinct black bars and margins..... 3

   .Head without black bars and margins..... 7

3 (2). Biparental species..... 4

   . Uniparental species..... 5

4 (3). Antennal club about 3 times as long as wide.....

   .....*Aphytis parameculicornis* DeBach and Rosen

   . Antennal club less than three tims as long as wide.....

   ..... *Aphytis philippinensis* DeBach and Rosen

5 (3). Club 7 sensilla..... *Aphytis diaspidis* (Howard)

   .Club 6 sensilla..... 6

6 (5). Mesoscutum 11 setae, propodeum 0.7 as long as scutellum, 3 times as long as metanotum.....

   ..... *Aphytis vandenboshi* DeBach and Rosen

   .Mesoscutum 13 setae, propodeum 0.6 as long as scutellum, 4 times as long as metanotum.....

   .....*Aphytis hispanicus* (Mercet)

7(2). Propodeal crenulae large and overlapping..... 8

.Propodeal crenulae either large but not overlapping or small..... 12

8(7). Thoracic sterna dusky..... 9

.Thoracic sterna immaculate..... 11

9(8). Club 3. 2 times as long as wide..... 10

.....*Aphytis coheni* DeBach. Club 3 times as long as wide

10 (9). Mesoscutum 12 setae, ovipositor 1.5 times as long as midtibia..... *Aphytis africanus* Qudenau

.Mesoscutum 10 setae, ovipositor 1.9 times as long as midtibia..... *Aphytis lingnanensis* Compere

11(8). Club 3.4 to fully 4 times as long as wide.....

.....*Aphytis melinus* DeBach

.Club not more than 3.5 times as long as wide.....

.....*Aphytis holoxanthus* DeBach

12 (7). Thoracic satae dark, propodeum short..... 13

.Thoracic setae paler, propodeum long..... 17

13 (12). Thoracic sterna dusky..... 14

. Thoracic sterna immaculate..... 15

14 (13). Pale, margins of scutellum, propodeum, crenulae infuscate..... *Aphytis mytilaspidis* (Le Baron)

.Dark, margins of scutellum, propodeum, crenulae strongly infuscate.....*Aphytis opuntiae* (Merect)

15 (13). Pale yellow, posterior margin of scutellum narrowly lined with blackish or fuscous, thoracic setae very dark... 16

.Entirely pale yellow, posterior margin of scutellum concolorous, thoracic setae some what paler.....

.....*Aphytis libanicus* Traboulsi

16 (15). Ovipositor 1.6 times as long as midtibia, 4.6 times as long as sheath..... *Aphytis aonidiae* (Mercet)

. Ovipositor 1.9 times as long as midtibia, 3.9 times as long as sheath..... *Aphytis phoencis* DeBach and Rosen

17 (12). Mesoscutum with 10 setae, propodeum 6 times as long as metanotum, 0.7 length of scutellum.....

..... *Aphytis chrysomphali* (Mercet)

. Mesoscutum with 12 setae, propodeum 4.5 times as long as metanotum, 0.6 length of scutellum.....

..... *Aphytis lepidosaphes* Compere

Aphytis africanus Quednau

(Fig. 2)

Aphytis africanus Quednau, 1964, J. Entomol. Soc. S. 27:112-113

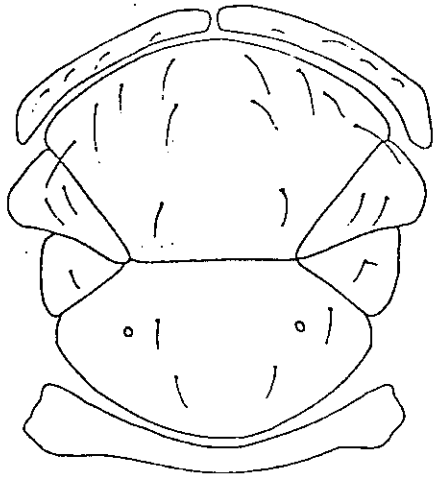
Description:

Female:

Color: Thoracic sterna dusky, mesoscutum and the furca fuscous, the surrounding plates pale.Length 0.75mm.

Head: Without black bars and margins, mandibles well developed with 2 denticles and a dorsal truncation, palpi 2-segmented, labial palpi 1-segmented. Antennae 6-segmented, antennal scape 5.4 times as long as wide, 1.3 times as long as club; pedicel 2 times as long as wide, 1.3 times as long as third funcil segment (F_3); first funcil segment (F_1) 0.8 times as long as wide; second funcil segment (F_2) 0.6 times as long as wide; F_3 1.3 times as long as wide, 0.4 times as long as club, one sensillum; club 3 times as long as wide and 4 sensilla.

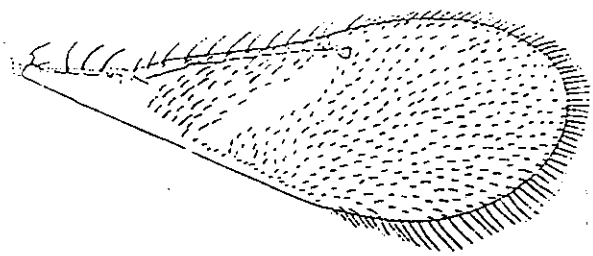
Thorax: Mesoscutum 12 setae, 1.3 times as long as scutellum; parapsis 4 setae; axilla 2 setae, scutellum 4 setae, 1.7 times as long as propodeum; metanotum as long as apodeme. Forewing 2.7 times as long



A

B

C



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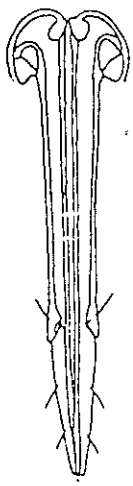

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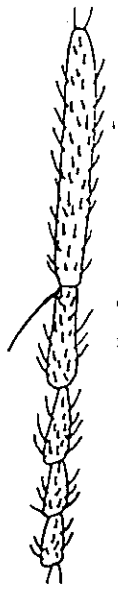


F

Fig. (2) : *Aphytis africanus* Quednau. Adult female : A, thorax and metanotum; B, antenna; C, propodeum and crenulae; D, forewing; E, ovipositor; F, tibial spur and basitarsus.

as wide, marginal vein 11 setae, submarginal vein 3 setae, 14 bullae, delta 47 setae in 5 rows, marginal fringe 0.2 times as long as the width of disk. Basitarsus 1.4 times as long as midtibial spur and midtibia 2.3 times as long as sheath, 0.7 times as long as ovipositor.

Gaster: Propodeum 0.6 times as long as scutellum, 4.6 times as long as metanotum, overlapping 6 crenulae. Ovipositor 1.5 times as long as midtibia, 3.7 times as long as sheath; sheath 0.4 times as long as midtibia. Tergite VII 2 setae, tergite VIII 4 setaeand syntergum 5-6 setae.

Male:

Similar to the female, but different in pedicel about 1.6 times as long as wide, F_3 1.2 longitudinal sensilla; club 2.3 longitudinal sensilla; mesoscutum 10 setae; marginal vein with 8-10 setae.Length 0.60 mm.

Species group placement: Lingnanensis

Material examined: Specimens (20 slides, males and females), Qalyubiya; associated with *A. aurantii* on *Citrus* sp. V.23.1997.

Comments: *A. africanus* recorded here for the first time in Egypt associated with *A. aurantii* on *Citrus* sp. This species can be readily distinguished from *A. lingnanensis* by 3 setae on submarginal vein.

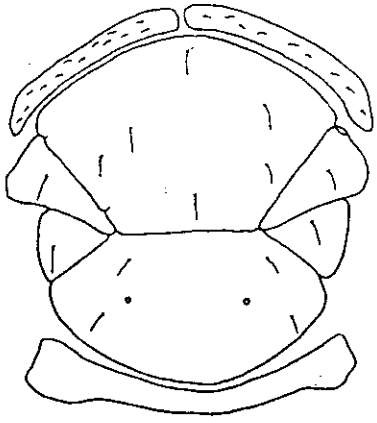
Aphytis aonidiae (Mercet)

(Fig. 3)

Aphelinus aonidiae Mercet 1911, Bd. R. Soc. Espan.Hist Nat., 11: 511-514.

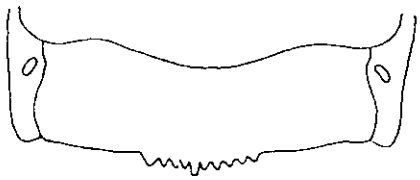
Aphelinus aonidiae Mercet, 1912, Trab.Mus.Cienc.Nat.Madrid, 10: 63-67.

Aphytis aonidiae Mercet, 1930, Rev. Biol. Forest.Limmol; Ser.B, 2:51. Mercet, 1932, Eos, 8: 360: Compere, 1955, Univ. Calif. Publ. Entomol.



A

B



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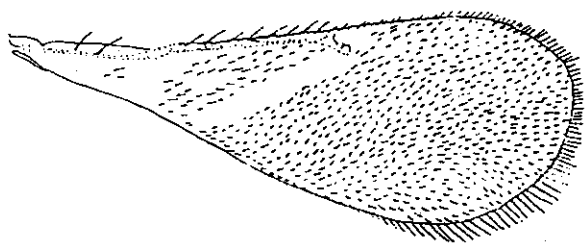

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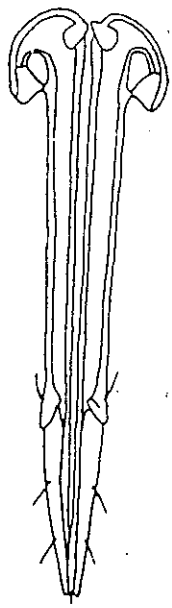


E

F

Fig. (3) : *Aphytis aonidiae* (Mercet). Adult female : A, thorax and metanotum; B, antenna; C, propodeum and crenulae; D, forewing; E, ovipositor; F, tibial spur and basitarsus.

Aphytis dubius: Compere, 1955, Univ. Calif. Publ. Entomol., 10: 310.

Aphytis (Prospahelinus) *dubius* var. *intermedia* DeSantis 1948, Rev. Mus. LaPlata, Zool. (N.S.), 5:129-130.

Aphytis citrinus Compere, 1955, Univ. Calif. Publ. Entomol.10:312-313.

Aphytis citrinus: Peak, 1963, Canad.Entomol. Suppl.30: 249.

Description:

Female:

Color: Body pale yellow. Thoracic setae very dark and posterior margin of scutellum narrowly lined with blackish or fuscous. Length. 0.60mm.

Head: Without black bars and margins, mandibles well developed with 2 denticles, max.illary palpi 2-segmented, labial palpi 1-segmented. Antennae 6-segmented, antennal scape 4.2 times as long as wide,1.3 times as long as F_3; F_1 0.8 times as long as wide; F_2 0.5 times as long as wide, F_3 1.2 times as long as wide, 0.5 times as long as club, one sensillum; club 2.2 times as long as wide and 6 sensilla.

Thorax: Mesoscutum 6 setae, 1.3 times as long as scutellum; parapsis 2 setae, axilla 2 setae; scutellum 4 setae, 1.3 times as long as propodeum; metanotum about 0.9 as long as apodeme. Forewing 2.6 times as long as wide, marginal vein 8 setae, submarginal vein 2 setae, 14 bullae, delta 49 setae in 5 rows, marginal fringe 0.2 as long as the width of disk. Basitarsus1.1 times as long as midtibial spur and midtibia 2.9 tiines as long as sheath, 0.7 as long as ovipositor.

Gaster: Propodeum short, 0.7 as long as scutellum, 5 times as long as metanotum, non-overlapping 10 crenulae, Ovipositor 1.6 times as long as midtibia, 4.6 times as long as sheath; sheath 0.35 as long as midtibia. Tergite VII 2 setae, tergite VIII 4 setaeand syntergum 5 setae.

Male:

Unkown.

Species group placement: Mytilaspidis.

Material examined: Specimens (7 slides, females), Alexandria; associated with *A. lauri* on *L. nobilis*, V.15.1997.

Comments: *A. aonidiae* recorded here for the first time in Egypt associated with *A. lauri* on *L. nobilis*. This species can be readily distinguished from the Egyptian *Aphytis* by the distinction that each parapsis has only one seta.

Aphytis chilensis Howard

(Fig. 4)

Aphytis chilensis Howard, 1900, Canad. Entomol., 32: 188.

Apehlinus longiclavae Mercet, 1911, Assoc. Españ.Prog.Crenc.Congr. Valencia,5:188.

Trichogrammatoidea signiphoroides Brethes, 1913, An. Mus. Nac. Nat. Buenos Aires,24:99-100.

Aphelinus Capitis Rust, 1915, Entomol.News, 26: 73-74.

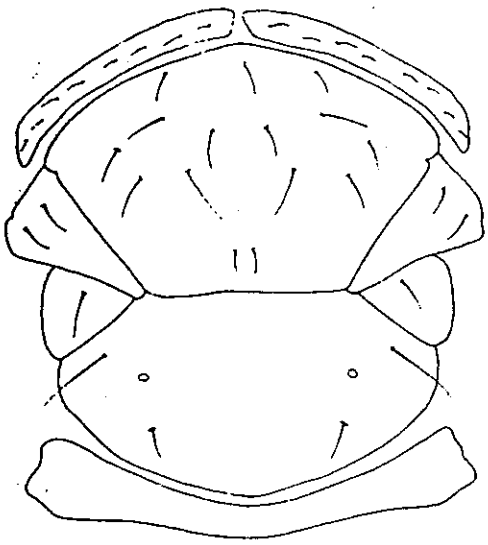
Aphelinus signiphoroides Brethes, 1916, An. Mus. Nac. Hist.Nat.Buenos Aires, 27: 429.

Aphytis riadi Delucchi, 1964, Rev. Path.Veg.Entomol. Agr., Fr. 43: 136-139.

Description:

Female:

Color: Body pale yellowish and transverse strongly pigmented black bar on occiput. The pupae are uniformly black ventrally. The meconial pellets 8-10 in number are unusual, almost square, distributed in two chairs along the slide of the pupae. Length: 0.90mm.



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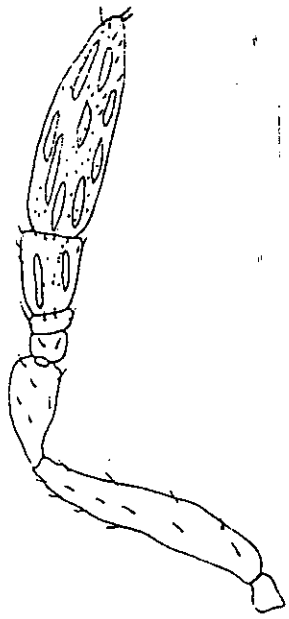

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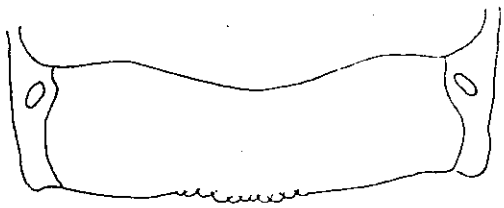

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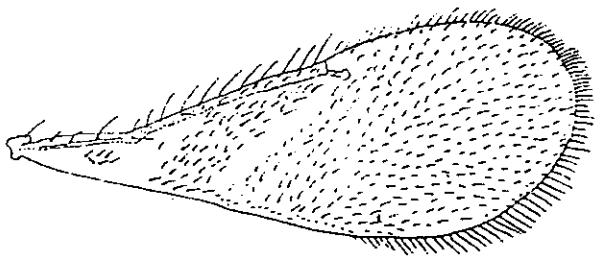

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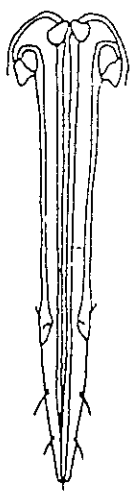

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Fig. (4) : *Aphytis chilensis* Howard. Adult female : A, thorax and metanotum; B, antenna; C, propodeum and crenulae; D, forewing; E, ovipositor; F, tibial spur and basitarsus.

Head: Mandibles well developed with 2 denticles and a dorsal truncation, max.illary palpi 2-segmented, labial palpi 1-segmented. Male antennae 4-segmented, antennal scape 4.6 times as long as wide, 1.1 times as long as club; pedicel 1.8 times as long as wide, 1.3 times as long as F_3; F_1 0.6 as long as wide; F_2 0.7 as long as wide; F_3 1.4 times as long as wide, 0.3 as long as club, 2 sensilla; club 3.4 times as long as wide and 9 sensilla. Setae on head readily visible.

Thorax: Mesoscutum 15 setae, 1.2 times as long as scutellum; parapsis 4 setae; axilla 2 setae; scutellum 4 setae; 1.8 times as long as propodeum; metanotum about as long as apodeme. Forewing 2.6 times as long as wide, marginal vein 11 setae, submarginal vein 3 setae, 17 bullae, delta 55 setae in 5 rows, marginal fringe 0.2 as long as the width of disk. Basitarsus 1.1 times as long as midtibial spur and midtibia 1.8 times as long as sheath, 0.6 as long as ovipositor.

Gaster: Propodeum 0.6 as long as scutellum, 3.5 times as long as metanotum, non-overlapping 11 crenulae. Ovipositor 1.6 times as long as midtibia, 3 times as long as sheath; sheath 0.53 as long as midtibia. Tergite VII 2-4 setae, tergite VIII 6-8 setacand syntergum 2-4 setae.

Male:

Similar to the female, different in the structure and coloration of antennae. Antennae 4-segmented, antennal scape pale and pedicel faintly dusky. Length 0.75mm.

Material examined: Specimens (20 slides, males and females), Minya; associated with *C. dictyospermi* on *F. nitida* X.11.1998.

Species group placement: Chilensis.

Comments: *A. chilensis* recorded in Algeria in North Africa and recorded here for the first time in Egypt associated with *H. latania* on *M. indica*. This species can be readily distinguished from other Egyptian *Aphytis* species by the male antennae, which are 4-segmented.

Aphytis chrysomphali (Mercet)

(Fig. 5)

Aphelinus chrysomphali Mercet, 1913, Bol. R. Soc.Españ.Hist.Nat.,18: 135-140.

Aphelinus quaylei Rust, 1915, Entomol.News, 26: 75.

Description:

Female:

Color: Body yellow and thoracic setae paler. Length 0.8mm.

Head: Without black bars and margins, mandibles well developed with 2 denticles and dorsal truncation, max.illary palpi 2-segmented, labial palpi 1-segmented. Antennae 6-segmented, antennal scape 5.8 times as long as wide, 1.1 times as long as club; pedicel 2.1 times as long as wide, 1.3 times as long as F_3; F_1 0.8 as long as wide; F_2 0.6 as long as wide; F_3 1.2 times as long as wide, 0.3 as long as club, 2 sensilla, club 3.5 times as long as wide and 6 sensilla.

Thorax: Mesoscutum 10 setae, 1.3 times as long as scutellum; parapsis 4 setae; axilla 2 setae; scutellum 4 setae, 1.5 times as long as propodeum; metanotum 0.8 as long as apodeme. Forewing 2.5 times as long as wide, marginal vein 10 setae, submarginal vein 2 setae, 15 bullae, delta 35 in 4 rows, marginal fringe 0.2 as long as the width of disk. Basitarsus nearly as long as midtibial spur and midtibia 1.9 times as long as sheath, 0.7 as long as ovipositor.

Gaster: Propodeum 0.7 as long as scutellum, 6 times as long as metanotum, non-overlapping 13 crenulae. Ovipositor 1.7 times as long as midtibia, 2.9 times as long as sheath; sheath 0.5 as long as midtibia. Tergite VII 2 setae, tergite VII 4 setaeand syntergym 6 setae.

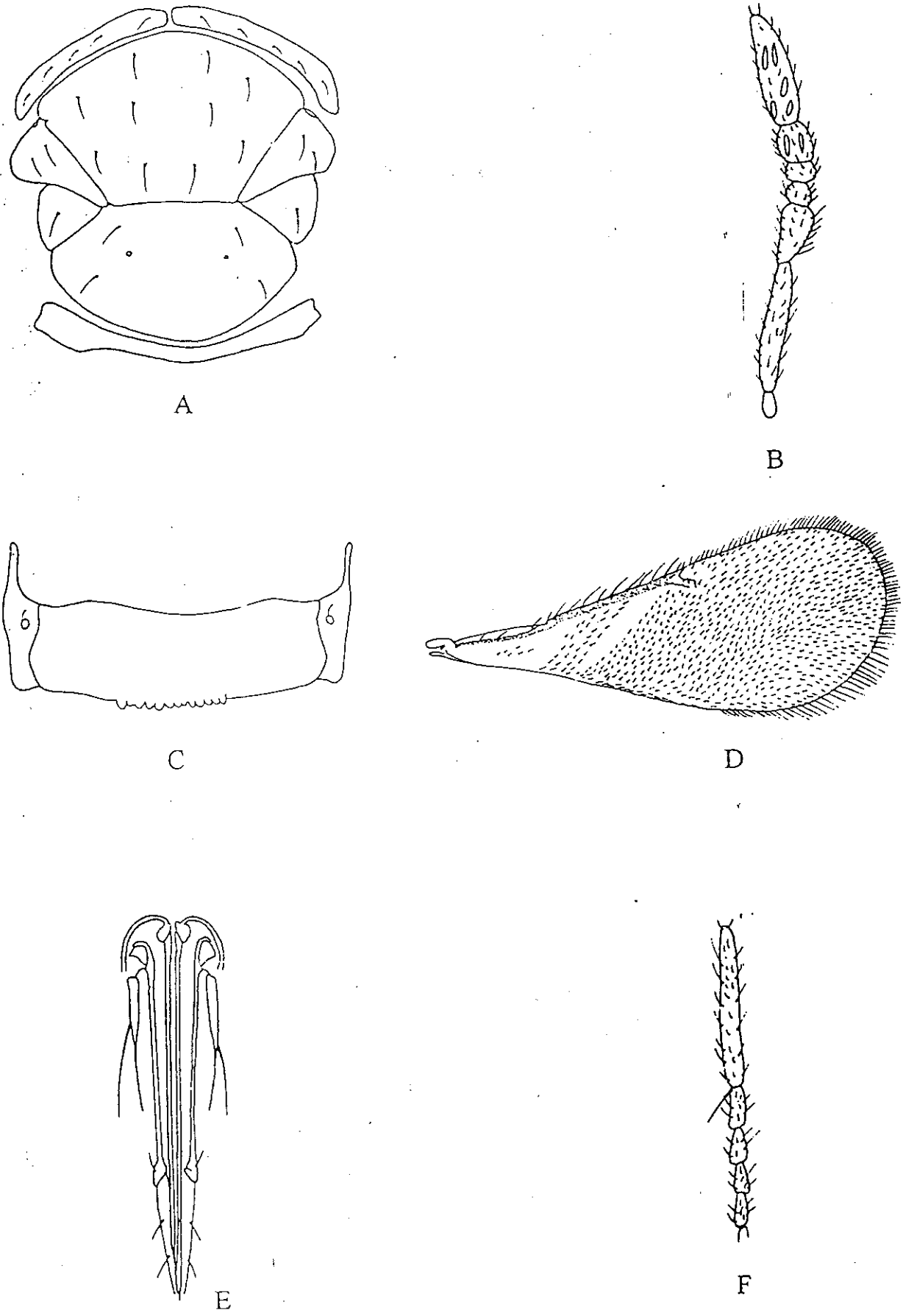


Fig. (5) : *Aphytis chrysomphali* (Mercet). Adult female : A, thorax and metanotum; B, antenna; C, propodeum and crenulae; D, forewing; E, ovipositor; F, tibial spur and basitarsus.

Male:

Similar to the female; differing mainly in the antennal scape, which is 5 times as long as wide, pedicel 1.6 times as long as wideand club short. Length 0.65mm.

Species group placement: Chrysomphali.

Material examined: Specimens (20 slides, males and females), Qalyubiya; associated with *C. dictyospermi* on *F. nitida* III.15.1997.

Comments: *A. chyrsomphali* recorded for the first time in Egypt by Priesner and Hosny (1940), associated with *A. aurantii* and *C. ficus* (both on *Citrus* sp.) with *Chrysomphalus personatus* (Comstock) on *M. indica*, with *P. oleae* on *Olea* sp. In the present work, it is associated with *P. ziziphi* on *Citrus* sp. in Giza. It differs from *A. lepidosaphes* in 12 setae on mesoscutum and scutellum 1.6 times as long as propodeum .

Aphytis coheni DeBach

(Fig. 6)

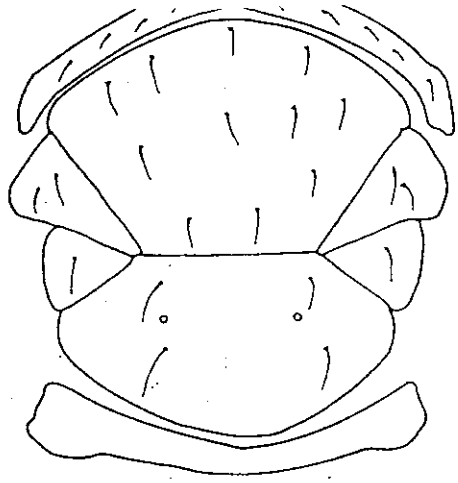
Aphytis coheni DeBach, 1960, Ann. Entomol. Soc. Amer., 53: 705

Description:

Female:

Color: Body yellow; thoracic sterna, pedicel, funicleand club distinctly dusky. Length 0.90mm.

Head: Without black bars and margins, mandibles well developed with 2 denticles and dorsal truncation, max.illary palpi 2-segmented, labial palpi 1-segmented. Antennae 6-segmented, antennal scape 5.4 times as long as wide, 1.4 times as long as club; pedicel; 1.7 times as long as wide, 1.2 times as long as F_3; F_1 0.8 as long as wide; F_2 0.6 as long as wide; F_3 1.5 times as long as wide, 0.5 as long as club, 2 sensilla; club 3.2 times as long as wide and 5 sensilla.



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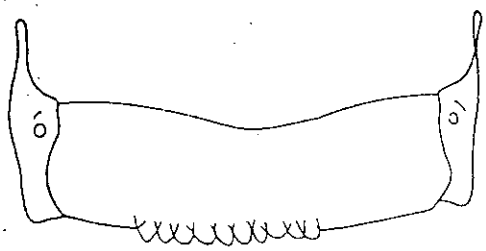

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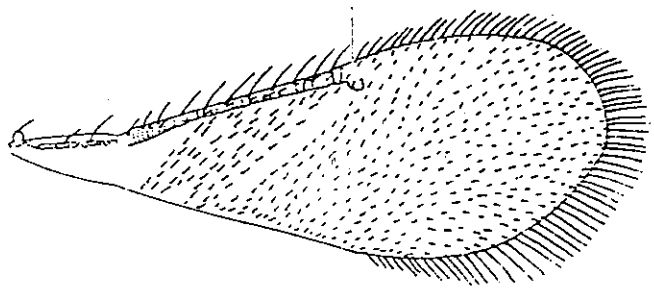

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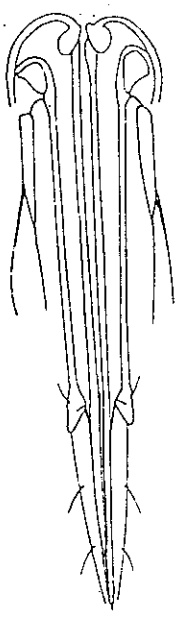

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Fig. (6) : *Aphytis coheni* DeBach. Adult female : A, thorax and metanotum; B, antenna; C, propodeum and crenulae; D, forewing; E, ovipositor; F, tibial spur and basitarsus.

Thorax: Mesoscutum 11 setae, 1.3 times as long as scutellum; parapsis 4 setae; axilla 2 setae; scutellum 4 setae, 1.3 times as long as propdeum; metanotum as long as apodeme. Forewing 2.6 times as long as wide, marginal vein 11 setae, submarginal vein 2 setae, 19 bullae, delta 55 setae in 6 rows, marginal fringe 0.2 as long as the width of disk. Basitarsus 1.3 times as long as midtibial spur and midtibia twice as long as sheath, 0.5 as long as ovipositor.

Gaster: Propodeum 0.8 as long as scutellum, 4.3 times as long as metanotum, overlapping 10 crenulae; ovipositor 1.9 times as long as midtibia, 3.2 times as long as sheath; sheath 0.5 as long as midtibia. Tergite VII 2 setae, tergite VIII 4 setaeand syntergum 5-8 setae.

Male:

Similar to the female, differing mainly in the number of delta setae (28-49). Length 0.79mm.

Species group placement: Lingnanensis.

Material examined: Specimens (20 slides, males and females), Alexandria; associated with *A. aurantii* on *Citrus* sp., XI.12.1998.

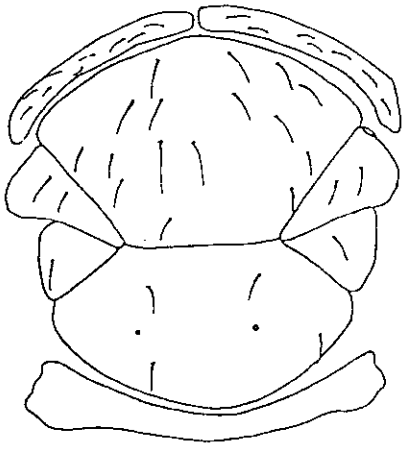
Comments: *A. coheni* recorded for the first time in Egypt by Hafez (1988) associated with *A. aurantii* on *Citrus* sp., but in this work, it is associated with *A. aurantii* on *Olea* sp. in Arish. It differs from *A. lingnanensis* by pronounced pigmentation of the thoracic sterna .

Aphytis diaspidis (Howard)

(Fig. 7)

Aphelinus diaspidis Howard, 1881, U.S. Commiss.Agr.Rept.for 1880, p.55.

Aphelinus fuscipennis Howard, 1881, U.S. Commiss. Agr. Ann. Rept. for 1880, p. 356.



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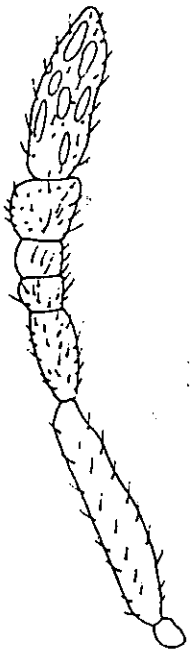

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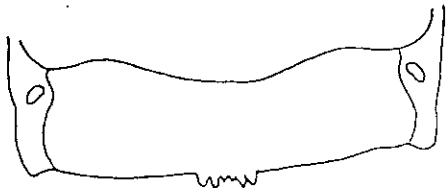

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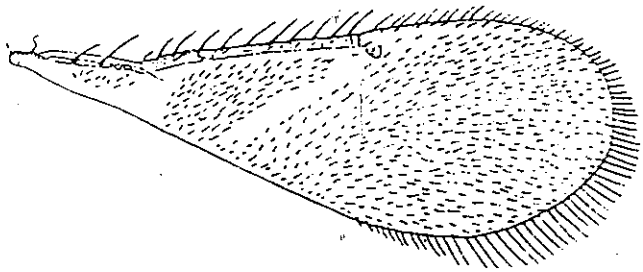

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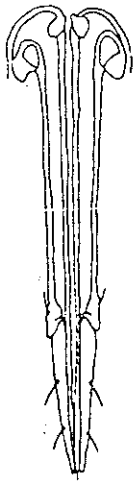

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Fig. (7) : *Aphytis diaspidis* (Howard). and Rosen. Adult female : A, thorax and metanotum; B, antenna; C, propodeum and crenulae; D, forewing; E, ovipositor; F, tibial spur and basitarsus.

Aphelinus ovidii Girault, 1919, Hymenoptera Chalcidoidea nova Australiensis. Priv. Publ. Brisbane, 3pp. page 1.

Aphytis opuntiae Risbec (née Mercet), 1952, Mem.Ins.Sci.Madagascar, Ser. E., 2: 150-152.

Prospaphelinus madagascariensis Risbec, 1952, Mem.Ins.Sci. Madagascar,Ser.E.,2:156-158.

Aphytis risbeci Annecke and Insley, 1971, S. Afr. Dep. Agr.Tech.Serv. Entomol.Mem.,23: 29 (new name for *A. opuntiae* Risbec).

Description:

Female:

Color: Body dark yellow, head blackish, mesoscutum infuscated. Length 1mm.

Head: With distinct black bars and margins, mandibles well developed, with 2 denticles and a dorsal truncation, max.illary palpi 2-segmented, labial palpi 1-segmented. Antennae 6-segmented, antennal scape 6 times as long as wide, 1.3 times as long as club; pedicel 1.8 times as long as wide, 1.5 times as long as F_3; F_1 0.8 as long as wide; F_2 0.7 as long as wide; F_3 1.1 times as long as wide, 0.3 as long as club, one sensillum; club 3 times as long as wide and 7 sensilla.

Thorax: Mesoscutum 16 setae, 1.3 times as long as scutellum; parapsis 4 setae; axilla 2 setae; scutellum 4 setae, 1.4 times as long as propodeum; metanotum slightly as long as apodeme. Forewing 2.6 times as long as wide, marginal vein 11 setae, submarginal vein 2 setae, 17 bullae, delta 75 setae in 7 rows, marginal fringe 0.2 as long as the width of disk. Basitarsus 1.2 times as long as midtibial spur and midtibia 2.4 times as long as sheath, 0.8 as long as ovipositor.

Gaster: Propodeum 0.8 as long as scutellum, 3 times as long as metanotum, non-overlapping 6 crenulae. Ovipositor 1.3 times as long as midtibia, 3.2 times as long as sheath; sheath 0.41 as long as midtibia. Tergite VII 4 setae, tergite VIII 8 setae and syntergum 12 setae.

Male:

Unknown.

Species group placement: Proclia

Material examined: Specimens (20 slides females), females), Northern Coast; associated with *P. oleae* on *Olea* sp., IV.4.1997.

Comments: *A. diaspidis* recorded for the first time in Egypt by Priesner and Hosny (1940), associated with *P. oleae* on *P. armeniaca* (apricot), *P. communis* (pear), *Rosa* sp. (rose), *Oleander* sp. and *F. nitida*, but in the present work, it is recorded on a new host plant (*Olea* sp.) but on the same host insect. According to Rosen and DeBach (1979) proclia group differs from other groups in the genus *Aphytis* by the distinct black bars and margins on the head. This species can be readily distinguished from the other members of proclia group in that the club has 7 sensilla .

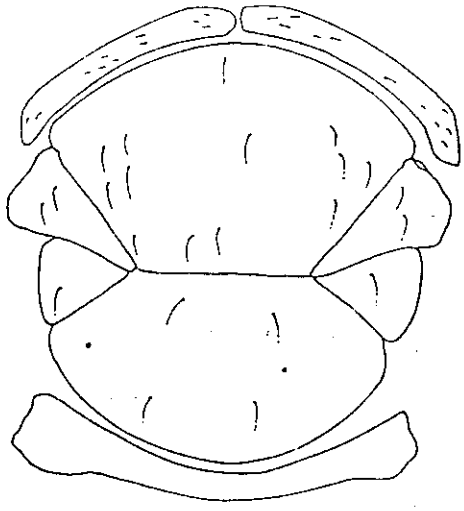
Aphytis hispanicus (Mercet)

(Fig. 8)

Aphelinus maculicornis var. *hispanica* Mercet, 1912, Trab.Mus.Oenc. Nat. Madrid, Ser.Zool.,10:81-82.

Aphelinus argentinus Brethes, 1916, An. Mus. Nac.Hist Nat.Buenos Aires, 27: 428-429.

Aphelinus bovelli Malenotti, 1918, Redia, 13: 78-81.



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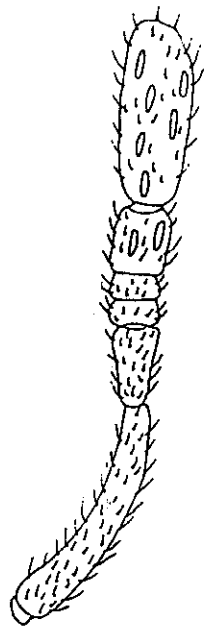

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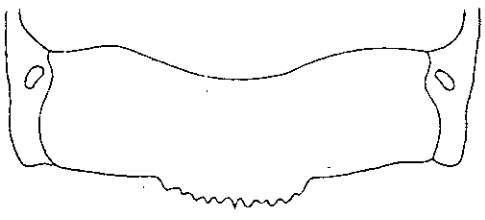

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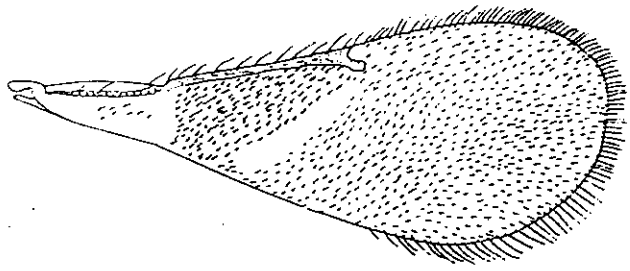

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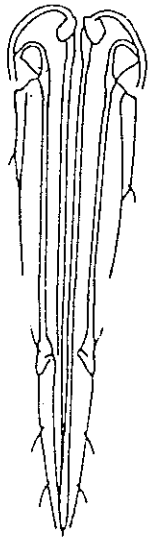

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Fig. (8) : *Aphytis hispanicus* (Mercet). Adult female : A, thorax and metanotum; B, antenna; C, propodeum and crenulae; D, forewing; E, ovipositor; F, tibial spur and basitarsus.

Description:

Female:

Color: Body pale yellow, antennal scape pale with longitudinal fuscous stripe, pedicel and funicel strongly infuscated and apical third of club blackish. Length 0.85mm.

Head: With distinct black bars and margins, mandibles well developed with 2 denticles and a dorsal truncation, maxillary palpi 2-segmented, labial palpi 1-segmented. Antennae 6-segmented, antennal scape 5.2 times as long as wide, 1.2 times as long as club; pedicel 1.8 times as long as wide, somewhat as long as F_3; F_1 0.7 as long as wide; F_2 0.4 as long as wide; F_3 1.5 times as long as wide, 0.4 as long as club, 2 sensilla; club 2.8 times as long as wide and 6 sensilla.

Thorax: Mesoscutum 13 setae, 1.2 times as long as scutellum; parapsis 4 setae; axilla 2 setae; scutellum 4 setae, 1.3 times as long as propodeum; metanotum the same length as apodeme. Forewing 2.7 times as long as wide, marginal vein 11 setae, submarginal vein 2 setae, 20 bullae, delta 143 setae in 10 rows, marginal fringe 0.3 as long as width of disk. Basitarsus 1.1 times as long as midtibial spur and midtibia 2.4 times as long as sheath, 0.7 as long as ovipositor.

Gaster: Propodeum 0.6 as long as scutellum, 4 times as long as metanotum, non-overlapping 11 crenulae. Ovipositor 1.5 times as long as midtibia, 3.7 times as long as sheath; sheath 0.41 as long as midtibia. Tergite VII 2-6 setae, tergite VIII 5-9 setae and syntergum 7-12 setae.

Male:

Unknown.

Species group placement: Proclia.

Material examined: Specimens (20 slides, females), Ismailia; associated with *I. pallidula* on *M. indica* III.14.1998.

Comments: *A. hispanicus* recorded for the first time in Egypt by Hafez (1984), associated with three armored scale insects attacking two host plants. This species can be readily distinguished from *A. paramaculicornis* and *A. vandenboshi* in 14 and 11 setae on mesoscutum and scutellum 1.4 and 1.5 as long as propodeum, respectively.

Aphytis holoxanthus DeBach

(Fig. 9)

Aphytis holoxanthus DeBach, 1960, Ann. Entomol.Soc.Amer., 53: 704-705.

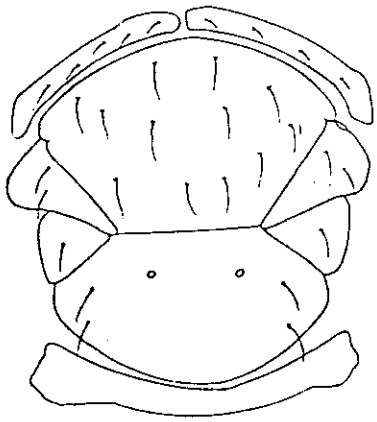
Description:

Female:

Color: Entirely yellow, thoracic sterna immaculate, a short black streak at base of the forewing. Length 0.95mm.

Head: Without black bars and margins, mandibles well developed with 2 denticles and dorsal truncation, max.illary palpi 2-segmented, labial palpi 1-segmented. Antennae 6-segmented, antennal scape 5 times as long as wide, 1.2 times as long as club; pedicel twice as long as wide, 1.4 times as long as 3 F_3; F_1 0.8 as long as wide; F_2 0.6 as long as wide; F_3 1.5 times as long as wide, 0.4 as long as club, 2 sensilla; club 3.2 times as long as wide and 5 sensilla.

Thorax: Mesoscutum 12 setae, 1.3 times as long as scutellum; parapsis 4 setae; axilla 2 setae; scutellum 4 setae, 1.3 times as long as propodeum; metanotum as long as apodeme. Forewing 2.5 times as long as wide, marginal vein 11 setae, submarginal vein 2 setae, 15 bullae, delta 38 setae in 5 rows, marginal fringe 0.1 as long as width of disk. Basitarsus nearly as long as midtibial spur and midtibia 1.8 times as long as sheath, 0.45 as long as ovipositor.



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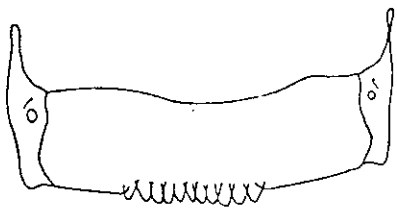
B



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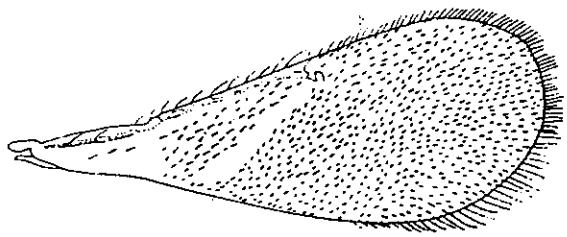

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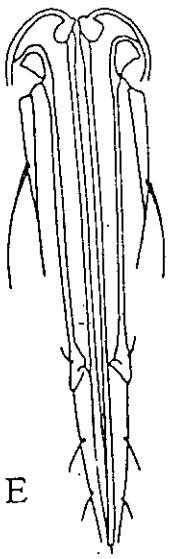

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Fig. (9) : *Aphytis holoxanthus* DeBach. Adult female : A, thorax and metanotum; B, antenna; C, propodeum and crenulae; D, forewing; E, ovipositor; F, tibial spur and basitarsus.

Gaster: Propodeum 0.7 as long as scutellum, 4.3 times as long as metanotum, overlapping 11 crenulae. Ovipositor 2.1 times as long as midtibia, 4 times as long as sheath; sheath 0.56 as long as midtibia. Tergite VII 2 setae, tergite VIII 4 setaeand syntergum 6 setae.

Male:

Similar to the female but different in club 2-3 sensilla and delta 24-33 setae. Length 0.80mm.

Species group placement: Lingnanensis.

Material examined: Specimens (20 slides, males and females), Giza; associated with *C. aonidum* on *Citrus* sp. XI.22.1998.

Comments: *A . holoxanthus* recorded in the present work for the first time associated with *C . aonidum* on *Citrus* sp . This species can be readily distinguished from *A. melinus* in pale setae on the thorax and head; antennal club long , slender and ovipositor , sheath short .

Aphytis lepidosaphes Compere

(Fig. 10)

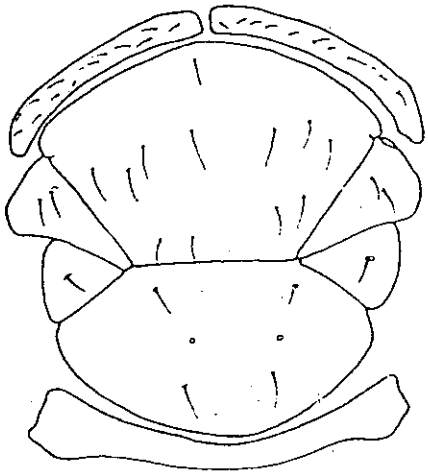
Aphytis lepidosaphes Compere, 1955, Univ. Calif. Publ. Entomol., 10: 307.

Description:

Female:

Color: Body yellow, thoracic setae paler. Thoracic sterna infuscated and scutellum lined with black. Length 1.0mm.

Head: Without black bars and margins, mandibles well developed with 2 denticles and a dorsal truncation, max.illary palpi 2-segmented, labial palpi 1-segmented. Antennae 6-segmented, antennal scape 5 times as long as wide, 1.7 times as long as club; pedicel 1.7 times as long as wide, 1.5 times as long as F_3; F_1 0.7 as long as wide; F_2 0.6 as long as



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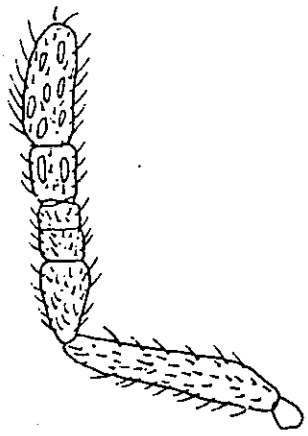

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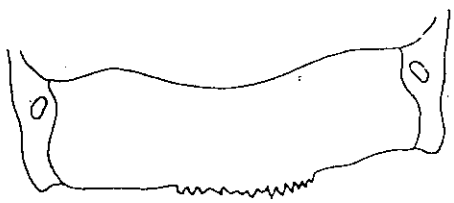

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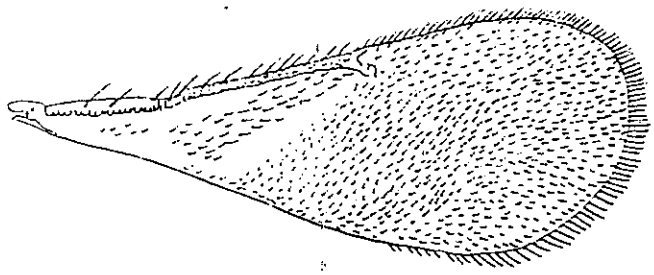

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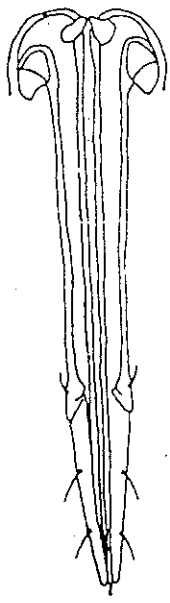

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Fig. (10) : *Aphytis lepidosapes* Compere. Adult female : A, thorax and metanotum; B, antenna; C, propodeum and crenulae; D, forewing; E, ovipositor; F, tibial spur and basitarsus.

wide; F_3 1.2 times as wide, 0.4 as long as club, 2 sensilla; club 2.8 times as long as wide and 7 sensilla.

Thorax: Mesoscutum 12 setae, 1.2 times as long as scutellum; parapsis 4 setae; axilla 2 setae; scutellum 4 setae; 1.6 times as long as propodeum; metanotum 1.1 times as long as apodeme. Forewing 2.6 times as long as wide, marginal vein 12 setae, submarginal vein 2 setae, 18 bullae, delta 44 setae in 4 rows, marginal fringe 0.1 as long as width of disk. Basitarsus 1.3 times as long as midtibial spur and midtibia 2.1 times as long as sheath, 0.6 as long as ovipositor.

Gaster: Propodeum 0.6 as long as scutellum, 4.5 times as long as metanotum, non-overlapping 12 crenulae; ovipositor 1.9 times as long as midtibia, 4 times as long as sheath; sheath 0.4 as long as midtibia. Tergite VII 2 setae, tergite VIII 4 setaeand syntergum 6 setae.

Male:

Similar to the female but different in club 3-5 sensilla, crenulae 6-11, delta 20-31 setae in 3-4 rows, marginal vein 8-10. Length 0.80mm.

Species group placement: Chrysomphali.

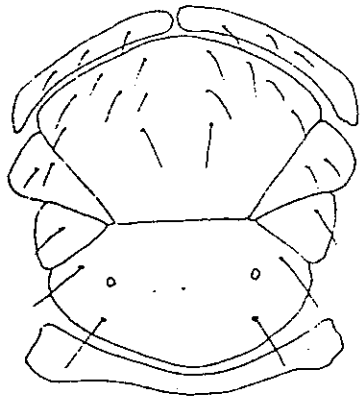
Material examined: Specimens (20 slides, males and females), Ismailia; associated with *L. beckii* on *M. indica* VI.1.1998.

Comments: *A. lepidosaphes* recorded for the first time in Egypt by Hafez (1984) associated with *L. beckii* on *C. sinenensis*. It differs from *A. chrysomphali* by the number of setae on mesoscutum and the relative length of propodeum, metanotum and scutellum. This species is characterized by specific host insects and plants.

Aphytis libanicus Traboulsi

(Fig. 11)

Aphytis libanicus T raboulsi, 1969, Ann. Soc. Entomol. Fr. (N.S.), 5: 66-67.



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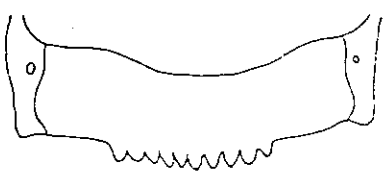

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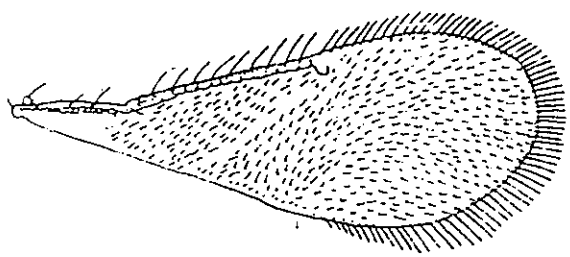

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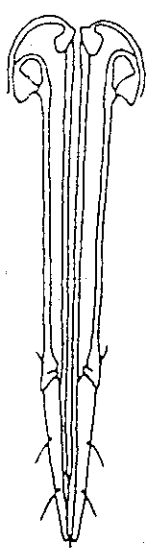

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Fig. (11) : *Aphytis libanicus* Traboulsi. Adult female : A, thorax and metanotum; B, antenna; C, propodeum and crenulae; D, forewing; E, ovipositor; F, tibial spur and basitarsus.

Description:

Female:

Color: Body yellow, without any fuscous markings and thoracic setae paler. Length 0.80mm.

Head: Without black bars and margins, mandibles well developed with 2 denticles and a dorsal truncation, max.illary palpi 2-segmented, labial palpi 1-segmented. Antennae 6-segmented, antennal scape 4.2 times as long as wide, 1.3 times as long as club; pedicel 1.6 times as long as wide, 1.1 times as long as F_3; F_1 0.7 as long as wide; F_2 0.5 as long as wide; F_3 1.2 times as long as wide, 0.4 as long as club, one sensillum; club 2.5 times as long as wide and 6 sensilla.

Thorax: Mesoscutum 11 setae, 1.3 times as long as scutellum; parapsis 4 setae, axilla 2 setae; scutellum 4 setae, 1.6 times as long as propodeum; metanotum the same length as apodeme. Forewing 2.5 times as long as wide, marginal vein 11 setae, submarginal vein 2 setae, 16 bullae, delta 42 setae in 5 rows, marginal fringe 0.2 as long as width of disk. Basitarsus 1.2 times as long as midtibial spur and midtibia 2.5 times as long as sheath, 0.6 as long as ovipositor.

Gaster: Propodeum 0.6 as long as scutellum, 4 times as long as metanotum, non-overlapping 10 crenulae. Ovipositor 1.8 times as long as midtibia, 4.5 times as long as sheath; sheath 0.4 as long as midtibia. Tergite VII 2 setae, tergite VIII 4 setaeand syntergum 5 setae.

Male:

Unknown.

Species group placement: Mytilaspidis.

Material examined: Specimens (15 slides, females), Fayoum; associated with *L. riccae* on *Olea* sp., XII.3.1996.

Comments: *A. libanicus* recorded here for the first time in Egypt associated with *L. riccae* on *Olea* sp. This species can be readily distinguished from *A. aonidiae* in thoracic sterna immaculate and thoracic setae very dark. It is also characterized by specific host plant and insect.

Aphytis lingnanensis Compere

(Fig. 12)

Aphytis lingnanensis Compere, 1955, Univ. Calif. Publ. Entomol., 10: 303-305.

Description:

Female:

Color: Body yellow, longitudinal of the furca blackish, posterior margin of scutellum lined with black and thoracic sterna dusky. Length 0.85mm.

Head: Without black bars and margins, mandibles well-developed with 2 denticles and a dorsal truncation, max.illary palpi 2-segmented, labial palpi 1-segmented. Antennae 6-segmented, antennal scape 5.6 times as long as wide, 1.2 times as long as club; pedicel 1.8 times as long as wide, 1.2 times as long as F_3; F_1 0.6 as long as wide; F_2 0.6 as long as wide; F_3 1.3 times as long as wide, 0.4 as long as club, 2 sensilla; club 3 times as long as wide and 7 sensilla.

Thorax: Mesoscutum 10 setae, 1.2 times as long as scutellum; parapsis 4 setae; axilla 2 setae; scutellum 4 setae, 1.4 times as long as propodeum; metanotum as long as apodeme. Forewing 2.6 times as long as wide, marginal vein 12 setae, submarginal vein 2 setae, 12 bullae, delta 40 setae in 5 rows, marginal fringe 0.1 as long as width of disk. Basitarsus 1.3 times as long as midtibial spur and midtibia 1.9 times as long as sheath, 0.52 as long as ovipositor.

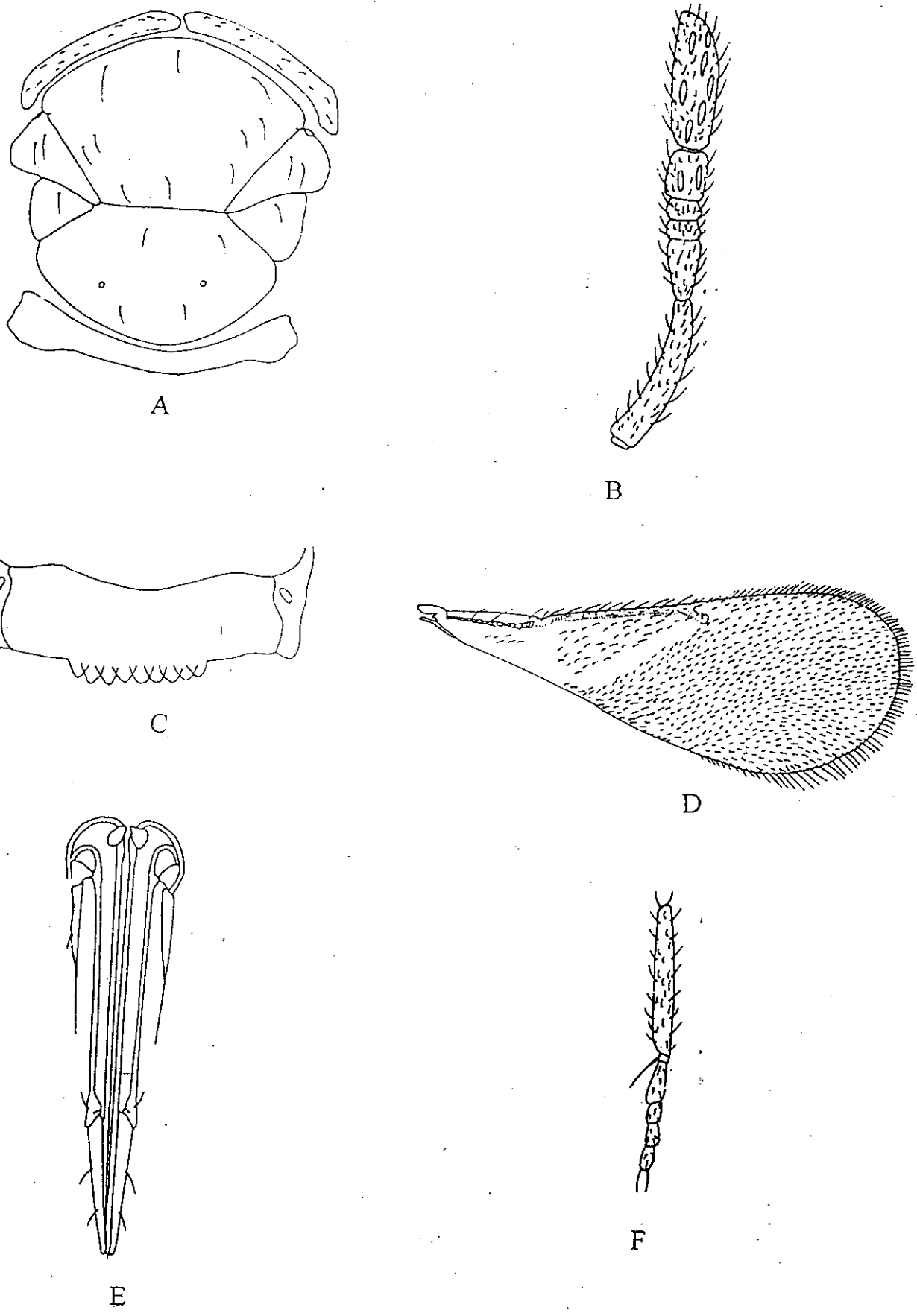


Fig. (12) : *Aphytis lingnanensis* Compere. Adult female : A, thorax and metanotum; B, antenna; C, propodeum and crenulae; D, forewing; E, ovipositor; F, tibial spur and basitarsus.

Gaster: Propodeum 0.7 as long as scutellum, 4.6 times as long as metanotum, overlapping 9 crenulae; ovipositor 1.9 times as long as midtibia, 3.7 times as long as sheath; sheath 0.51 as long as midtibia. Tergite VII 2 setae, tergite VIII 4 setae and syntergum 5-8 setae.

Male:

Similar to female, but differs in club (3-5 sensilla). Length 0.70mm.

Species group placement: Lingnanensis.

Material examined: Specimens (20 slides, males and females), Giza; associated with *A. aurantii on F. nitida* I.10.1997.

Comments: *A. lingnanensis* recorded for the first time in Egypt by Hafez (1984) associated *with A. aurantii* and *L. beckii* on Citrus sp. in Alexandria. It is distinguished from Egyptian *Aphytis* by strongly overlapping crenulae and long propodeum.

Aphytis melinus DeBach

(Fig. 13)

Aphytis melinus DeBach, 1959, Ann. Entomol. Soc. Amer., 52: 361-362.

Description:

Female:

Color: Body yellow and thoracic sterna immaculate.Length 0.90mm.

Head: Without black bars and margins, mandibles well-developed with 2 denticles and dorsal truncation, max.illary palpi 2-segmented, labial palpi 1-segmented. Antennae 6-segmented, antennal scape 6 times as long as wide, 1.2 times as long as club; pedicel 1.8 times as long as wide, 1.5 times as long as F_3; F_1 0.8 as long as wide; F_2 0.6 as long as

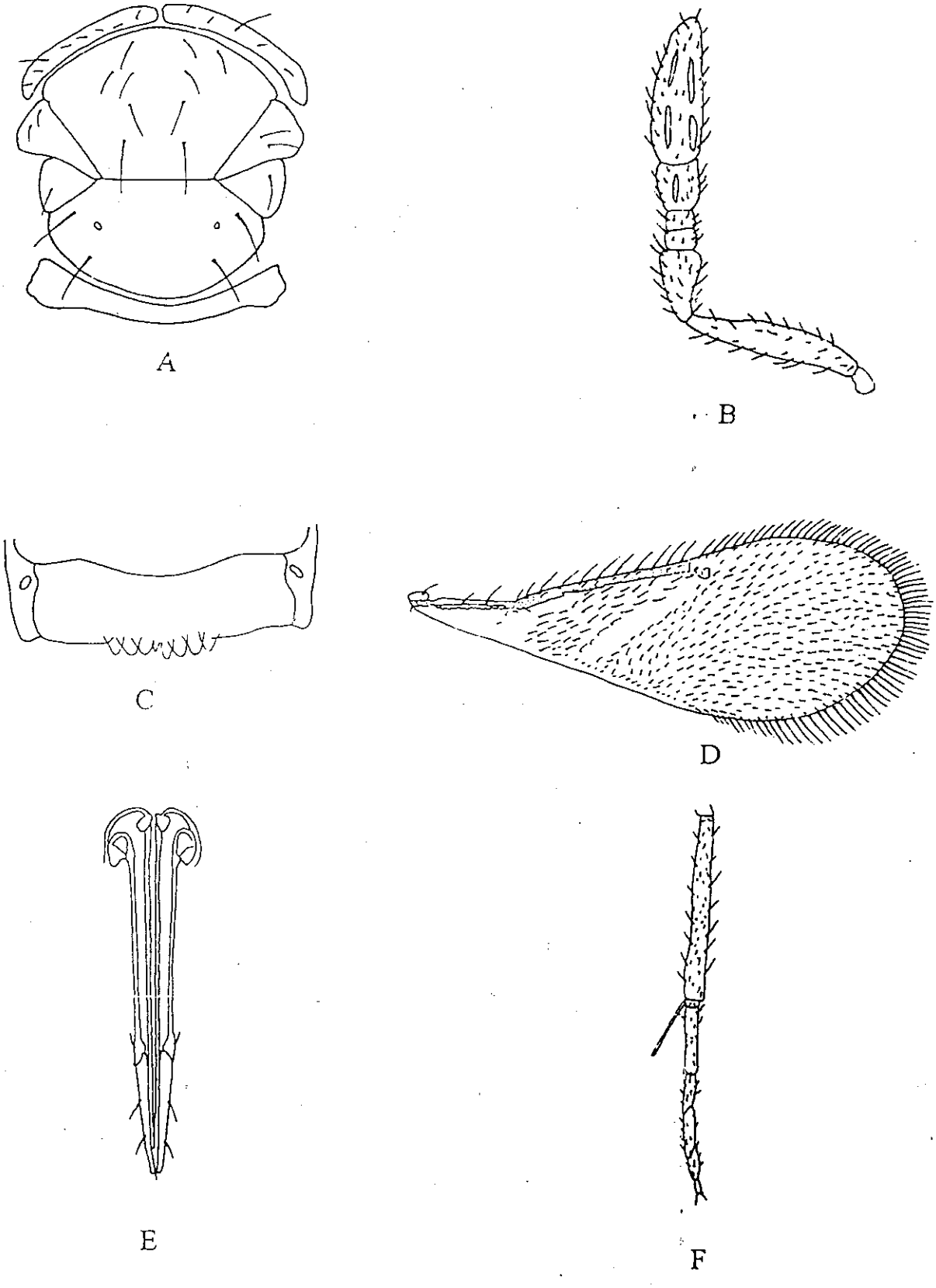


Fig. (13) : *Aphytis melinus* DeBach. Adult female : A, thorax and metanotum; B, antenna; C, propodeum and crenulae; D, forewing; E, ovipositor; F, tibial spur and basitarsus.

wide; F_3 1.2 tim es as long as wide, 0.3 as long as club, one sensillum; club 3.4 times as long as wide and 6 sensilla.

Thorax: Mesoscutum 10 setae, 1.3 times as long as scutellum; parapsis 4 setae; axilla 2 setae; scutellum 4 setae, 1.4 times as long as propodeum; metanotum the same length as apodeme. Forewing 2.7 times as long as wide, marginal vein 11 setae, submarginal vein 2 setae, 12 bullae, delta 44 setae in 6 rows, marginal fringe 0.2 as long as width of disk. Basitarsus 1.1 times as long as midtibial spur and midtibia 1.8 times as long as sheath, 0.6 as long as ovipositor.

Gaster: Propodeum 0.7 as long as scutellum, 4.6 times as long as metanotum, overlapping 8 crenulae. Ovipositor 1.6 times as long as midtibia, 3.1 times as long as sheath and 0.51 as long as midtibia. Tergite VII 6-7 setae, tergite VIII 6 setae and syntergum 6 setae.

Male:

Similar to female. Length 0.80mm.

Species group placement: Lingnanensis.

Material examined: Specimens (20 slides, males and females), Minya; associated with *A. aurantii* on *Citrus* sp. III.13.1997.

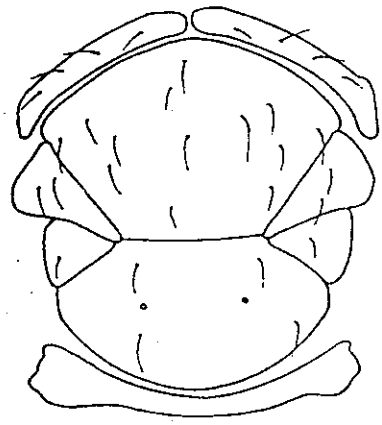
Comments: *A. melinus* was recorded for the first time in Egypt by Hafez (1984) associated with *A. aurantii* and *H. latania* on *P. guajava*. It is very similar to *A. holoxanthus* in coarse dark setae on the thorax and head ; antennal club robust and ovipositor , sheath long.

Aphytis mytilaspidis (LeBaron)

(Fig. 14)

Agonioneurus albidus Westwood, 1837, Phill. Mag. Ser. 3, 10: 422.

Aphelinus mytilaspidis LeBaron, 1870, Amer. Entomol. Bot., 2: 360-362.



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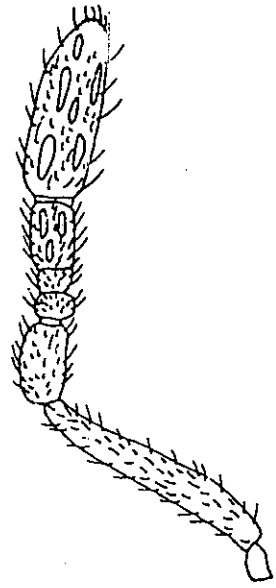

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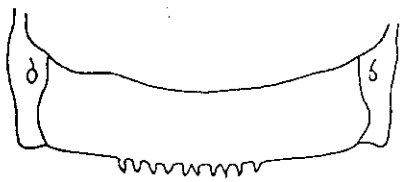

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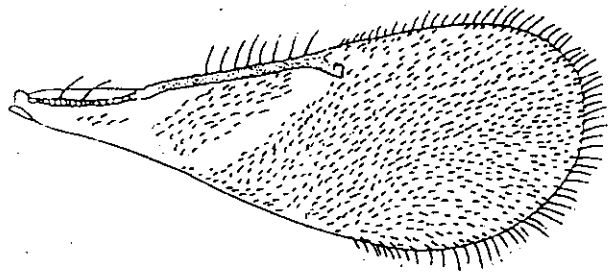

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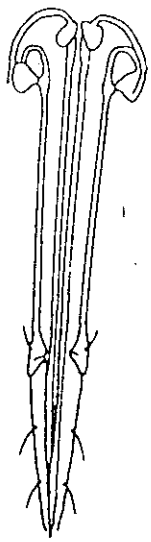

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Fig. (14) : *Aphytis mytilaspidis* (LeBaron). Adult female : A, thorax and metanotum; B, antenna; C, propodeum and crenulae; D, forewing; E, ovipositor; F, tibial spur and basitarsus.

Description:

Female:

Color: Body pale yellow, thoracic setae dark, thoracic sterna dusky, margins of scutellum and propodeum, crenulae infuscate. Length 1.1mm.

Head: Without black bars and margins, mandibles well-developed, with 2 denticles and a dorsal truncation, max.illary palpi 2-segmented, labial palpi 1-segmented. Antennae 6-segmented, antennal scape 6.3 times as long as wide, 1.4 times as long as club; pedicel 1.8 times as long as wide, 1.1 times as long as F_3; F_1 0.7 as long as wide; F_2 0.6 as long as wide; F_3 1.5 times as long as wide, 0.4 as long as club, 3 sensilla; club 2.7 times as long as wide and 6 sensilla.

Thorax: Mesoscutum 13 setae, 1.4 times as long as scutellum; parapsis 4 setae; axilla 2 setae; scutellum 4 setae, 1.7 times as long as propodeum; metanotum slightly as long as apodeme. Forewing 2.5 times as long as wide, marginal vein 6 setae, submarginal vein 2 setae, 18 bullae, delta 55 setae in 6 rows, marginal fringe 0.1 as long as width of disk. Basitarsus 1.1 times as long as midtibial spur and midtibia 2.7 times as long as sheath, 0.7 as long as ovipositor.

Gaster: Propodeum 0.7 as long as scutellum, 3 times as long as metanotum, non-overlapping 10 crenulae. Ovipositor 1.4 times as long as midtibia, 3.8 times as long as sheath; sheath 0.37 as long as midtibia. Tergite VII 2 setae, tergite VIII 4-6 setaeand syntergum 8-11 setae.

Male:

Similar to female but differing in the pedicel (about 1.3 times as long as wideand club 3-4 sensilla). Length 0.95mm.

Species group placement: Mytilaspidis.

Material examined: Specimens (20 slides, males and females), Qalyubiya; associated with *P. oleae* on *P. armeniaca* VIII.28.1997.

Comments: *A. mytilaspidis* was recorded for the first time in Egypt by Priesner and Hosny (1940) associated with *A. aurantii* on *Citrus* sp., *Aspidioutus cyanophylli* (Signoret) on *Alternanthera* sp., *H. latania* on *P. guajava*, *A. hederae* on *Jasmin.um* sp., *Russellaspis pustulans* (Cockerell) on *F. carica*, *C. striata* on *Cupressus* sp. and *Thuja* sp., *D. echinocacti* on *O. vulgaris*, *L. ulmi* on *V. vinifera* and *P. oleae on P. armeniaca*. This species is distinguished from Egyptian *Aphytis* by a short propodeum and small crenulae.

Aphytis opuntiae (Mercet)

(Fig. 15)

Aphelinus opuntiae Mercet, 1912, Trab. Mus. Cienc. Nat. Madrid, 10: 84-87.

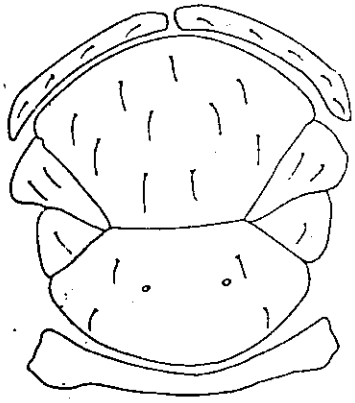
Description:

Female:

Color: Body dark yellow, thoracic setae dark, thoracic sterna dusky, margins of scutellum, propodeumand crenulae strongly infuscated. Length 0.90mm.

Head: Without black bars and margins, mandibles well-developed with 2 denticles, max.illary palpi 2-segmented, labial palpi 1-segmented. Antennae 6-segmented, antennal scape 6 times as long as wide, 1.3 times as long as club; pedicel 1.8 times as long as wide, 1.3 times as long as F_3; F_1 0.7 as long as wide; F_2 0.5 as long as wide; F_3 1.5 times as long as wide, 0.5 as long as club, 2 sensilla; club 3 times as long as wide and 6 sensilla.

Thorax: Mesoscutum 10 setae, 1.4 times as long as scutellum; parapsis 4 setae; axilla 2 setae; scutellum 4 setae, 1.5 times as long as propodeum; metanotum as long as apodeme. Forewing 2.5 times as long as wide, marginal vein 11 setae, submarginal vein 2 setae, 18 bullae, delta



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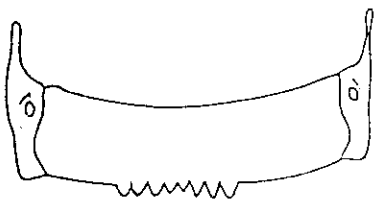

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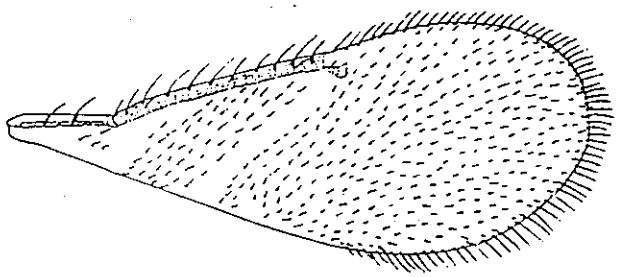

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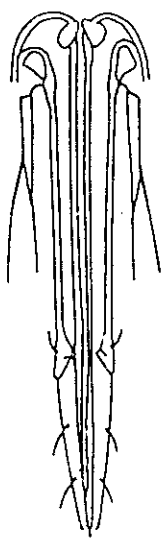

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Fig. (15) : *Aphytis opuntiae* (Mercet). Adult female :A, thorax and metanotum B, antenna; C, propodeum and crenulae; D, forewing; E, ovipositor; F, tibial spur and basitarsus.

55 setae in 6 rows, marginal fringe 0.1 as long as width of disk. Basitarsus 1.2 times as long as midtibial spur and midtibia 2.5 times as long as sheath, 0.7 as long as ovipositor.

Gaster: Propodeum 0.7 as long as scutellum, 3.6 times as long as metanotum, non-overlapping 8 crenulae; ovipositor 1.4 times as long as midtibia, 3.5 times as long as sheath; sheath 0.4 as long as midtibia. Tergite VII 2 setae, tergite VIII 4-6 setaeand syntergum 6-8 setae.

Male:

Similar to female. Length 0.80mm.

Species group placement: Myitlaspidis.

Material examined: Specimens (20 slides, males and females), Alexandria; associated with *A. aurantii* on *P. guajava* IX.4.1997.

Comments: *A. opuntiae* is recorded here for the first time associated with *A. aurantii* on *Citrus* sp. It differs from *A. mytilaspidis* in pale yellow and mesoscutum without a pair of blotches .

Aphytis paramaculicornis DeBach and Rosen

(Fig. 16)

Aphytis paramaculicornis DeBach and Rosen, 1976, Ann. Entomol. Soc. Amer., 69: 542-543.

Description:

Female:

Color: Body pale yellow and apical part of club blackish. Length 1.0mm.

Head: With distinct black bars and margins, mandibles well-developed with 2 denticles and a dorsal truncation, max.illary palpi 2-segmented, labial palpi 1-segmented. Antennae 6-segmented, antennal scape 5 times as long as wide, 1.1 times as long as club; pedicel 1.8 times as long as wide, 1.1 times as long as F_3; F_1 0.8 as long as wide; F_2 0.6 as

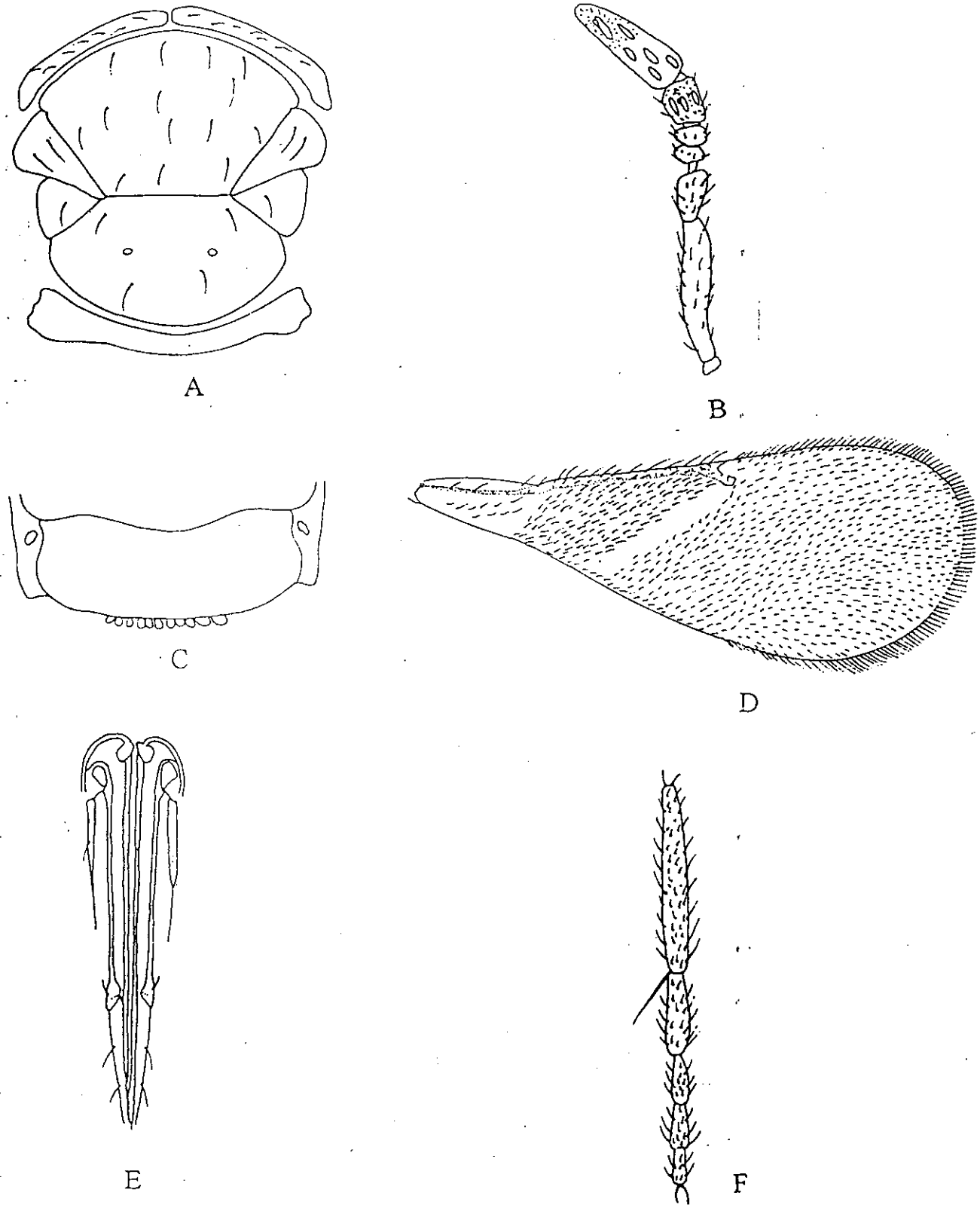


Fig. (16) : *Aphytis paramaculicornis* DeBach and Rosen. Adult female : A, thorax and metanotum; B, antenna; C, propodeum and crenulae; D, forewing; E, ovipositor; F, tibial spur and basitarsus.

long as wide; F_3 1.2 times as long as wide, 0.4 as long as club, 3 sensilla; club 3.1 times as long as wide and 6 sensilla.

Thorax: Mesoscutum 14 setae, 1.3 times as long as scutellum; parapsis 4 setae; axilla 2 setae; scutellum 4 setae, 1.4 times as long as propodeum; metanotum the same length as apodeme. Forewing 2.9 times as long as wide, marginal vein 13 setae, submarginal vein 2 setae, 19 bullae, delta 130 setae in 10 rows, marginal fringe 0.1 as long as width of disk. Basitarsus 1.3 times as long as midtibial spur and midtibia 1.9 times as long as sheath, 0.6 as long as ovipositor.

Gaster: Propodeum 0.7 as long as scutellum, 4.3 times as long as metanotum, non-overlapping 11 crenulae. Ovipositor 1.6 times as long as midtibia, 3 times as long as sheath; sheath 0.53 as long as midtibia. Tergite VII 6 setae, tergite VIII 4 setaeand syntergum 6 setae.

Male:

Similar to female. Length 0.85mm.

Species group placement: Proclia.

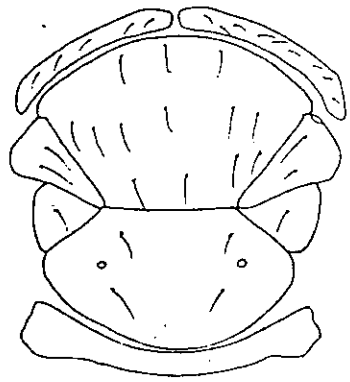
Material examined: Specimens (20 slides, males and females), Northern Coast; associated with *P. oleae* on *Olea* sp. XII.17.1996.

Comments: *A. paramaculicornis* is recorded here for the first time in Egypt associated with *P. oleae* on *Olea* sp.This species can be readily distinguished from *A. hispanicus* and *A. vandenboshi* in13and11setae on mesoscutum and scutellum1.3 and 1.5 as long as propodeum,respectively.

Aphytis philippinensis DeBach and Rosen

(Fig. 17)

Aphytis philippinensis DeBach and Rosen, 1976, Ann. Entomol. Soc. Amer., 9:543.



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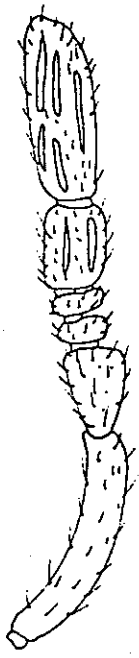

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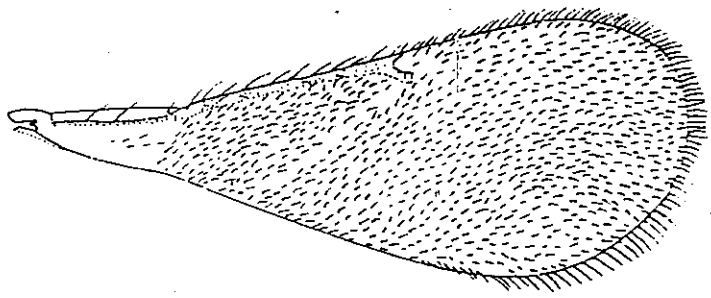

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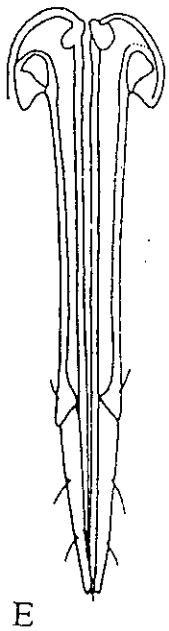

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Fig. (17) : *Aphytis philippinensis* DeBach and Rosen. Adult female : A, thorax and metanotum; B, antenna; C, propodeum and crenulae; D, forewing; E, ovipositor; F, tibial spur and basitarsus.

Description:

Female:

Color: Body yellowish with blackish markings and wing veins lined with brownish. Length 1.0 mm.

Head: With distinct black bars and margins, mandibles well-developed, with 2 denticles and dorsal truncation; max.illary palpi 2-segmented, labial palpi 1-segmented. Antennae 6-segmented, antennal scape 5.7 times as long as wide, 1.2 times as long as club; pedicel 1.8 times as long as wide, 1.1 times as long as F_3; F_1 0.6 as long as wide; F_2 0.4 as long as wide; F_3 1.5 times as long as wide, 0.4 as long as club, 2 sensilla; club 2.8 times as long as wide and 5 sensilla.

Thorax: Mesoscutum 13 setae, 1.3 times as long as scutellum; parapsis 4 setae; axilla 2 setae; scutellum 4 setae, 1.3 times as long as propodeum; metanotum 1.3 times as long as apodeme. Forewing 2.7 times as long as wide, marginal vein 10 setae, submarginal vein 2 setae, 21 bullae, delta 130 setae in 14 rows, marginal fringe 0.1 as long as the width of disk. Basitarsus 0.9 as long as midtibial spur and midtibia 2.6 times as long as sheath, 0.7 as long as ovipositor.

Gaster: Propodeum 0.8 as long as scutellum, 5 times as long as metanotum, non-overlapping 10 crenulae. Ovipositor 1.7 times as long as midtibia, 4.3 times as long as sheath; sheath 0.39 as long as midtibia. Tergite VII 4-7 setae, tergite VIII 4 setae and syntergum 12-17 setae.

Male:

Similar to the female. Length 0.85mm.

Species group placement: Proclia.

Material examined: Specimens (9 slides, males and females), Giza; associated with *C. aonidum* on *Jasmin.um* sp. XII.17.1997.

Comments: *A. philippinensis* is recorded here for the first time in Egypt associated with *C. aonidum* on *Citrus* sp. This species can be readily distinguished from the other members of the Egyptian Proclia group by the number of club sensilla .

Aphytis phoenicis DeBach and Rosen

(Fig. 18)

Aphytis phoenicis DeBach and Rosen, 1976, Ann. Entomol. Soc. Amer., 69: 543-544.

Description:

Female:

Color: Body pale yellow, thoracic setae very dark and thoracic sternae immaculate. Uniparental species. Length 0.60mm.

Head: Without black bars and margins, mandibles well-developed, with 2 denticles and dorsal truncation; maxillary palpi 2-segmented, labial palpi 1-segmented. Antennae 6-segmented, antennal scape 4.6 times as long as wide, 1.4 times as long as club, pedicel 2 times as long as wide, 1.1 times as long as F_3; F_1 0.7 as long as wide; F_2 0.4 as long as wide; F_3 1.3 times as long as wide, 0.5 as long as club, one sensillum; club 2.8 times as long as wide and 5 sensilla.

Thorax: Mesoscutum 7 setae, 1.2 times as long as scutellum; parapsis 4 setae; axilla 2 setae; scutellum 4 setae, 1.6 times as long as propodeum; metanotum 0.8 as long as apodeme. Forewing 2.7 times as long as wide, marginal vein 7 setae, submarginal vein 2.5 setae, 15 bullae, delta 26 setae in 4 rows, marginal fringe 0.1 as long as the width of disk. Basitarsus 1.1 times as long as midtibial spur and midtibia twice as long as sheath, 0.5 as long as ovipositor.

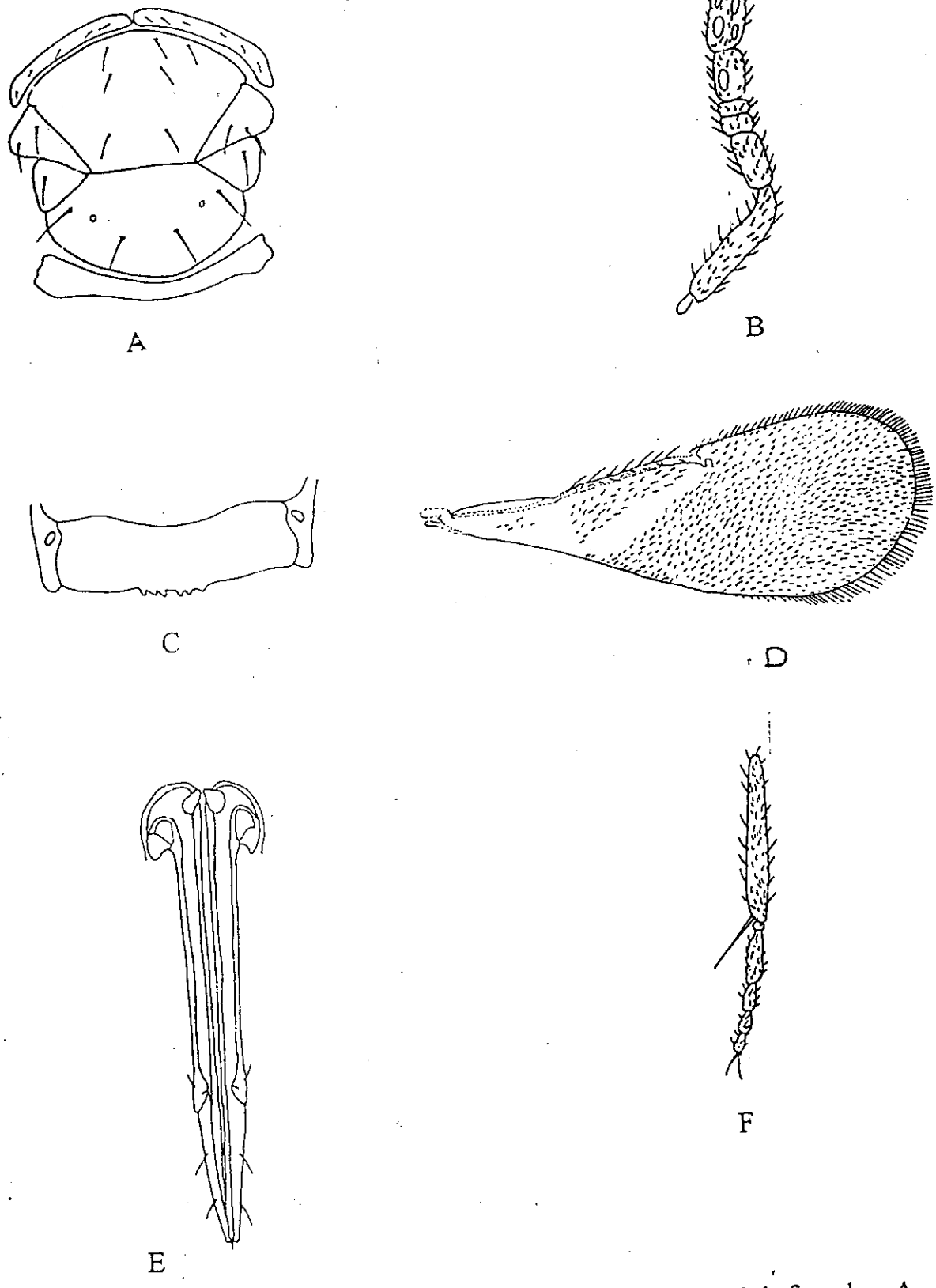


Fig. (18) : *Aphytis phoenicis* DeBach and Rosen. Adult female : A, thorax and metanotum; B, antenna; C, propodeum and crenulae; D, forewing; E, ovipositor; F, tibial spur and basitarsus.

Gaster: Propodeum 0.6 as long as scutellum, 4 times as long as metanotum, non-overlapping 6 crenulae. Ovipositor 1.9 times as long as midtibia, 3.9 times as long as sheath; sheath 0.49 as long as midtibia. Tergite VII 2 setae, tergite VIII 4 setaeand syntergum 5 setae.

Species group placement: Mytilaspidis.

Material examined: Specimens (15 slides, females only), Ismailia; associated with *P. blanchardi* on *P. dactylifera* XI.10.1998.

Comments: *A. phoenicis* is recorded here for the first time in Egypt associated with *P. blanchardi* on *P. dactylifera*. This species can be readily distinguished from *A. aonidiae* in ovipositor 4.6 times as long as sheath and characterized by specific host insects and plants.

Aphytis vandenboshi DeBach and Rosen

(Fig. 19)

Aphytis vandenboshi DeBach and Rosen, 1976, Ann. Entomol. Soc. Amer., 69:543.

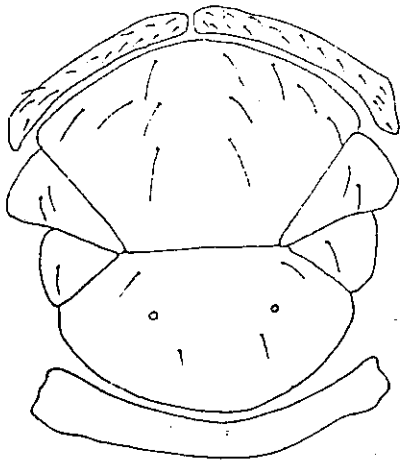
Description:

Female:

Color: Body pale yellowish and the tip of club blackish. Uniparental species. Length 0.90mm.

Head: With black bars and margins, mandibles well-developed, with 2 denticles and dorsal truncation; max.illary palpi 2-segmented, labial palpi 1-segmented. Antennae 6-segmented, antennal scape 4.6 times as long as wide, 1.4 times as long as club, pedicel 1.6 times as long as wide, 1.1 times as long as F_3; F_1 0.8 as long as wide; F_2 0.7 as long as wide; F_3 1.1 times as long as wide, 0.4 as long as club, one sensillum club 2.8 times as long as wide and 6 sensilla.

Thorax: Mesoscutum 11 setae, 1.3 times as long as scutellum; parapsis 4 setae; axilla 2 setae; scutellum 4 setae, 1.5 times as long as



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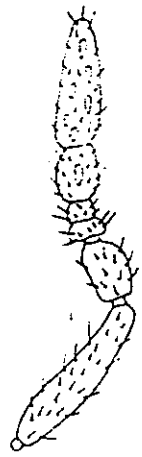

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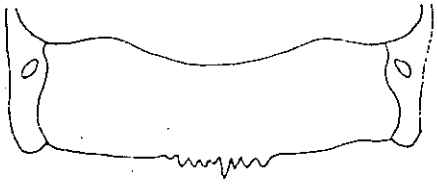

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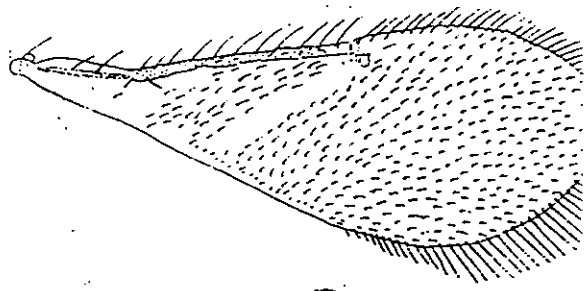

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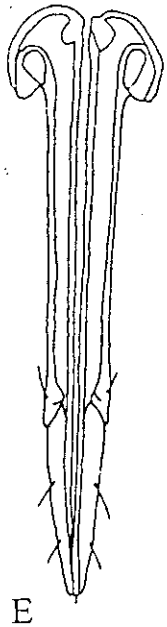

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Fig. (19) : *Aphytis vandenboshi* DeBach and Rosen. Adult female : A, thorax and metanotum; B, antenna; C, propodeum and crenulae; D, forewing; E, ovipositor; F, tibial spur and basitarsus.

propodeum; metanotum 1.2 times as long as apodeme. Forewing 2.6 times as long as wide, marginal vein 9 setae, submarginal vein 2 setae, 16 bullae, delta 90-94 setae in 10 rows, marginal fringe 0.2 as long as the width of disk. Basitarsus 1.2 times as long as midtibial spur and midtibia 2.5 times as long as sheath, 0.8 as long as ovipositor.

Gaster: Propodeum 0.7 as long as scutellum, 3 times as long as metanotum, non-overlapping 9 crenulae. Ovipositor 1.3 times as long as midtibia, 3.2 times as long as sheath; sheath 0.4 as long as midtibia. Tergite VII 3-5 setae, tergite VIII 6-10 setaeand syntergum 10-14 setae.

Species group placement: Proclia.

Material examined: Specimens (7 slides, females only), Qalyubiya; associated with *A. nerii* on *Oleander* sp. XII.15.1997.

Comments: *A. vandenboshi* is recorded here for the first time in Egypt associated with *A. nerii* on *Oleander* sp. This species can be readily distinguished from *A. hispanicus* and *A. paramaculicornis* in 13 and 14 setae on mesoscutum and scutellum 1.3 and 1.4 as long as propodeum, respectively .

Rosen and DeBach (1979) treated 90 valid species of the genus *Aphytis* throughout the world. Rosen (1994) documented the great advance in *Aphytis* research that above occurred since, 1979.

In Egypt, Priesner and Hosny (1940) recorded and collected for the first time in Egypt *A. chrysomphali*, *A. diaspidis*, *A. maculicornis*and *A. mytilaspidis* associated with different armored scale insects. *A. lepidosaphes* was recorded for the first time in Egypt associated with *L. beckii* by Abdel-Fattah and El-Saadany (1979). Later, Hafez (1984) collected and recorded *A. coheni*, *A. hispanicus*, *A. lingnanensis* and *A. melinus* as new records in Egypt.

The present work dealt with 18 species of the genus *Aphytis* in Egypt. The major characteristics which differentiate these species are: the

number of setae on the mesoscutum, the setae of the submarginal vein and parapsis; the presence or absence of overlapping crenulae; the length of the propodeum, the variations in the relative lengths of the propodeum, scutellum and metanotum; the number of sensilla on the club; the length of the ovipositor and variations in the relative lengths of the midtibia and basitarsus.

Eighteen species as described according to recent concepts. Ten of them are recorded here as new records in Egypt, these being: *A. africanus*, *A. aonidiae*, *A. chilensis*, *A. holoxanthus*, *A. libanicus*, *A. opuntiae*, *A. paramaculicornis*, *A. philippinensis*, *A. phoenicis*and *A. vandenboshi*. A key is provided for the recognition of these different species of *Aphytis*.

Abd-Rabou (1997b), Hafez (1984)and Priesner and Hosny (1940) recorded *A. maculicornis* associated with *P. oleae*, but in this work the parlatoria scale, *P. oleae* was associated *with A. paramaculicornis*. These results indicate that the forementioned researchers misidentified *A. paramaculicornis* as *A. maculicornis* in their observations.

A specific host is vital for some species of *Aphytis* to flourish. The present work indicated that *L. beckii*, *L. riccae*and *P. blanchardi* are the most favorable hosts of *A. lepidosaphes*, *A. libanicus* and *A. phoenicis*, respectively.

2. Population dynamics of genus *Aphytis* and its role in the biological control of armored scale insects in Egypt:

In the present work the population dynamics of 18 species of genus *Aphytis* in Egypt was conducted on ten host plants infested by eleven armored scale insects in seven distinctive weather factors governorates.

The results indicate that some species e.g. *A. holoxanthus, A. melinusand A. paramaculicornis* have a good role in supressing the population of *C. aonidum, A.aurantii* and *P. oleae,* respectively.

This in turn will associated in different biological control activities and increase their effectiveness in reduction pest population under different weather factors and to find out the best methods for raising this parasitoid efficiencies.

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

The Data in Table (3) and Fig. (20) shows that in 1997, the numbers of *Aphytis africanus* associated with *A. aurantii* on citrus trees recorded the first peak on January 1st (at 21.7°C max., 7.9°C min. and 65.0% RH) and reached the highest peak on November 1st (at 27.6°C max., 15.1°C min.and 61.0% RH). The numbers of parasitoids were 183 and 431 respectively. The rate of parasitism recorded the first peak of 11.7% on January 1st decreasing afterwardsand then increasing again to record the second peak of 14.6% on October 1st (at 30.9°C max., 17.0°C min. and 59.6% RH). In 1998 (Fig. 21) the numbers of parasitoids achieved the first peak of 110 on January 1st (at 18.0°C max., 7.1°C min. and 68.0% RH), reached the highest peak of 561 on November 1st (at 28.2°C max., 16.8°C min. and 62.5% RH). The rate of parasitism achieved its first peak of 4.7% on January 1st, after which it decreased to reach zero on April 1st (at 26.1°C max., 16.2°C min.and 57.5% RH), but then began to increase gradually to reach another peak of 13.4% on September 15th (at 33.6°C max., 18.6°C min.and 56.8% RH). *A.africanus* is an important parasitoid of the California red scale in South Africa (Rosen and DeBach, 1979).

Table (3): **Number of scales, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis africanus* resulted from *Aonidiella aurantii* on *citrus* sp. in Qalyubiya, in relation to weather factors during 1997 and 1998.**

Date of sampling	1997						1998					
	No. of scales	Parasitoid		Daily mean weather factors			No. of scales	Parasitoid		Daily mean weather factors		
				Temperature		RH%				Temperature		RH%
		No.	R%	Min	Max			No.	R%	Min	Max	
Jan. 1st	1571	183	11.7	7.9	21.7	65.0	2350	110	4.7	7.1	18.0	68.0
15th	1677	127	7.6	7.0	20.0	62.0	2547	95	3.8	7.9	19.8	60.7
Feb. 1st	1657	116	6.5	5.0	18.3	60.0	3111	58	1.9	8.2	21.6	63.3
15th	1869	138	7.4	8.0	20.0	55.0	3184	40	1.3	7.8	19.5	65.0
Mar.1st	2060	109	5.3	9.0	21.0	61.5	3658	32	0.6	7.9	21.8	66.7
15th	2267	140	6.8	8.9	23.7	60.4	4182	15	0.4	7.4	21.2	58.5
April.1st	2483	115	4.6	10.6	24.1	59.9	4599	0	0	16.2	26.1	57.5
15th	2770	94	3.4	15.0	29.3	59.3	5036	32	0.6	13.5	28.5	56.0
May. 1st	3074	46	1.5	14.9	31.1	60.1	5864	87	1.5	18.2	34.5	53.5
15th	3452	57	1.4	19.0	34.5	55.5	6282	183	2.9	17.7	32.1	58.0
June. 1st	3871	81	1.6	19.5	34.4	56.0	6449	216	3.4	18.4	34.1	55.0
15th	4188	110	2.7	21.7	36.1	53.9	5083	218	4.2	18.8	33.3	63.0
July. 1st	3760	136	3.6	22.1	36.0	56.2	4813	277	5.8	21.3	35.9	58.5
15th	3575	175	4.9	22.3	35.3	64.1	4035	309	7.7	21.3	35.9	58.5
Aug. 1st	2957	193	6.5	22.4	34.5	61.5	3608	355	8.6	24.5	37.7	61.8
15th	2682	241	9.0	21.6	33.8	60.5	3076	314	10.2	22.7	34.6	64.8
Sep. 1st	2485	257	10.4	20.6	32.9	59.3	2870	346	12.1	21.5	37.0	56.5
15th	2262	281	12.2	18.5	31.7	58.3	3645	487	13.4	18.4	33.6	56.8
Oct. 1st	2889	422	14.6	17.0	30.9	59.6	4892	384	7.9	19.0	33.8	57.0
15th	3054	380	12.5	15.3	29.3	61.8	6691	446	6.7	17.5	28.5	59.0
Nov. 1st	3563	431	12.1	15.1	27.6	61.0	8057	561	7.0	16.8	28.2	62.5
15th	2980	349	11.7	11.0	25.4	67.2	7351	284	3.9	16.2	25.6	60.0
Dec. 1st	2809	306	10.9	10.1	23.7	62.7	6654	291	4.2	14.7	26.7	58.5
15th	2548	253	9.7	7.4	20.8	69.3	6283	277	4.4	9.7	20.9	57.5

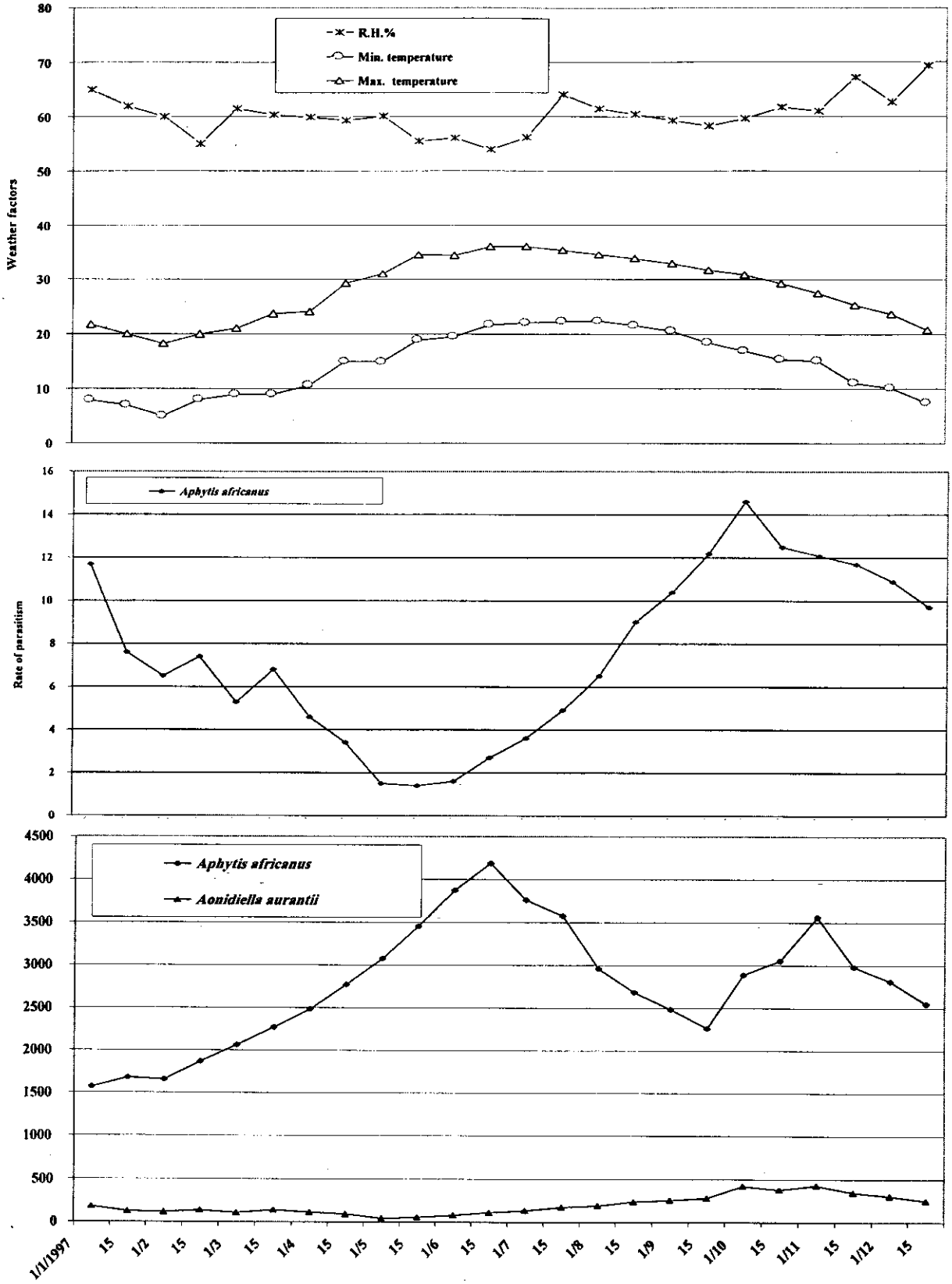

Fig. (20): Number scale stages , number of parasitoid individuals and rate of parasitism (R%) of *Aphytis africanus* resulted from *Aonidiella aurantii* on *citrus* sp. in Qalyubiya, in relation to weather factors during 1997.

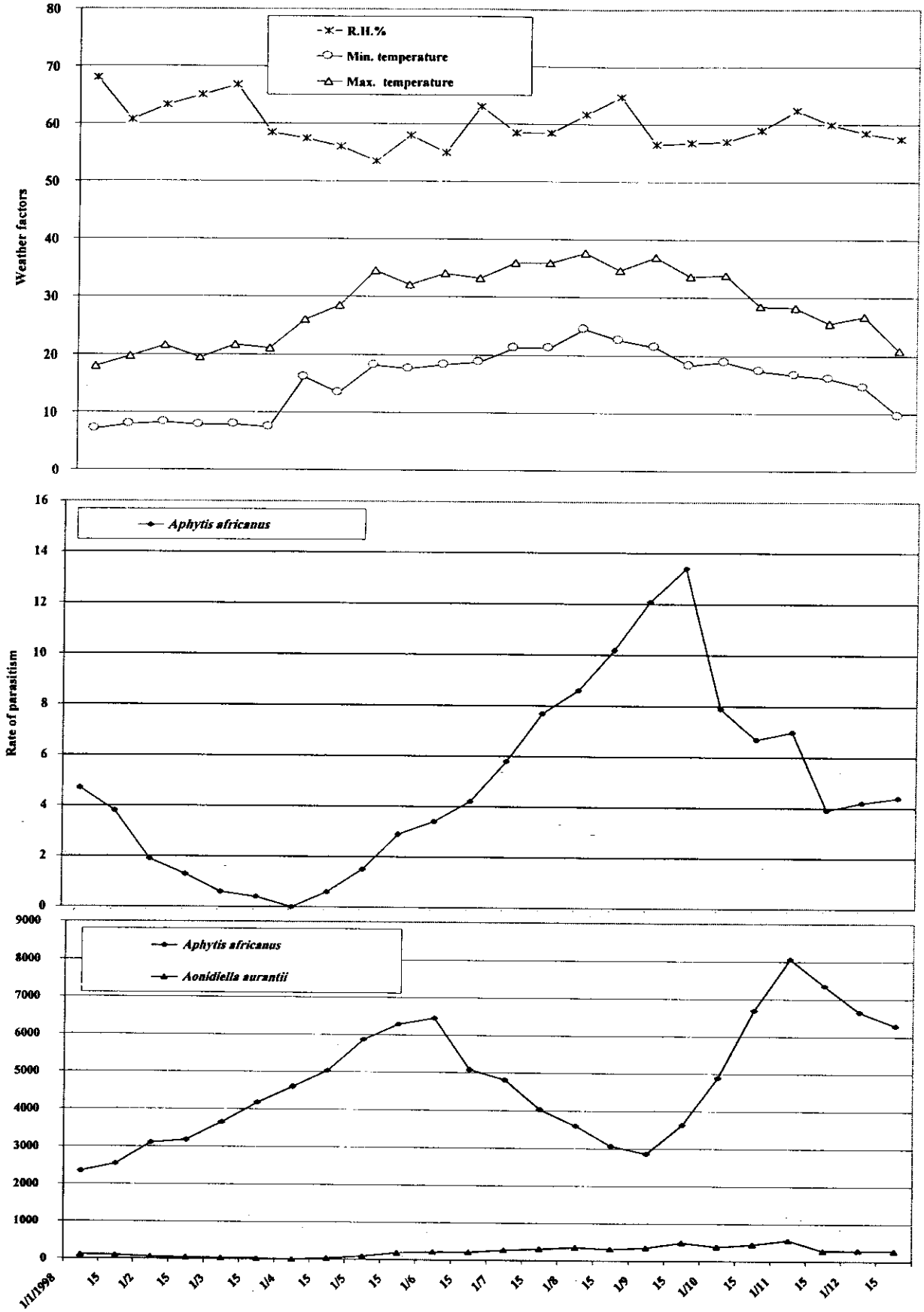

Fig. (21): **Number scale stages , number of parasitoid individuals and rate of parasitism (R%) of *Aphytis africanus* resulted from *Aonidiella aurantii* on *citrus* sp. in Qalyubiya, in relation to weather factors during 1998.**

Statistical analysis indicated that D.Mx.T., D.Mn.T.and D.M.R. 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 ($R^2 = 0.9617$, $P < 0.01$), while D.Mn.T. did not show any significant effect on the rate of parasitism (Table, 4).

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

Rates of parasitism by this species during the two seasons were very low. In 1997 (Table, 5 and Fig. 22) only two females were collected on May 1st (at 26.3°C max., 13.7°C min.and 63.5% RH)and only one female on August 1st (at 30.0°C max., 23.5°C min.and 68.8% RH). In 1998, one female was collected in August 1st (at 32.1°C max., 26.1°C min.and 76% RH), three on August 15th (at 31.4°C max., 25.5°C min.and 70.0% RH) and one on September 1st (at 32.7°C max., 24.6°C min.and 64% RH) (Table, 5 and Fig. 23).

Gulamahamad and DeBach (1978) stated that this species is the most common and widespread of parasitoid, constituting nearly 80% of all parasitism

2.3. *Aphytis chilensis* associated with *Chrysomphalus dictyospermi* on *Ficus nitida* in Min.ya:

This parasitoid was absent from March 1st (at 21.2°C max., 7.6°C min. and 62.5% RH) to August 15th (at 31.9°C max., 18.4°C min. and 66.0% RH) during the first year 1997 (Table 6 and Fig. 24) and from February 1st (at 23.7°C max., 7.6°C min.and 63.0% RH) to September 1st (at 37.4°C max., 22.0°C min.and 52.5% RH) during the second year 1998 (Table, 6 and Fig. 25). Two peaks were recorded annually for this species during the two successive years. In the present work, the average

Table (4) : Multiple regression values indicating the effect of weather factors on the percent parasitism of *Aphytis africanus* on *Aonidiella aurantii* in Qalyubiya

Year	1997					1998				
Daily mean weather factors	SS	df	Ms	F	P	SS	df	Ms	F	P
D.MX.T.	1.576	1	1.576	2.705	0.1048	18.382	1	18.382	32.231	0.0001
D.MN. T.	0.232	1	0.232	0.398	0.5298	1.781	1	1.781	3.103	0.0828
D.M.R.H	1.879	1	1.879	3.226	0.1611	5.857	1	5.857	10.207	0.0021

Table (5): **Number of scales, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis aonidiae* resulted from *Aonidia Lauri* on *Laurus* nobilis. in Alexandria, in relation to weather factors during 1997 and 1998.**

Date of sampling	1997						1998					
	No. of scales	Parasitoid		Daily mean weather factors			No. of scales	Parasitoid		Daily mean weather factors		
		No.	R%	Temperature		RH%		No.	R%	Temperature		RH%
				Min	Max					Min	Max	
Jan. 1st	102	-	-	8.8	19.8	71.6	142	-	-	8.9	18.6	73.6
15th	121	-	-	10.0	18.0	68.0	161	-	-	7.8	19.4	71.4
Feb. 1st	137	-	-	7.2	16.0	68.4	176	-	-	9.4	19.8	75.5
15th	161	-	-	11.1	18.4	63.2	190	-	-	9.2	18.0	65.7
Mar.1st	184	-	-	10.8	19.3	63.8	215	-	-	9.4	20.2	71.0
15th	188	-	-	9.6	19.4	61.6	225	-	-	9.7	19.3	60.0
April. 1st	209	-	-	9.8	19.1	62.2	239	-	-	9.8	22.9	64.0
15th	332	-	-	13.7	24.3	66.5	254	-	-	14.3	24.1	64.0
May. 1st	228	2	0.9	13.7	26.3	63.5	206	-	-	17.2	27.7	63.6
15th	167	-	-	17.8	27.6	70.4	189	-	-	17.6	26.3	67.0
June. 1st	159	-	-	18.5	29.1	65.0	190	-	-	19.6	27.3	72.0
15th	138	-	-	22.5	30.9	68.1	177	-	-	15.8	29.8	64.0
July. 1st	117	-	-	23.3	30.1	72.2	163	-	-	22.4	30.5	68.0
15th	126	-	-	24.4	30.6	66.4	161	-	-	23.2	31.1	74.0
Aug. 1st	158	1	0.7	23.5	30.0	68.8	180	1	0.7	26.1	32.1	76.0
15th	167	-	-	23.7	29.8	64.6	202	3	1.2	25.5	31.4	70.0
Sep. 1st	151	-	-	22.3	28.9	77.6	160	1	5.7	24.6	32.7	64.0
15th	208	-	-	17.9	27.6	88.0	242	-	-	20.7	29.3	59.0
Oct. 1st	237	-	-	18.6	27.9	66.5	267	-	-	19.9	29.7	66.0
15th	245	-	-	16.0	26.7	63.8	275	-	-	16.9	26.7	65.0
Nov. 1st	256	-	-	15.0	24.6	73.5	284	-	-	15.4	25.8	70.0
15th	277	-	-	11.8	23.4	73.3	325	-	-	13.4	23.8	70.0
Dec. 1st	291	-	-	9.7	22.0	62.1	374	-	-	13.5	22.8	69.0
15th	313	-	-	17.1	19.6	74.4	310	-	-	9.6	18.8	72.0

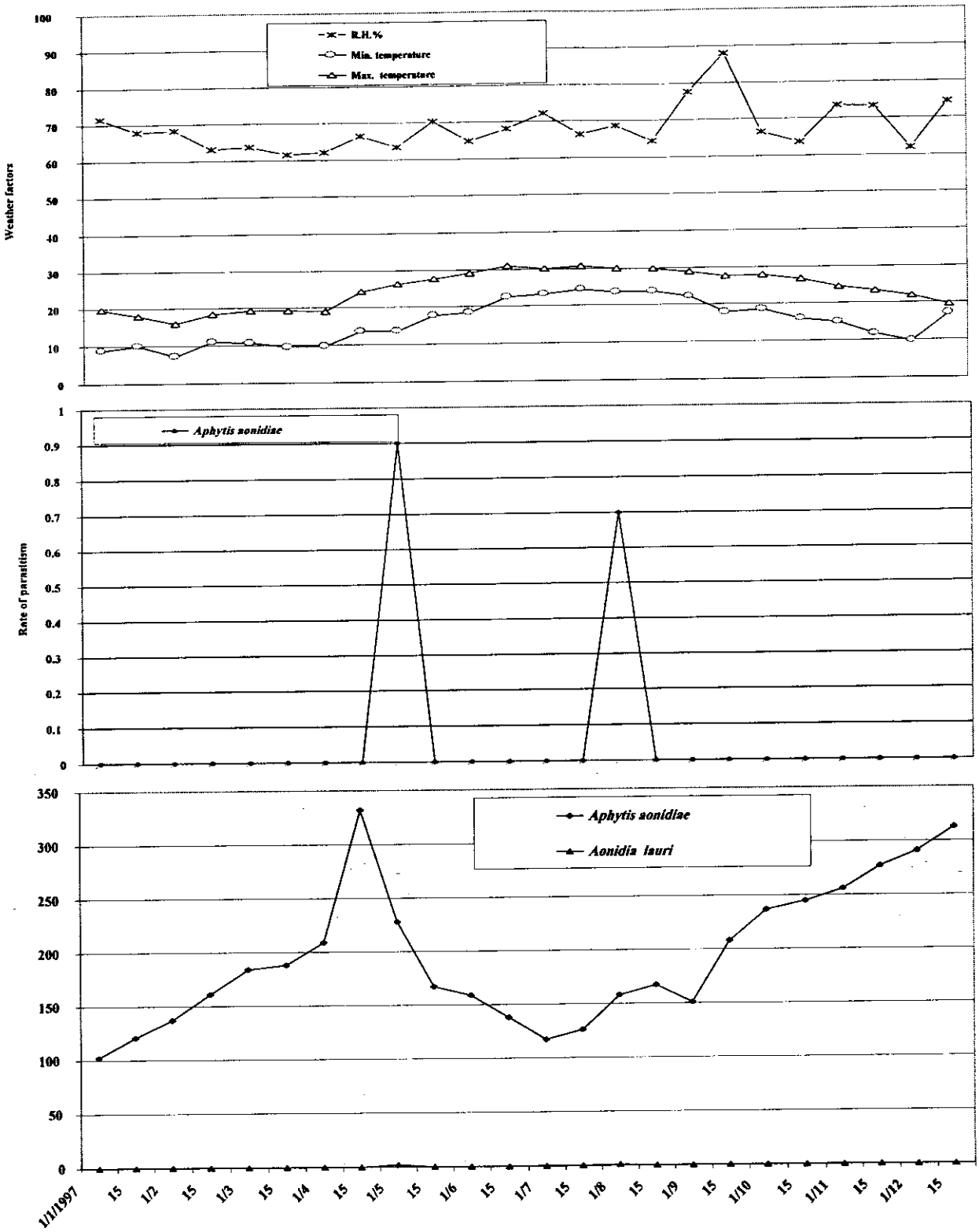

Fig. (22): **Number of scale stages , number of parasitoid individuals and rate of parasitism (R%) of *Aphytis aonidiae* resulted from *Aonidia Lauri* on *Laurus* nobilis. in Alexandria, in relation to weather factors during 1997.**

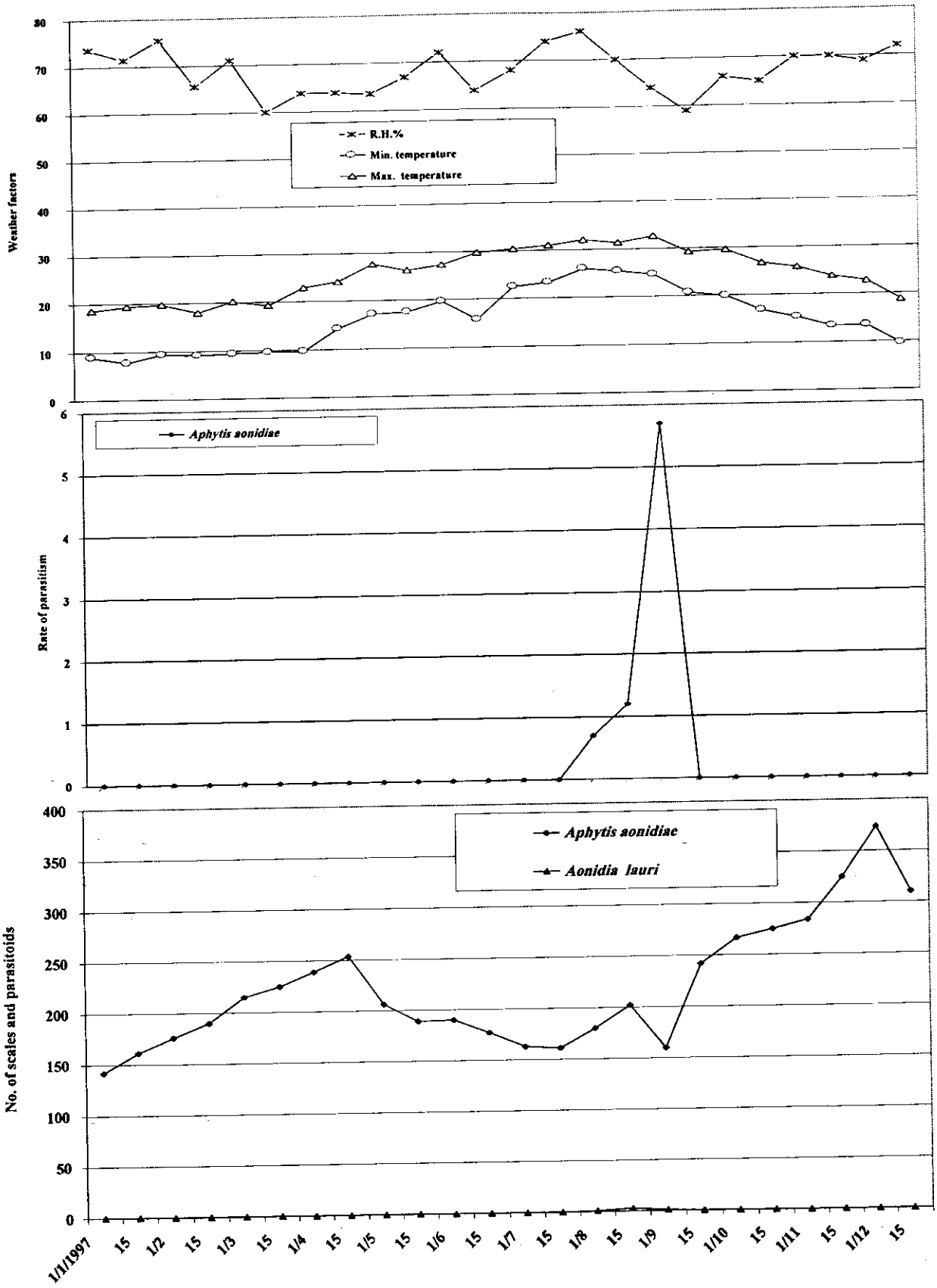

Fig. (23): **Number of scale stages , number of parasitoid individuals and rate of parasitism (R%) of *Aphytis aonidiae* resulted from *Aonidia Lauri* on *Laurus* nobilis. in Alexandria, in relation to weather factors during 1998.**

Table (6): **Number of scales, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis chilensis* resulted from *Chrysomphalus dictyospermi* on *Ficus nitida* in Minya, in relation to weather factors during 1997 and 1998.**

Date of sampling	1997						1998					
	No. of scales	Parasitoid		Daily mean weather factors			No. of scales	Parasitoid		Daily mean weather factors		
		No.	R%	Temperature		RH%		No.	R%	Temperature		RH%
				Min	Max					Min	Max	
Jan. 1st	519	11	2.0	5.9	20.3	65.0	640	3	0.5	6.7	18.6	70.2
15th	478	4	0.8	5.8	17.8	68.0	653	2	0.3	5.7	21.0	61.9
Feb. 1st	452	2	0.4	3.9	18.2	59.0	687	-	-	7.6	23.7	63.0
15th	592	3	0.4	5.9	19.8	60.0	755	-	-	8.1	20.3	62.5
Mar.1st	641	-	-	7.6	21.2	62.5	886	-	-	7.6	21.1	59.8
15th	667	-	-	12.2	22.0	50.3	831	-	-	5.9	21.9	54.0
April. 1st	431	-	-	11.2	22.6	44.9	610	-	-	9.9	26.3	53.5
15th	452	-	-	16.7	29.2	49.7	597	-	-	13.2	28.9	51.5
May. 1st	520	-	-	17.4	31.5	47.8	492	-	-	18.6	39.0	47.5
15th	554	-	-	21.3	32.2	44.4	396	-	-	18.5	34.6	49.5
June. 1st	593	-	-	23.4	34.4	41.4	352	-	-	19.2	32.2	53.0
15th	676	-	-	21.9	36.0	44.7	397	-	-	19.9	34.5	51.0
July. 1st	694	-	-	24.4	34.4	45.6	522	-	-	21.2	37.2	50.0
15th	734	-	-	24.3	35.1	50.2	586	-	-	21.0	37.8	53.5
Aug. 1st	1278	-	-	23.8	33.0	57.0	701	-	-	23.6	38.7	57.5
15th	1347	-	-	18.4	31.9	66.0	874	-	-	22.0	35.2	55.2
Sep. 1st	1391	3	0.2	19.5	33.8	50.0	1100	-	-	22.0	37.4	52.5
15th	1456	7	0.5	18.7	29.4	62.0	1495	5	0.4	18.5	32.5	58.0
Oct. 1st	1197	17	1.4	19.3	31.8	66.2	1560	16	1.0	18.4	33.5	54.5
15th	805	13	1.6	11.9	28.4	66.2	1316	23	1.8	15.5	28.2	58.0
Nov. 1st	595	10	1.7	13.4	25.4	67.0	1071	27	2.3	14.6	26.7	61.0
15th	651	16	2.5	9.5	24.4	67.5	354	29	2.9	21.1	26.1	58.0
Dec. 1st	918	30	3.3	6.4	19.7	68.5	807	15	1.9	10.2	23.9	57.0
15th	790	24	3.0	6.6	19.4	66.7	920	9	1.0	6.5	18.2	61.5

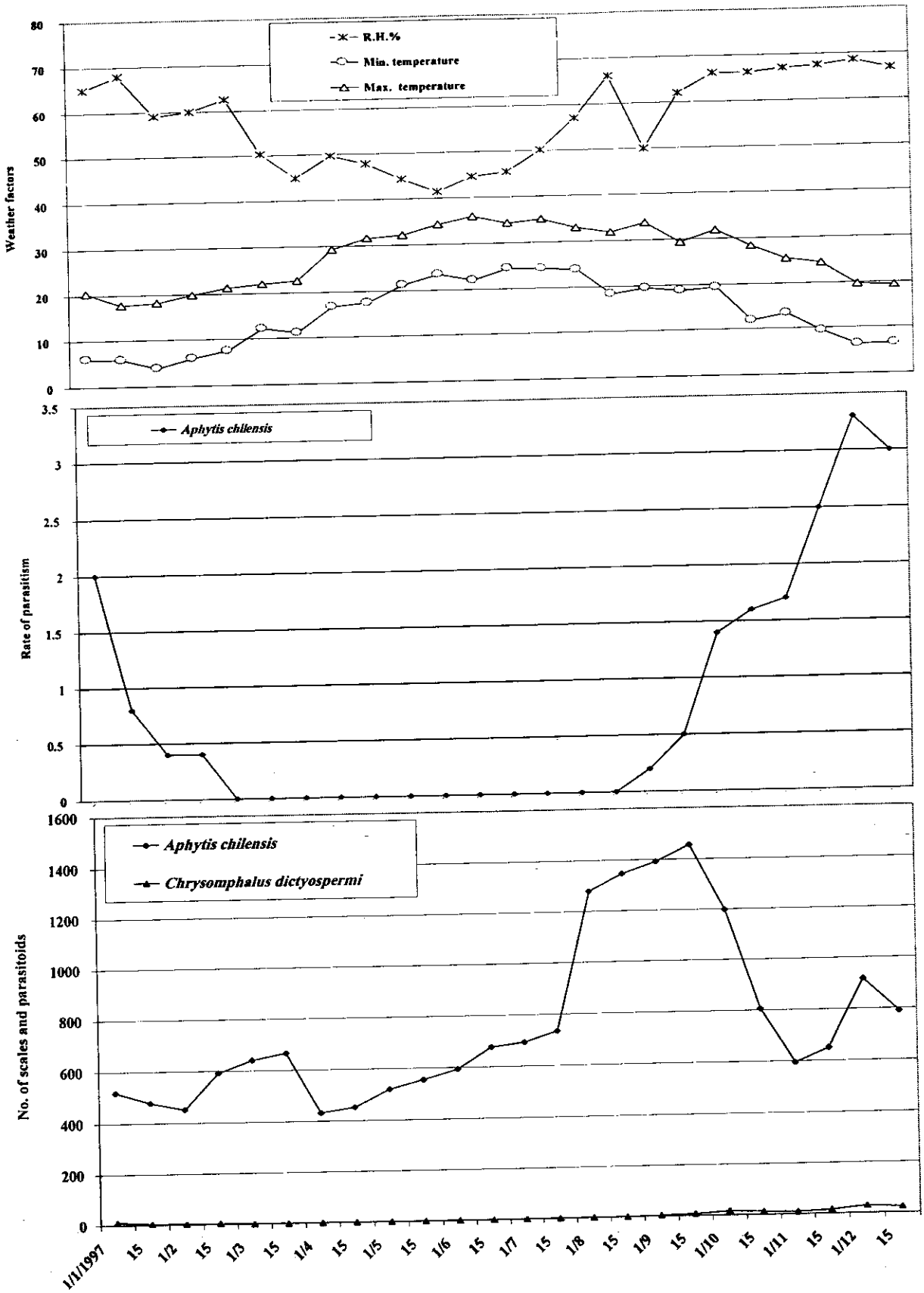

Fig. (24): **Number of scale stages , number of parasitoid individuals and rate of parasitism (R%) of *Aphytis chilensis* resulted from *Chrysomphalus dictyospermi* on *Ficus nitida* in Minya, in relation to weather factors during 1997.**

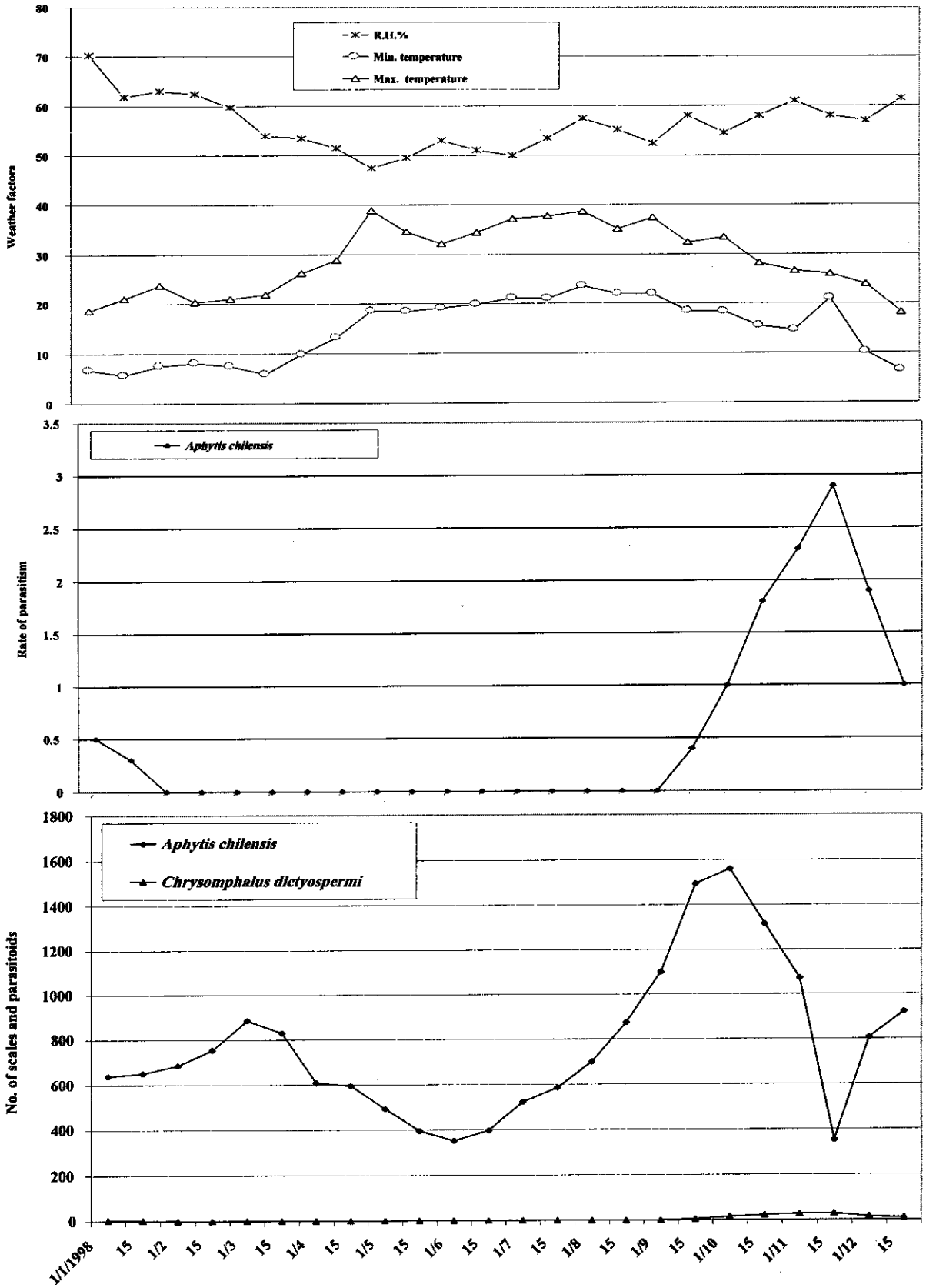

Fig. (25): **Number of scale stages , number of parasitoid individuals and rate of parasitism (R%) of *Aphytis chilensis* resulted from *Chrysomphalus dictyospermi* on *Ficus nitida* in Minya, in relation to weather factors during 1998.**

percentage of parasitism was 0.7% in the first year and 0.5% in the second year. Average parasitism by this species on *A . nerii* was 60% in Italy on *C . limonum*.(Liotta, 1983 a) .

This species has a good effect in controlling some armored scale insects in different countries all over the world. (Liotta *et al.*, 1985; Rosen and DeBach, 1979).

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 (R^2 = 0.2120, $P < 0.01$), while those of D.Mx.T. and D.M.R.H. were insignificant (Table, 7).

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

During the two years of this work, *A. chrysomphali* was present abundunt. In 1997 (Table, 8 and Fig. 26), two peaks were recorded. The first peak of parasitism was 29.1% on January 1st (at 21.7°C max., 7.9°C min.and 65% RH). After this peak, the percentage of parasitism declined gradually to reach 0.6% on August 1st (at 34.5°C max., 22.4°C min.and 61.5% RH). The second peak was 41.4% on November 15th (at 25.4°C max., 11.0°C min.and 67.2% RH).

During 1998, the peak of parasitism was estimated at 21.1% and occurred on January 15th (at 19.4°C max., 7.8°C min.and 71.4% RH). After this peak, the percentage of parasitism declined sharply to reach zero on July 1st (at 30.5°C max., 22.4°C min.and 68.0% RH). The parasitoid activity was observed to restart on August 15th (at 31.4°C max., 25.5°C min.and 70.0% RH)and gradually increased to reach its highest peak 36.8% on December 1st (at 22.8°C max., 13.5°C min.and 69.0% RH) (Table, 8 and Fig. 27).

Table (7) : Multiple regression values indicating the effect of weather factors on the percent parasitism of *Aphytis chilensis* on *Chrysomphalus dictyospermi* in Minya.

Year	1997					1998				
Daily mean weather factors	SS	df	Ms	F	P	SS	df	Ms	F	P
D.MX.T.	0.242	1	0.242	0.027	0.8703	0.828	1	0.828	1.259	0.2659
D.MN. T.	7.105	1	7.105	0.787	0.3782	8.797	1	8.797	13.382	0.0005
D.M.R.H	0494	1	0.494	0.055	08157	2.369	1	2.369	3.604	0.0620

Table (8): **Number of scales, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis chrysomphali* resulted from *Chrysomphalus dictyospermi* on *Ficus* nitida in Qalyubiya, in relation to weather factors during 1997 and 1998.**

Date of sampling	No. of scales	1997					No. of scales	1998				
		Parasitoid		Daily mean weather factors				Parasitoid		Daily mean weather factors		
		No.	R%	Temperature		RH%		No.	R%	Temperature		RH%
				Min	Max					Min	Max	
Jan. 1st	1203	350	29.1	7.9	21.7	65.0	2258	389	17.2	7.1	18.0	68.0
15th	1782	383	21.5	7.0	20.0	62.0	2443	343	21.1	7.9	19.8	60.7
Feb. 1st	693	126	18.5	5.0	18.3	60.0	1043	127	12.2	8.2	21.6	63.3
15th	725	107	14.8	8.0	20.0	55.0	1173	128	10.9	7.8	19.5	65.0
Mar.1st	836	110	13.1	9.0	21.0	61.5	1328	120	9.0	7.9	21.8	66.7
15th	945	102	10.8	8.9	23.7	60.0	1236	104	8.4	7.4	21.2	58.5
April. 1st	1440	141	9.1	10.6	24.1	59.5	1259	83	6.6	16.2	26.1	57.5
15th	1493	91	7.7	15.0	29.3	59.0	1580	94	6.1	13.5	28.5	56.0
May. 1st	1142	58	5.4	14.9	31.1	59.5	1405	44	3.1	18.2	34.5	53.5
15th	993	51	5.1	19.0	34.5	55.5	1241	24	2.0	17.7	32.1	58.0
June. 1st	376	16	4.2	19.5	34.4	56.0	1027	8	0.8	18.4	34.1	55.0
15th	840	22	2.6	21.7	36.1	53.9	1008	4	0.4	18.8	33.3	63.0
July. 1st	1528	41	3.1	22.1	36.0	56.2	656	0	0	21.3	35.9	58.5
15th	1352	9	1.1	22.3	35.3	64.1	519	0	0	21.3	35.9	58.5
Aug. 1st	1753	11	0.6	22.4	34.5	61.5	757	0	0	24.5	37.7	61.8
15th	1534	73	4.8	21.6	33.8	60.5	878	24	2.8	22.7	34.6	64.8
Sep. 1st	1758	154	8.8	20.6	32.9	59.3	1390	119	8.6	21.5	37.0	56.5
15th	1829	253	13.5	18.5	31.7	58.3	1508	175	11.2	18.4	33.6	56.8
Oct. 1st	1952	320	16.3	17.0	30.9	59.6	1919	466	24.9	19.0	33.8	57.0
15th	1465	443	30.2	15.3	29.3	61.8	2134	510	23.9	17.5	28.5	59.0
Nov. 1st	1232	432	35.9	15.1	27.6	61.0	1513	296	19.3	16.8	28.2	62.5
15th	1005	417	41.4	11.0	25.4	67.2	1236	359	29.1	16.2	25.6	60.0
Dec. 1st	746	295	39.6	10.1	23.7	62.7	1269	467	36.8	14.7	26.7	58.5
15th	877	240	27.4	7.4	20.8	69.3	1214	380	31.3	9.7	20.9	57.0

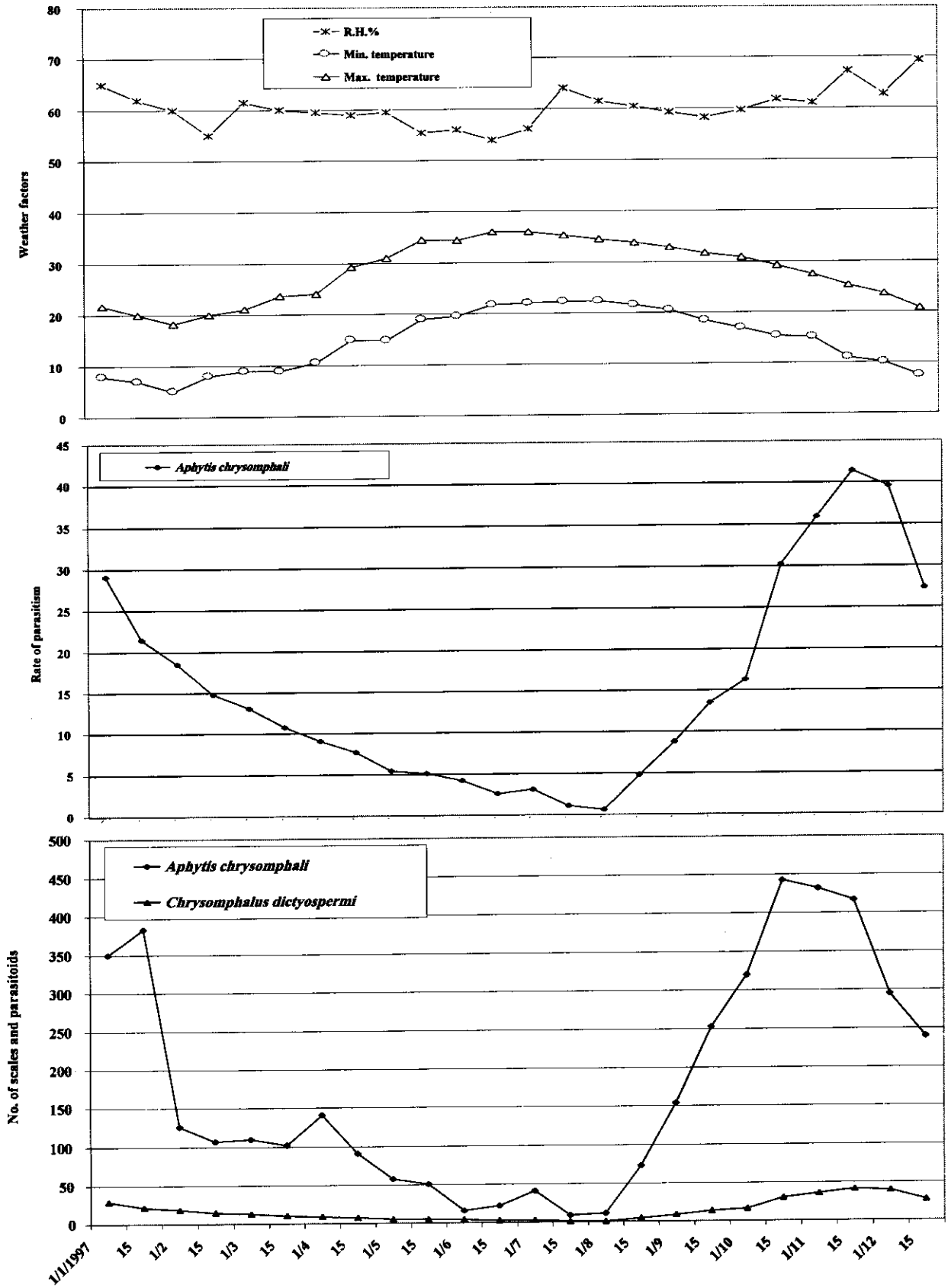

Fig. (26): **Number of scale stages , number of parasitoid individuals and rate of parasitism (R%) of *Aphytis chrysomphali* resulted from *Chrysomphalus dictyospermi* on *Ficus* nitida in Qalyubiya, in relation to weather factors during 1997.**

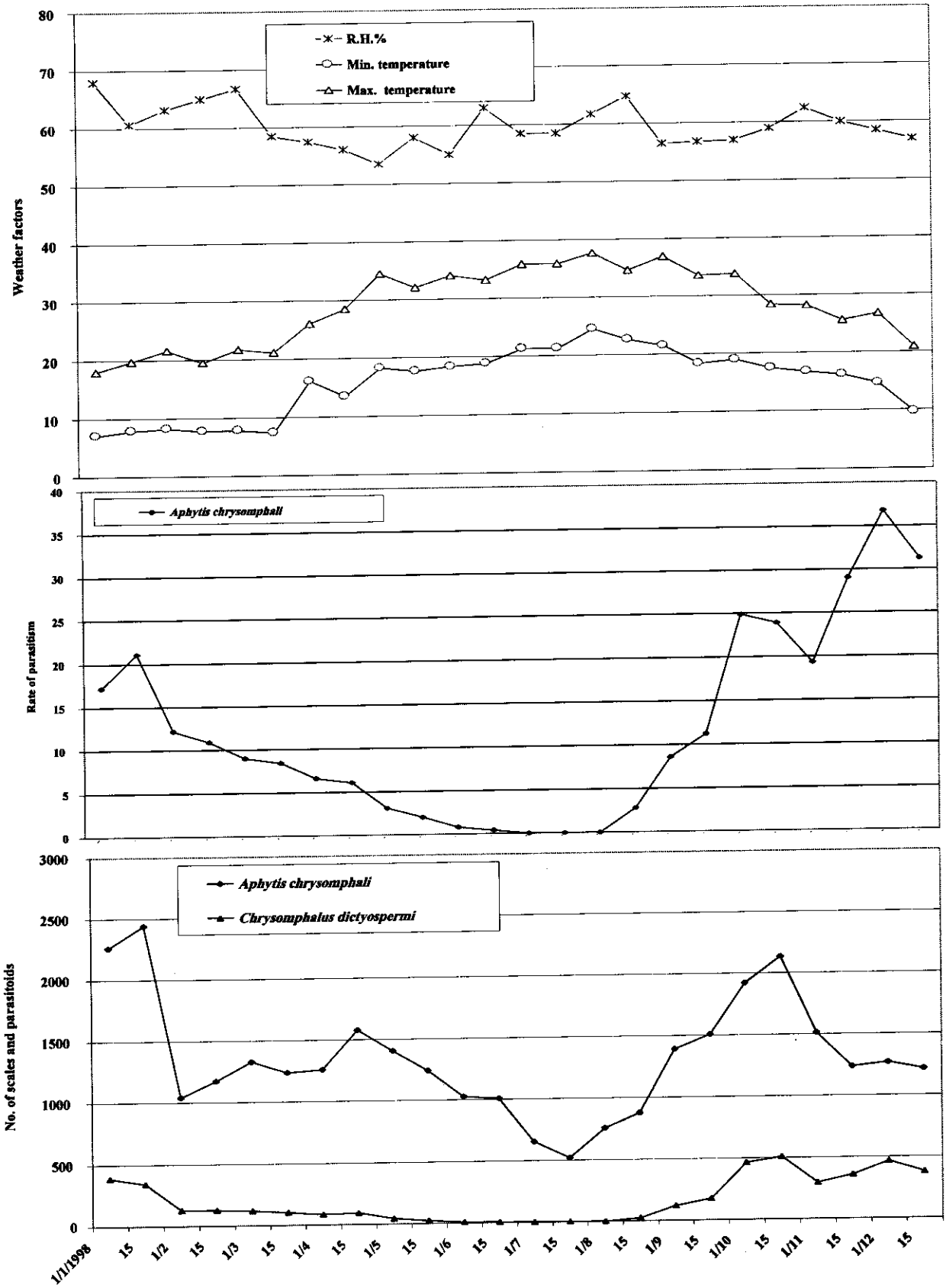

Fig. (27): **Number of scale stages , number of parasitoid individuals and rate of parasitism (R%) of *Aphytis chrysomphali* resulted from *Chrysomphalus dictyospermi* on *Ficus* nitida in Qalyubiya, in relation to weather factors during 1998.**

The effectiveness of *A. chrysomphali* has been observed by many researchers all over the world. Amongest them are: Priesner and Hosny (1940), Swailem (1974), El-Minshaway and Osman (1974), Hafez (1988), Asfoor (1997), Abd-Rabou (1997a, 1997b and 2000) in Egypt; Bartlett and Fisher (1950), Flanders (1951), Dean (1955), DeBach (1956) in the United States of America; Benassy (1987) in Moroccoand Viggiani and Iannaccove (1973) in Italy.

Statistical analysis indicated that during the first year, D.M.R.H was of highly significant effect on the rate of parasitism ($R^2 = 0.8884$, $P < 0.01$), 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 ($R^2 = 0.9324$, $P < 0.05$), while D.Mx.T. and D.Mn.T. were of insignificant effect (Table, 9).

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

During 1997 (Table, 10 and Fig. 28), the presence of this parasitoid was observed from February 1st (at 16.0°C max., 7.2°C min.and 68.4% RH) to September 15th (at 27.6°C max., 17.9°C min.and 88.0% RH). During 1998 (Table, 10 and Fig. 29), it was observed from February 15th (at 18.0°C max., 9.2°C min.and 65.7% RH) to September 15th (at 29.3°C max., 20.7°C min.and 59.0% RH). Maximum parasitism of this species reached 3.9 on December 15th (at 19.6°C max., 17.1°C min.and 74.4% RH) during 1997. In 1998, the maximum parasitism recorded was 5.3 on December 1st (at 22.8°C max., 13.5°C min.and 69.0% RH). The average rate of parasitism of *A. coheni* was 0.6% in 1997and 0.8% in 1998 respectively.

Table (9) : **Multiple regression values indicating the effect of weather factors on the percent parasitism of *Aphytis chrysomphali* on *Chrysomphlus dictyospermi* in Qalyubiya.**

Year	1997					1998				
Daily mean weather factors	SS	df	Ms	F	P	SS	df	Ms	F	P
D.MX.T.	35.883	1	35.883	1.965	0.1656	37.684	1	37.684	1.986	0.1758
D.MN. T.	13.570	1	13.570	0.743	0.3917	0.089	1	0.089	0.005	0.9459
D.M.R.H	133.118	1	133.118	7.291	0.0088	139.526	1	139.526	7.352	0.0143

Table (10): Number of scales, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis coheni* resulted from *Aonidiella aurantii* on *Citrus* sp in Alexandria, in relation to weather factors during 1997 and 1998.

Date of sampling	1997						1998					
	No. of scales	Parasitoid		Daily mean weather factors			No. of scales	Parasitoid		Daily mean weather factors		
		No.	R%	Temperature		RH%		No.	R%	Temperature		RH%
				Min	Max					Min	Max	
Jan. 1st	3052	37	1.2	8.8	19.8	71.6	4150	43	1.0	8.9	18.6	73.6
15th	4023	26	0.6	10.0	18.0	68.0	4044	21	0.5	7.8	19.4	71.4
Feb. 1st	3686	-	-	7.2	16.0	68.4	5759	14	0.3	9.4	19.8	75.5
15th	2199	-	-	11.1	18.4	63.2	3640	-	-	9.2	18.0	65.7
Mar.1st	1812	-	-	10.8	19.3	63.8	3079	-	-	9.4	20.2	71.0
15th	2083	-	-	9.6	19.4	61.6	2861	-	-	9.7	19.3	60.0
April. 1st	4467	-	-	9.8	19.1	62.2	3085	-	-	9.8	22.9	64.0
15th	5173	-	-	13.7	24.3	66.5	6142	-	-	14.3	24.1	64.0
May. 1st	7059	-	-	13.7	26.3	63.5	5938	-	-	17.2	27.7	63.6
15th	5166	-	-	17.8	27.6	70.4	6154	-	-	17.6	26.3	67.0
June. 1st	4253	-	-	18.5	29.1	65.0	4909	-	-	19.6	27.3	72.0
15th	4197	-	-	22.5	30.9	68.1	4643	-	-	15.8	29.8	64.0
July. 1st	3693	-	-	23.3	30.1	72.2	2077	-	-	22.4	30.5	68.0
15th	2611	-	-	24.4	30.6	66.4	1920	-	-	23.2	31.1	74.0
Aug. 1st	1334	-	-	23.5	30.0	68.8	1764	-	-	26.1	32.1	76.0
15th	3629	-	-	23.7	29.8	64.6	2658	-	-	25.5	31.4	70.0
Sep. 1st	4526	-	-	22.3	28.9	77.6	3535	-	-	24.6	32.7	64.0
15th	5430	-	-	17.9	27.6	88.0	3850	-	-	20.7	29.3	59.0
Oct. 1st	5605	45	1.1	18.6	27.9	66.5	3941	24	0.5	19.9	29.7	66.0
15th	5917	83	1.4	16.0	26.7	63.8	4206	31	0.8	16.9	26.7	65.0
Nov. 1st	7548	71	0.9	15.1	24.6	73.5	4289	67	1.6	15.4	25.8	70.0
15th	6036	159	2.5	11.8	23.4	73.3	5800	208	3.4	13.4	23.8	70.0
Dec. 1st	4731	132	3.2	9.7	22.0	62.1	3049	162	5.3	13.5	22.8	69.0
15th	3684	143	3.9	17.1	19.6	74.4	3488	173	4.8	9.6	18.8	72.0

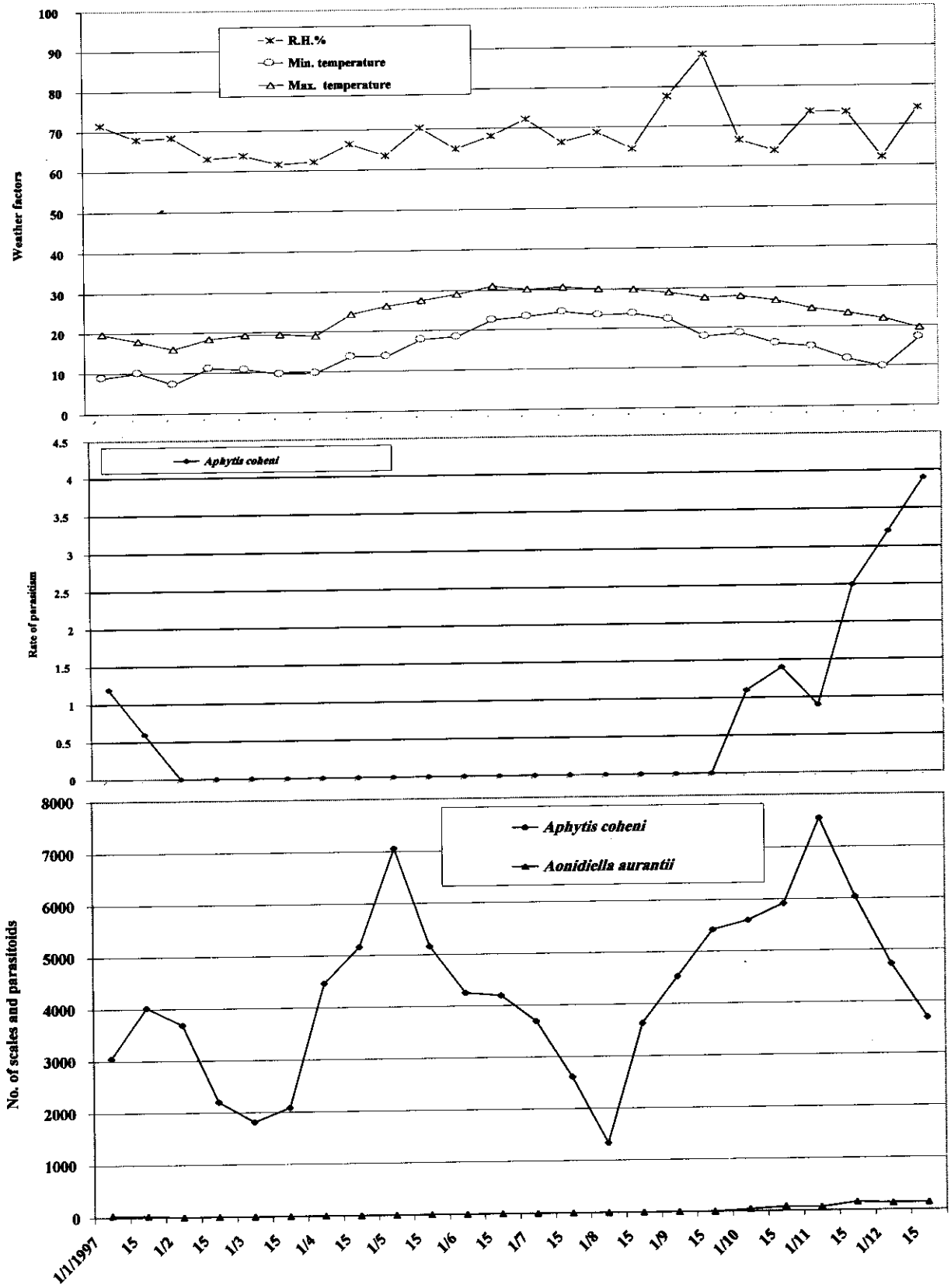

Fig. (28): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis coheni* resulted from *Aonidiella aurantii* on *Citrus* sp. in Alexandria, in relation to weather factors during 1997.**

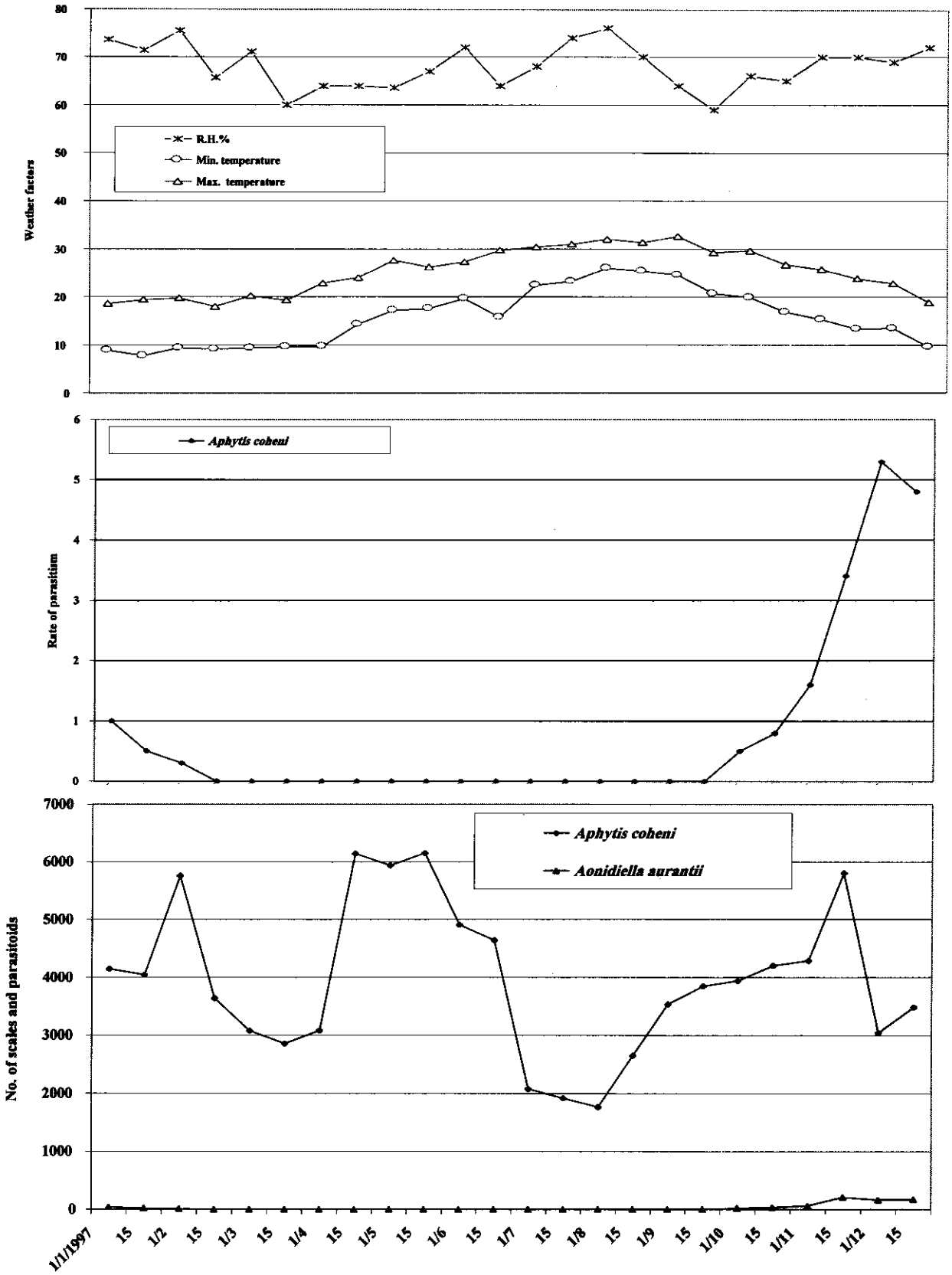

Fig. (29): Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis coheni* resulted from *Aonidiella aurantii* on *Citrus* sp. in Alexandria, in relation to weather factors during 1998.

A. coheni is one of the more effective parasitoids in the control of some armored scale insects (DeBach, 1962). In Egypt, Hafez (1986) recorded this species attacking *A. aurantii* in Alexandria and the rate of parasitism was 4.0%, 4.7%and 0.4% in January, Juneand December of 1987, 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 (Table, 11).

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

The data in Table, 12 and Fig. 30 shows that in the first year (1999), the numbers of *A. diaspidis* on *P. oleae* began to increase on January 1st (at 18.3°C max., 10.5°C min.and 73.0% RH), then reached their highest peak on May 15th (at maximum temp. of 26.2°C, 17.7°C min. and 68.0% RH), after which another peak was recorded on December 15th (at 17.5°C max., 19.0°C min.and 62.0% RH), The numbers of parasitoids were 34, 465and 77, respectively. The rates of parasitism followed the same trend in these months. The rates were 3.2%, 26.1%and 4.1% respectively.

In the second year (2000) (Table, 12 and Fig. 31) the numbers began to increase on February 1th (at 17.1°C max., 10.1°C min.and 70.0% RH). The highest number was recorded on May 15th (at 26.6°C max., 17.3°C min.and 73.6% RH), followed by another peak recorded on November 1st (at 22.0°C max., 14.1°C min.and 64.0% RH). The numbers of parasitoids were 41, 414 and 80, respectively. The rates of parasitism during these months were 6.8%, 26.7% and 4.5%, respectively.

Priesner and Hosny (1940) recorded *A. diaspidis* on *P. oleae* in April. This species was found to be a rare parasite of *A. aurantii* on *C. sinensis*. It occurs only in February, April, June, Augustand October with

Table (11) : **Multiple regression values indicating the effect of weather factors on the percent parasitism of *Aphytis coheni* on *Aonidiella aurantii* in Alexandria.**

Year	1997					1998				
Daily mean weather factors	SS	df	Ms	F	P	SS	df	Ms	F	P
D.MX.T.	0.026	1	0.026	0.337	0.5635	0.281	1	0.281	1.519	0.2222
D.MN. T.	0.254	1	0.254	3.296	0.0741	5.248	1	5.248	2.839	0.3341
D.M.R.H	0.074	1	0.074	0.959	0.331	0.009	1	0.009	0.053	0.8194

Table (12): Number of scales, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis diaspidis* resulted from *Parlatoria oleae* on *Olea* sp in Northern Coast, in relation to weather factors during 1999 and 2000.

Date of sampling	No. of scales	1999					No. of scales	2000				
		Parasitoid		Daily mean weather factors				Parasitoid		Daily mean weather factors		
		No.	R%	Temperature		RH%		No.	R%	Temperature		RH%
				Min	Max					Min	Max	
Jan. 1st	1058	34	3.2	10.5	18.3	73.0	827	47	5.7	10.4	15.5	72.0
15th	971	45	4.4	10.7	18.9	63.0	791	29	3.7	8.6	16.2	72.0
Feb. 1st	832	56	6.8	8.7	18.9	65.0	609	41	6.8	10.1	17.1	70.0
15th	748	61	8.2	8.7	19.4	59.0	524	59	9.3	8.6	15.9	64.0
Mar.1st	1234	143	11.7	10.2	19.7	67.7	917	139	15.1	9.1	17.4	67.6
15th	1123	165	14.6	11.7	21.0	57.7	965	196	20.4	10.7	20.3	66.2
April. 1st	1335	217	16.3	11.6	20.6	61.0	987	203	21.9	13.9	25.7	54.9
15th	1621	288	17.7	13.8	23.0	71.0	1241	295	23.8	12.8	21.8	74.5
May. 1st	1598	357	22.3	16.8	25.9	58.0	1410	402	29.3	14.8	23.1	73.8
15th	1783	465	26.1	17.7	26.2	68.0	1548	414	26.7	17.3	26.6	73.6
June. 1st	1939	398	20.5	19.3	27.7	70.0	1663	391	23.3	17.0	26.3	70.0
15th	1301	209	16.0	21.3	27.8	75.0	1379	229	17.0	20.4	27.3	75.0
July. 1st	1129	48	4.3	21.1	29.9	71.0	1172	130	11.2	18.7	29.9	71.0
15th	993	21	2.1	22.2	29.2	71.0	1315	135	10.3	22.2	29.2	70.3
Aug. 1st	1084	0	0	23.0	30.1	71.0	1439	38	2.9	23.0	29.2	70.3
15th	1330	0	0	22.8	30.2	72.0	1670	27	1.6	23.0	29.3	72.0
Sep. 1st	1412	0	0	21.9	29.2	71.0	2004	8	0.4	21.9	29.2	71.0
15th	1991	0	0	20.1	28.4	73.0	2035	0	0	21.2	28.2	72.1
Oct. 1st	2150	29	1.4	19.4	28.1	74.7	2183	0	0	19.4	28.1	73.9
15th	2426	19	0.8	16.7	23.8	62.3	2042	10	0.5	16.7	23.8	62.3
Nov. 1st	3027	76	2.5	14.1	22.0	64.0	1764	80	4.5	14.1	22.0	64.0
15th	2360	87	3.7	13.1	22.1	65.0	1506	74	4.2	13.4	20.8	63.5
Dec. 1st	2083	69	3.3	11.5	20.6	63.3	1083	26	2.4	11.5	19.6	63.3
15th	1859	77	4.1	9.0	17.5	62.0	906	39	4.4	9.0	17.5	62.0

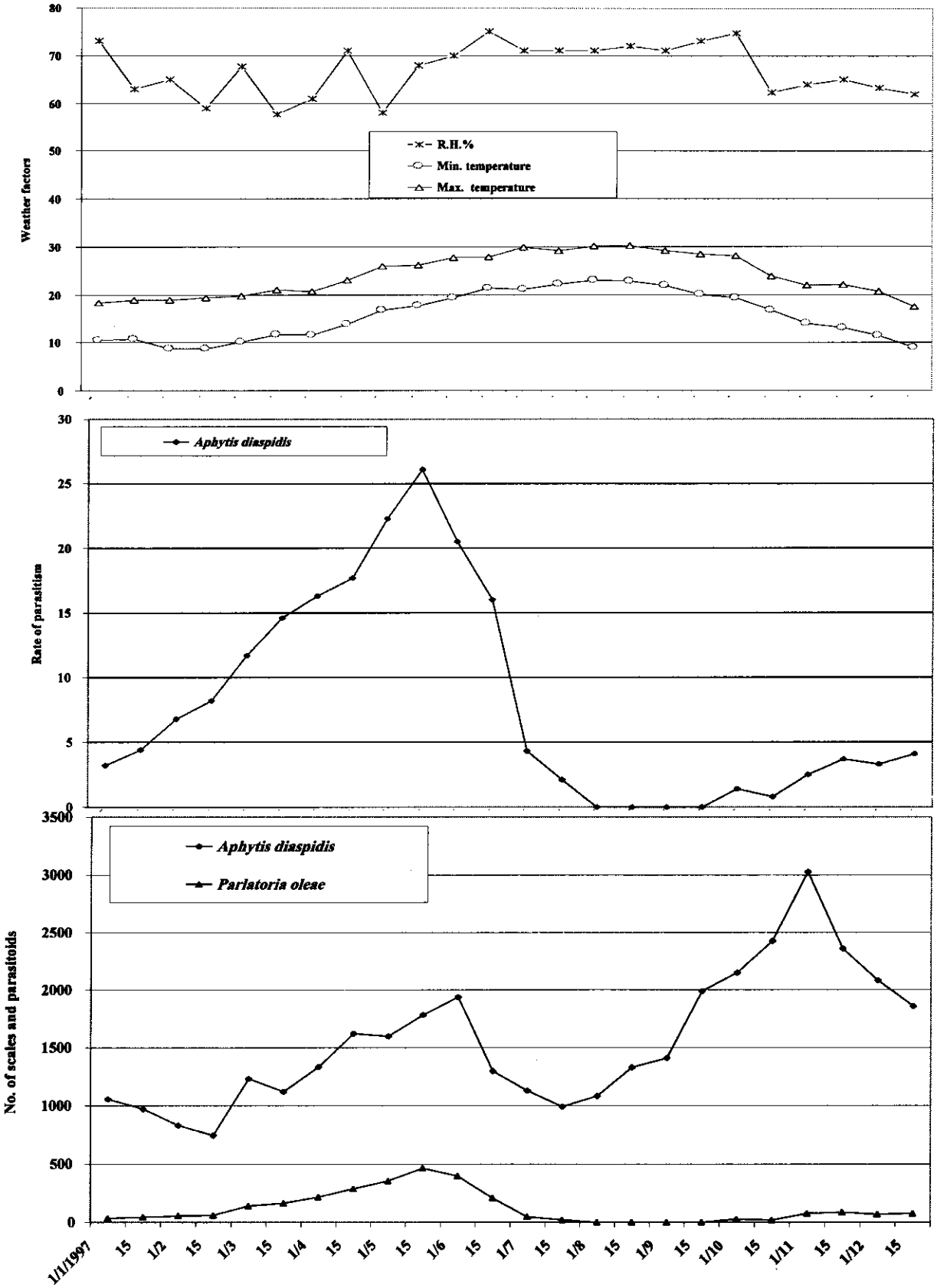

Fig. (30): Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis diaspidis* resulted from *Parlatoria oleae* on *Olea* sp. in Northern Coast, in relation to weather factors during 1999.

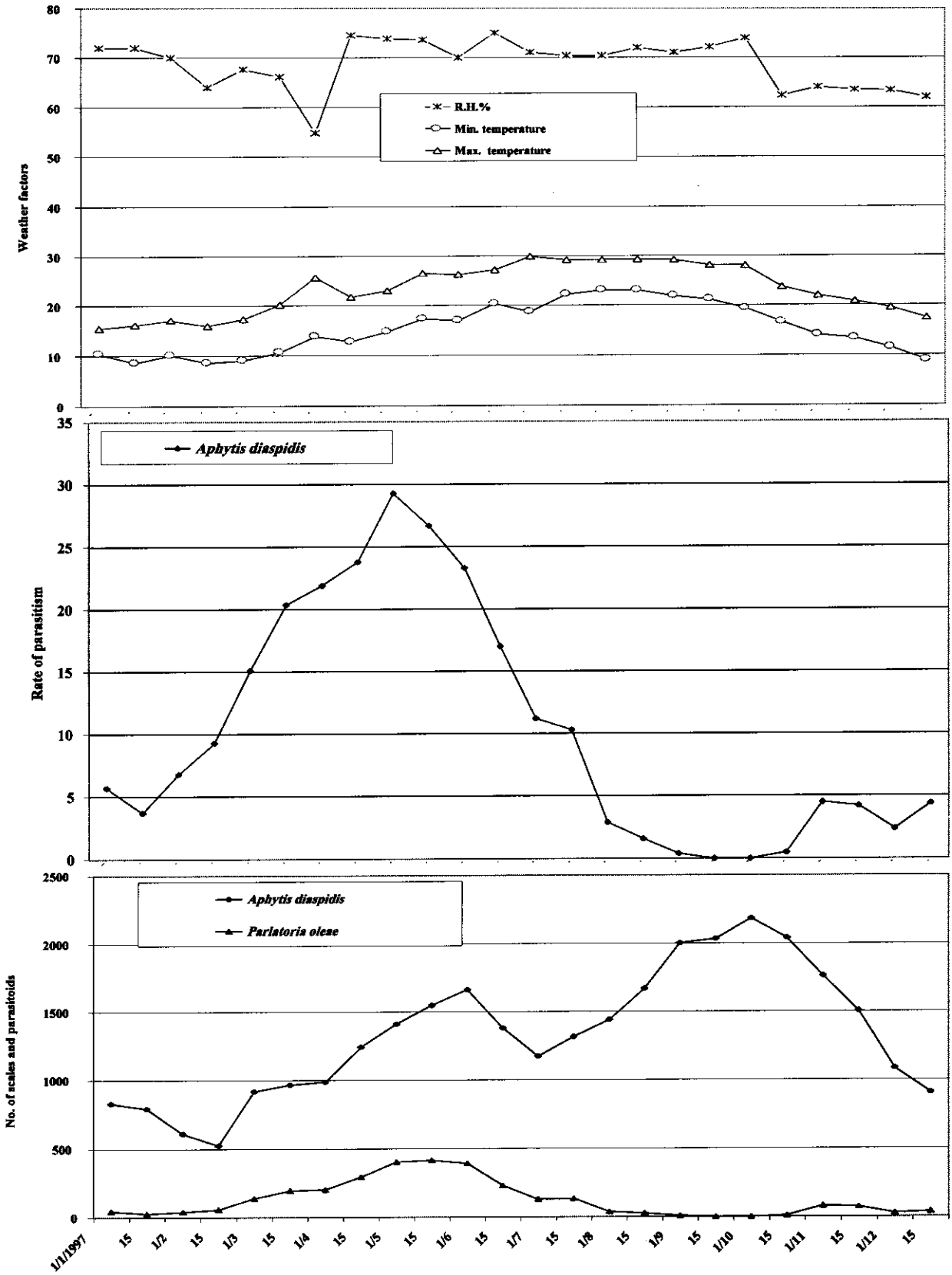

Fig. (31): Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis diaspidis* resulted from *Parlatoria oleae* on *Olea* sp. in Northern Coast, in relation to weather factors during 2000.

low percentages of parasitism of 0.8%, 1.0%, 1.3%, 0.6%and 0.3%, respectively (Hafez, 1988).

Statistical analysis indicated that during the first year, the effect of D.Mn.T. on the rate of parasitism was highly significant ($R^2 = 0.9721$, $P < 0.01$), 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 ($R^2 = 0.9623$,$P < 0.01$), while D.Mx.T. and D.M.R.H. were once more of insignificant effect (Table, 13).

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

In the first year (1999) (Table, 14 and Fig. 32), the numbers of *A. hispanicus* that attacked *I. pallidula* on *M. indica* (mango) began to increase on January 1st (at 20.4°C max., 8.4°C min.and 74.0% RH), recording the first peak, after which it increased once more to reach the highest peak. This was recorded on May 1st (at 32.2°C max., 16.6°C min.and 54% RH). Another peak was recorded on October 1st (at 31.3°C max., 18.4°C min.and 64.5% RH). The numbers of parasitoids were 8, 75and 569, respectively. The rate of parasitism recorded the first peak of 4.2% on April 15th (at 28.9°C max., 13.6°C min.and 58.0% RH), after which it decreased and then increased once more to record the second peak of 9.4% on October 1st.

During the second year (2000) (Table, 14 and Fig. 33), the numbers of parasitoids began an increase on January 1st (at 18.4°C max., 10.3°C min.and 69% RH), continued to rise until they reached the highest peak on August 1st (34.4°C max., 22.5°C min.and 61.6% RH)and then recorded a third peak on November 1st (at 26.1°C max., 13.5°C min.and 60.0% RH). The numbers of parasitoids were 5, 55 and 305, respectively.

Table (13) : **Multiple regression values indicating the effect of weather factors on the percent parasitism of *Aphytis diaspidis* on *Parlatoria oleae* in Northrn Coast.**

Year	1997					1998				
Daily mean weather factors	SS	df	Ms	F	P	SS	df	Ms	F	P
D.MX.T.	2.100	1	2.100	1.139	0.2998	12.984	1	12.984	3.689	0.0591
D.MN. T.	47.131	1	47.131	25.578	0.0001	39.688	1	39.688	11.277	0.0013
D.M.R.H	2.549	1	2.549	1.383	0.2549	3.780	1	3.780	1.074	0.3038

Table (14): Number of scales, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis hispanicus* resulted from *Insulaspis pallidula* on *Mangifera indica* in Ismailia, in relation to weather factors during 1999 and 2000.

Date of sampling	1997						1998					
	No. of scales	Parasitoid		Daily mean weather factors			No. of scales	Parasitoid		Daily mean weather factors		
		No.	R%	Temperature		RH%		No.	R%	Temperature		RH%
				Min	Max					Min	Max	
Jan. 1st	1224	8	0.7	8.4	20.4	74.0	987	5	0.5	10.3	18.4	69.0
15th	1431	19	1.3	8.7	21.4	62.0	816	6	0.8	7.2	17.5	65.0
Feb. 1st	1109	14	1.2	7.7	20.5	67.0	729	8	1.0	8.0	18.6	69.0
15th	645	15	2.4	7.6	19.9	67.0	535	9	1.7	7.3	19.3	65.0
Mar.1st	651	17	2.7	10.5	23.9	66.5	520	11	2.2	6.6	19.1	62.6
15th	882	30	3.4	12.5	35.3	51.2	487	12	2.4	10.5	22.5	64.1
April. 1st	1293	53	4.1	12.6	25.7	50.0	675	15	2.1	13.3	28.7	53.0
15th	1362	57	4.2	13.6	28.9	58.0	702	18	2.6	14.6	28.3	60.7
May. 1st	2048	75	3.6	16.6	32.2	54.0	723	24	3.3	15.7	29.3	55.9
15th	1844	40	2.2	18.2	32.4	56.0	817	30	3.6	17.6	32.3	46.8
June. 1st	1160	22	1.9	19.7	34.2	53.0	935	34	3.7	19.7	32.4	57.0
15th	1013	6	0.6	21.1	34.2	62.0	1016	42	4.1	20.4	34.3	56.0
July. 1st	1631	17	1.0	21.7	35.3	61.0	942	44	4.6	21.8	36.9	53.4
15th	1855	25	1.3	21.8	34.6	60.0	875	50	5.7	22.8	36.6	52.2
Aug. 1st	2723	124	4.5	22.8	35.6	61.4	1029	55	5.3	22.5	34.4	61.6
15th	2854	192	6.7	22.4	35.3	59.0	1142	49	4.7	23.0	34.3	64.5
Sep. 1st	3159	219	6.9	19.7	33.5	62.1	2431	107	5.0	21.6	34.4	60.0
15th	4530	372	8.2	21.3	33.8	65.0	2724	156	5.7	19.6	32.0	63.0
Oct. 1st	6023	569	9.4	18.4	31.3	64.5	3049	184	6.0	13.7	31.8	66.3
15th	6238	453	7.2	17.8	29.5	70.4	4130	249	6.2	14.2	24.8	66.9
Nov. 1st	5632	391	6.9	14.2	27.2	64.0	4793	305	6.4	13.5	26.1	60.0
15th	4349	197	4.5	11.9	24.6	59.0	3138	182	5.8	12.0	23.4	58.0
Dec. 1st	1532	48	3.1	7.0	21.4	62.8	3244	136	4.2	8.0	20.5	61.0
15th	1620	19	1.2	9.3	21.1	67.8	3759	133	3.5	9.0	20.3	65.3

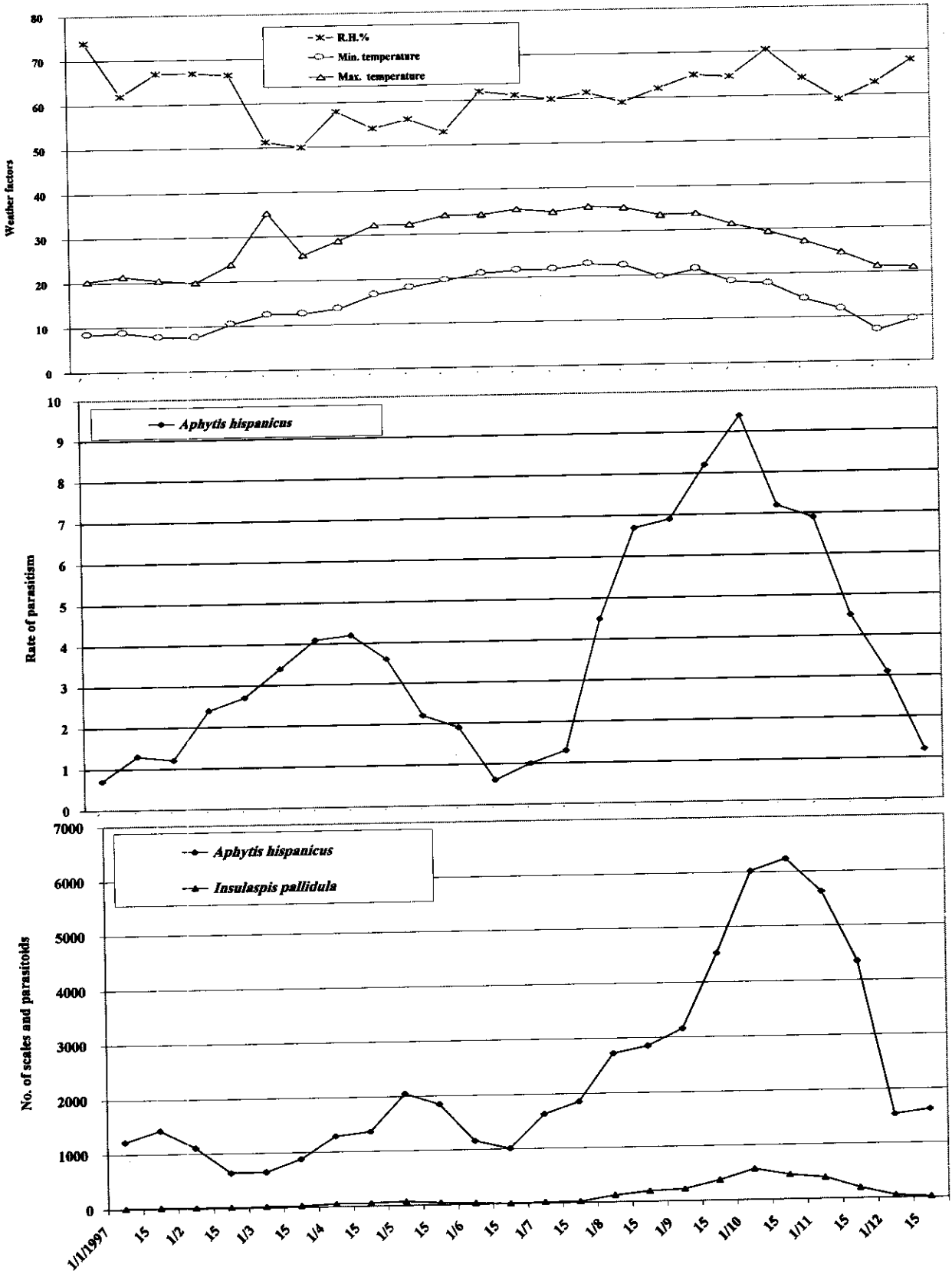

Fig. (32): **Number of scale susceptible stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis hispanicus* resulted from *Insulaspis pallidula* on *Mangifera indica* in Ismailia, in relation to weather factors during 1997.**

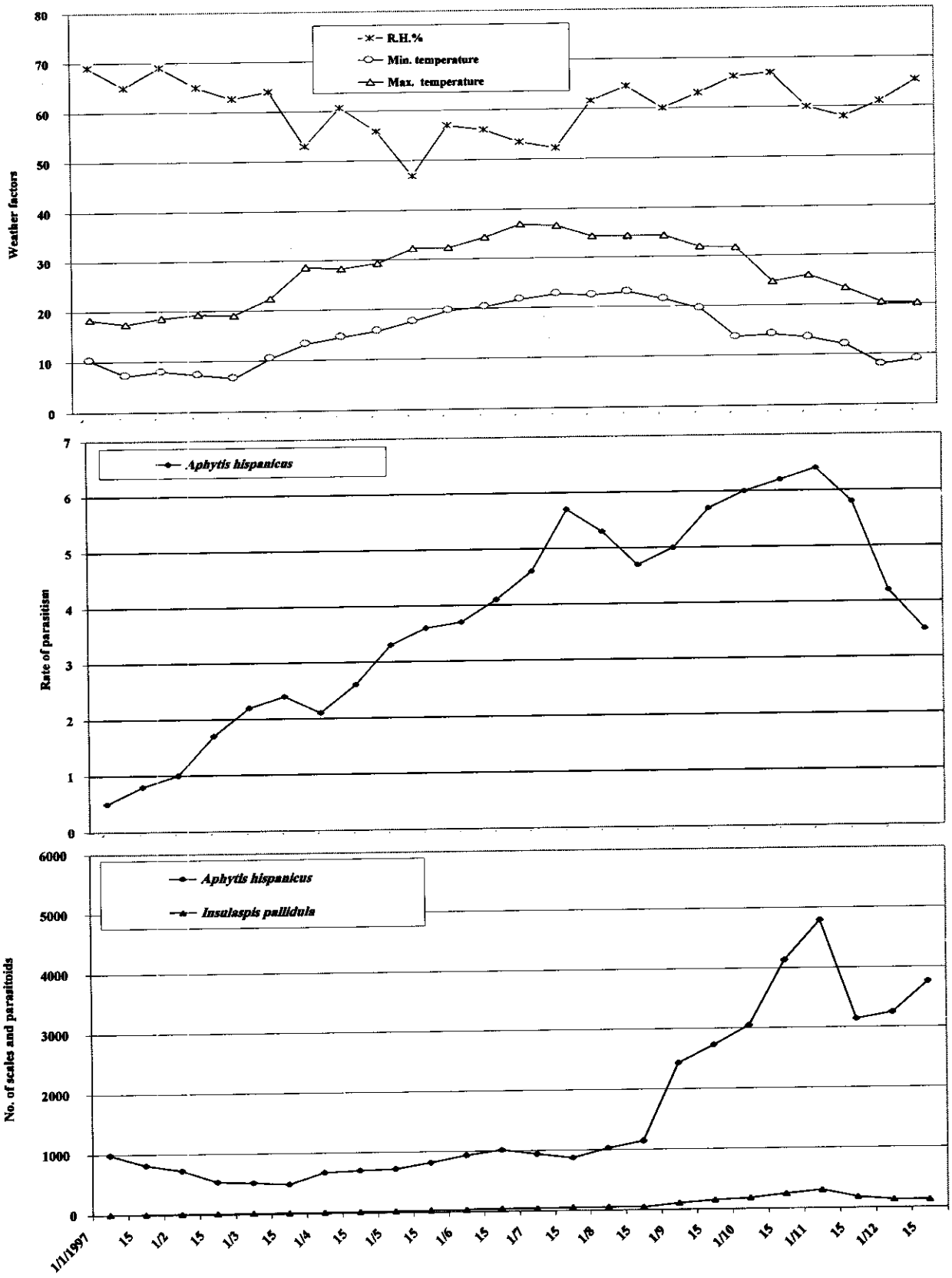

Fig. (33): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis hispanicus* resulted from *Insulaspis pallidula* on *Mangifera indica* in Ismailia,, in relation to weather factors during 1998.**

The rate of parasitism recorded a first peak of 5.7% on July 15th (at 36.6°C max., 22.8°C min.and 52.2% RH), then decreased and then increased again to record a second peak of 6.4% on November 1st.

The present work agrees with the findings of Hafez, *et al.* (1987a). This species was one of the most prolific parasitoids to attack some armored scale insects. (Gerson, 1967; Avidov, 1970).

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 ($R^2 = 0.9360$, $P < 0.01$), while those of D.Mn.T. and D.M.R.H. were insignificant (Table 15).

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

The data in Table (16) and Fig. (34) shows that in the first year (1997), the numbers of *A. holoxanthus* associated with *C. aonidum* on citrus trees began to increase on January 1st (at 21.8°C max., 9.0°C min.and 58.8% RH) and recorded the first peak on February 15th (at20.0°C max., 9.0°C min.and 62.0% RH) and recorded another peak on November 1st (at 27.8°C max., 15.9°C min.and 63.9% RH). The numbers of parasitoids were 196, 578 and 1051, respectively. The rate of parasitism recorded its first peak of 52.0% on March 1st (at 22.0°C max., 9.0°C min.and 58.5% RH). It then proceeded to decreaseand then increase to record the second peak of 70.9% on November 1st.

During the second year (1998) (Table, 16 and Fig. 35), the numbers began to increase on January 1st (at 20.0°C max., 8.2°C min.and 70.3% RH). The first peak was recorded on March 1st (at 22.3°C max., 9.7°C min. and 61.7% RH) and the second peak was recorded on October 1st

Table (15) : **Multiple regression values indicating the effect of weather factors on the percent parasitism of *Aphytis hispanicus* on *Insulaspis pallidula* in Ismailia.**

Year	1997					1998				
Daily mean weather factors	SS	df	Ms	F	P	SS	df	Ms	F	P
D.MX.T.	2.578	1	2.578	1.979	0.1830	16.924	1	16.924	64.736	0.0001
D.MN. T.	0.281	1	0.281	0.216	0.6501	0.347	1	0.347	1.326	0.2645
D.M.R.H	4.969	1	4.969	3.814	0.0727	80.451	1	8.451	3.233	0.9859

Table (16): Number of scales, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis holoxanthus* resulted from *Chrysomphalus aonidum* on *Citrus* sp. in Giza, in relation to weather factors during 1997 and 1998.

Date of sampling	No. of scales	1997					No. of scales	1998				
		Parasitoid		Daily mean weather factors				Parasitoid		Daily mean weather factors		
		No.	R%	Temperature		RH%		No.	R%	Temperature		RH%
				Min	Max					Min	Max	
Jan. 1st	827	198	23.8	9.0	21.8	58.8	836	159	19.0	8.2	20.0	70.3
15th	988	284	28.7	8.0	20.0	65.0	1022	227	22.1	8.6	22.5	62.2
Feb. 1st	964	417	43.5	5.7	19.0	67.5	1348	392	29.3	9.3	23.9	60.3
15th	1208	578	47.7	9.0	20.0	62.0	1434	443	30.8	10.1	19.9	66.4
Mar.1st	1121	563	52.0	9.0	22.0	58.5	1542	590	38.3	9.7	22.3	61.7
15th	747	327	43.8	10.0	24.0	57.5	948	282	30.0	11.4	24.1	58.0
April. 1st	1348	239	40.0	11.2	23.8	57.8	874	181	20.6	13.5	27.2	59.5
15th	549	150	27.2	14.8	29.3	59.2	731	136	18.5	17.1	29.9	57.0
May. 1st	619	133	21.4	15.7	30.3	54.7	663	99	14.9	13.5	27.2	84.6
15th	865	118	17.3	19.1	34.1	56.5	578	66	11.4	19.4	33.0	62.2
June. 1st	890	69	7.6	19.8	34.1	47.7	641	58	9.1	20.4	34.2	61.7
15th	1184	134	11.3	22.0	39.6	58.1	762	48	6.2	20.8	34.8	58.9
July. 1st	1589	237	14.9	22.7	36.9	52.0	848	42	4.9	22.3	38.1	56.8
15th	1370	359	26.2	22.9	35.8	62.1	1031	130	12.6	23.7	38.0	57.6
Aug. 1st	1533	491	32.0	22.5	35.1	62.5	1150	206	17.9	24.7	39.1	58.2
15th	1716	615	35.7	22.0	35.1	62.0	1939	498	25.7	22.3	35.5	61.3
Sep. 1st	1893	846	44.8	20.7	33.1	61.8	2337	857	36.7	23.7	38.8	55.9
15th	1969	974	49.7	19.2	32.5	55.7	3118	1270	40.7	21.3	33.9	60.3
Oct. 1st	1263	690	54.6	17.6	32.0	63.7	2854	1413	49.5	21.0	34.7	57.4
15th	1370	932	67.8	16.0	29.8	61.1	2621	1364	52.0	18.2	30.3	59.5
Nov. 1st	1482	1051	70.9	15.9	27.8	63.3	1962	1247	63.6	17.4	28.3	64.9
15th	1176	782	66.5	11.8	26.1	63.3	1834	1236	67.4	16.0	26.9	58.8
Dec. 1st	958	665	69.4	9.9	23.1	58.6	1655	955	57.7	14.6	25.4	61.2
15th	1012	647	62.4	8.0	21.0	67.6	1482	809	54.6	10.0	19.9	61.5

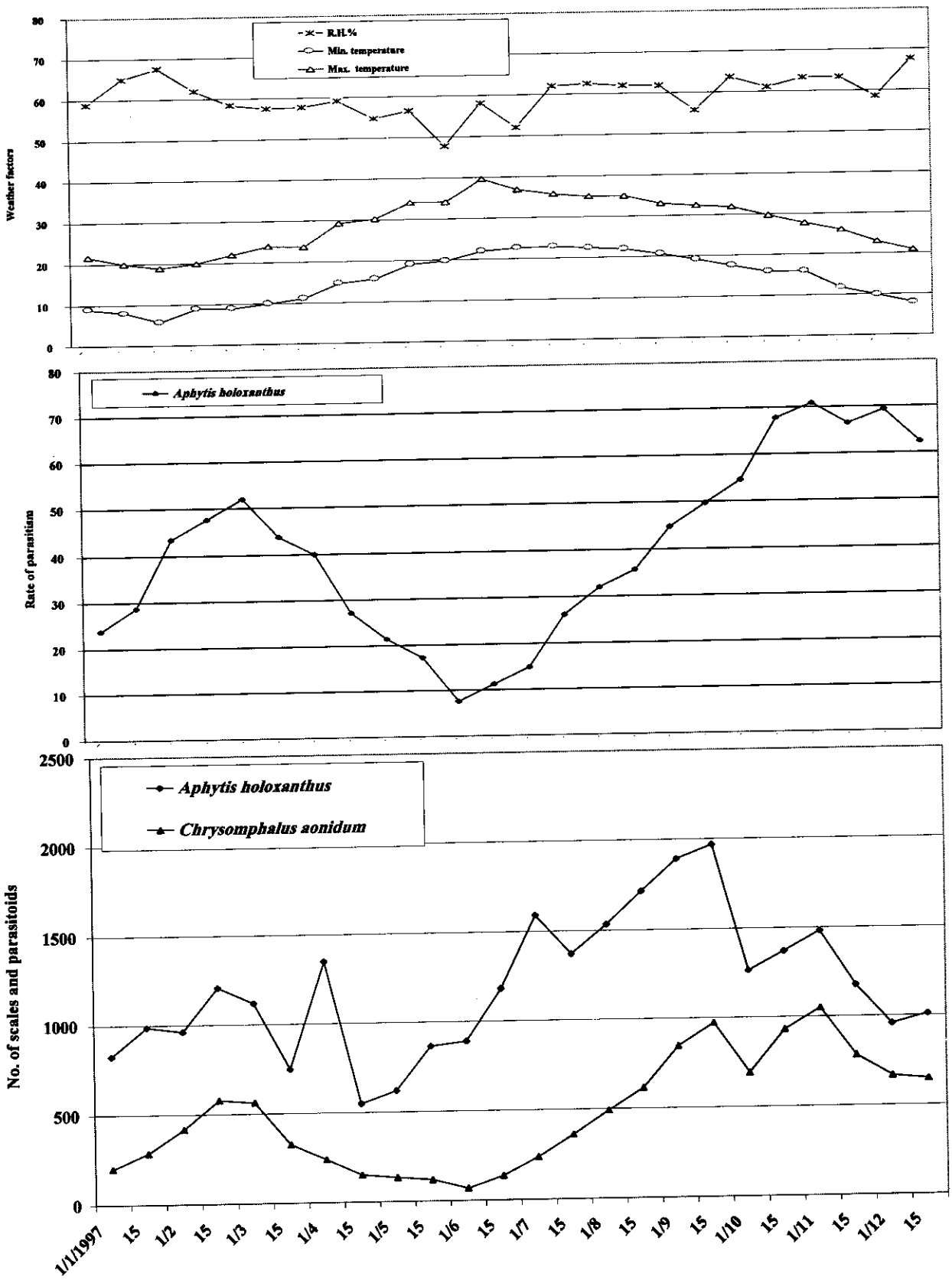

Fig. (34): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis holoxanthus* resulted from *Chrysomphalus aonidum* on *Citrus* sp. in Giza, in relation to weather factors during 1997.**

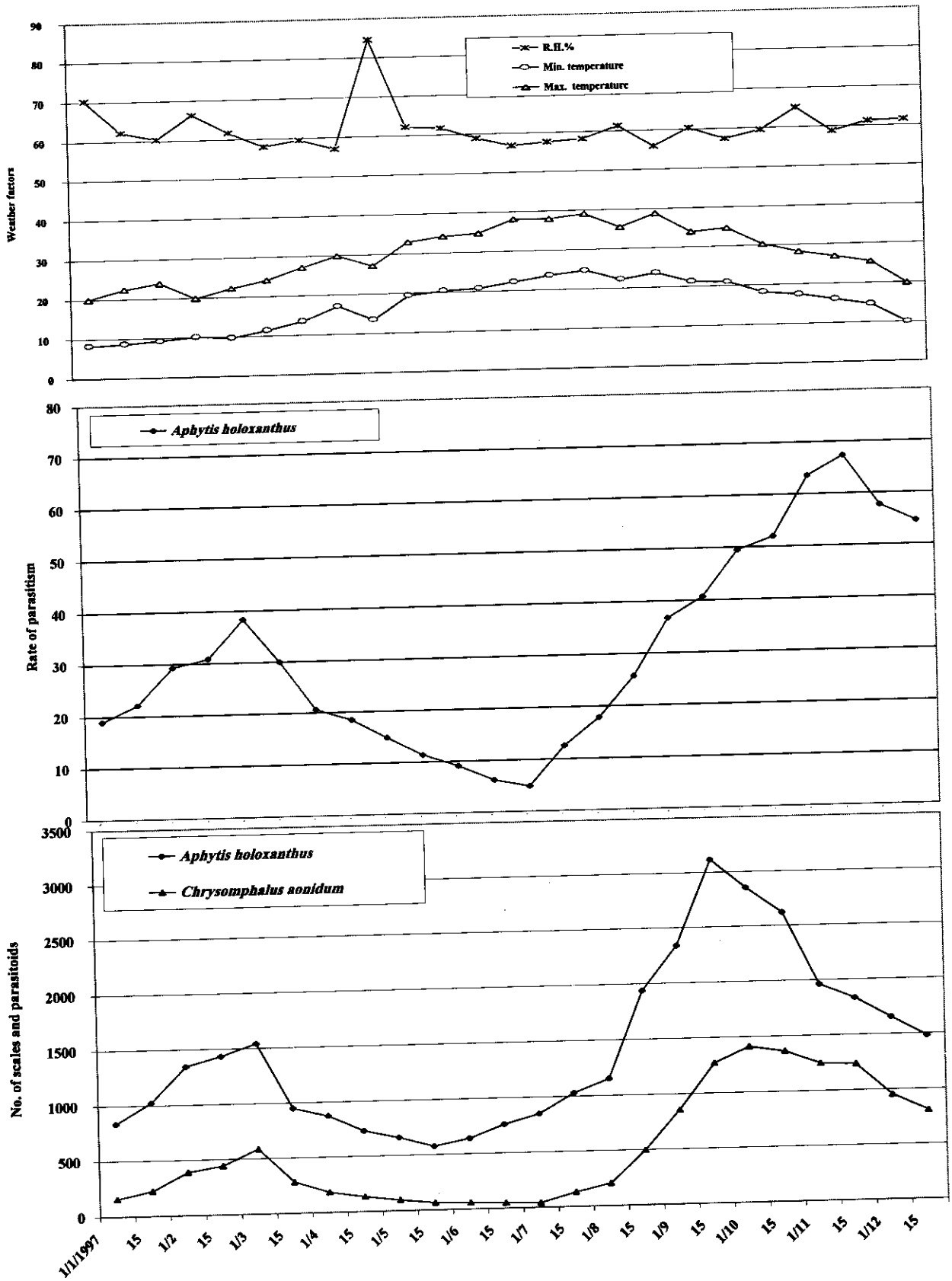

Fig. (35): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis holoxanthus* resulted from *Chrysomphalus aonidum* on *Citrus* sp. in Giza, in relation to weather factors during 1998.**

(at 34.7°C max., min. 21.0°C and 57.4% RH). The numbers of parasitoids were 590 and 1413, respectively. The rates of parasitism during these months were 38.3% and 49.5%, respectively. In this sample, this species recorded maximum parasitism rates of 70.9% and 67.4% during 1997 and 1998 respectively.

Clancy, *et al.* (1963), Selhime, *et al.* (1969), DeBach and Rosen (1976), Dean (1982) and Steinberg, *et al.* (1986) all recorded *A. holoxanthus* as an effective parasitoid on *C. aonidum.*

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 with $P < 0.01$) and $P < 0.05$, respectively ($R^2 = 0.9744$), while 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 ($R^2 = 0.9522$, $P < 0.01$), while D.Mn.T. and D.M.R.H were insignificant (Table, 17).

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

An abundance of *A. lepidosaphes* was recorded during the two successive years of this work. The data in Table, 18 and Fig. 36 shows that in the first year (1999), the numbers of this parasitoid recorded their first peak on January 1st (at 20.4°C max., 8.4°C min.and 74.0% RH)and reached their highest peak on December 15th (at 21.1°C max., 9.3°C min.and 67.8% RH). The numbers of parasitoids were 377 and 605, respectively. The rates of parasitism followed the same trend in these months, reaching 45.0% and 59.2%, respectively. In the second year (2000) (Table, 18 and Fig. 37), the numbers of parasitoids recorded their first peak of 226 on January 1st (at 18.4°C max., 10.3°C min.and 69.0% RH)and reached their highest peak of 449 on November 15th (at 23.4°C max., 12.0°C min.and 58% RH). The rate of parasitism recorded the first

Table (17) : **Multiple regression values indicating the effect of weather factors on the percent parasitism of *Aphytis holoxanthus* on *Chrysomphalus aonidum* in Giza.**

Year	1997					1998				
Daily mean weather factors	SS	df	Ms	F	P	SS	df	Ms	F	P
D.MX.T.	21.428	1	21.428	1.763	0.2008	233.903	1	233.903	10.806	0.0041
D.MN. T.	174.576	1	174.576	14.363	0.0013	11.964	1	11.964	0.553	0.4668
D.M.R.H	95.749	1	95.749	7.878	0.0117	32.663	1	32.663	1.509	0.2351

Table (18): Number of scales, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis lepidosaphes* resulted from *Lepidosaphes beckii* on *Mangifera* indica in Ismailia, in relation to weather factors during 1999 and 2000.

Date of sampling	1999						2000				
	No. of scales	Parasitoid		Daily mean weather factors			No. of scales	Parasitoid		Daily mean weather factors		
		No.	R%	Temperature		RH%		No.	R%	Temperature		RH%
				Min	Max					Min	Max	
Jan. 1st	838	377	45.0	8.4	20.4	74.0	716	226	31.5	10.3	18.4	69.0
15th	879	320	36.4	8.7	21.4	62.0	746	184	24.7	7.2	17.5	65.0
Feb. 1st	423	123	29.0	7.7	20.5	67.0	401	60	15.1	8.0	18.6	69.0
15th	447	98	21.9	7.6	19.9	67.0	387	41	10.7	7.3	19.3	65.0
Mar.1st	327	60	18.5	10.5	23.9	66.5	324	15	4.8	6.6	19.1	62.6
15th	306	37	11.0	12.5	35.3	51.2	229	15	6.2	10.5	22.5	64.1
April. 1st	227	15	6.6	12.6	25.7	50.0	186	3	1.6	13.3	28.7	53.0
15th	209	5	2.6	13.6	28.9	58.0	148	8	5.4	14.6	28.3	60.7
May. 1st	198	11	5.4	16.6	32.2	54.0	134	11	8.3	15.7	29.3	55.9
15th	152	14	9.1	18.2	32.4	56.0	101	13	12.9	17.6	32.3	46.8
June. 1st	160	26	16.1	19.7	34.2	53.0	66	10	17.6	19.7	32.4	57.0
15th	177	33	18.9	21.1	34.2	62.0	81	17	21.3	20.4	34.3	56.0
July. 1st	248	57	22.9	21.7	35.3	61.0	96	20	20.9	21.8	36.9	53.4
15th	267	84	31.5	21.8	34.6	60.0	179	34	19.2	22.8	36.6	52.2
Aug. 1st	319	94	29.1	22.8	35.6	61.4	218	23	10.6	22.5	34.4	61.6
15th	354	53	15.0	22.4	35.3	59.0	238	48	20.3	23.0	34.3	64.5
Sep. 1st	501	65	12.9	19.7	33.5	62.1	429	119	27.9	21.6	34.4	60.0
15th	534	113	21.2	21.3	33.8	65.0	510	161	31.6	19.6	32.0	63.0
Oct. 1st	654	218	33.3	18.4	31.3	64.5	664	233	35.7	13.7	31.8	66.3
15th	706	259	36.8	17.8	29.5	70.4	727	268	37.0	14.2	24.8	66.9
Nov. 1st	933	384	41.1	14.2	27.2	64.0	848	369	43.6	13.5	26.1	60.0
15th	957	452	47.3	11.9	24.6	59.0	901	449	49.9	12.0	23.4	58.0
Dec. 1st	999	512	51.2	7.0	21.4	62.8	828	320	38.7	8.0	20.5	61.0
15th	1022	605	59.2	9.3	21.1	67.8	801	271	33.9	9.0	20.3	65.0

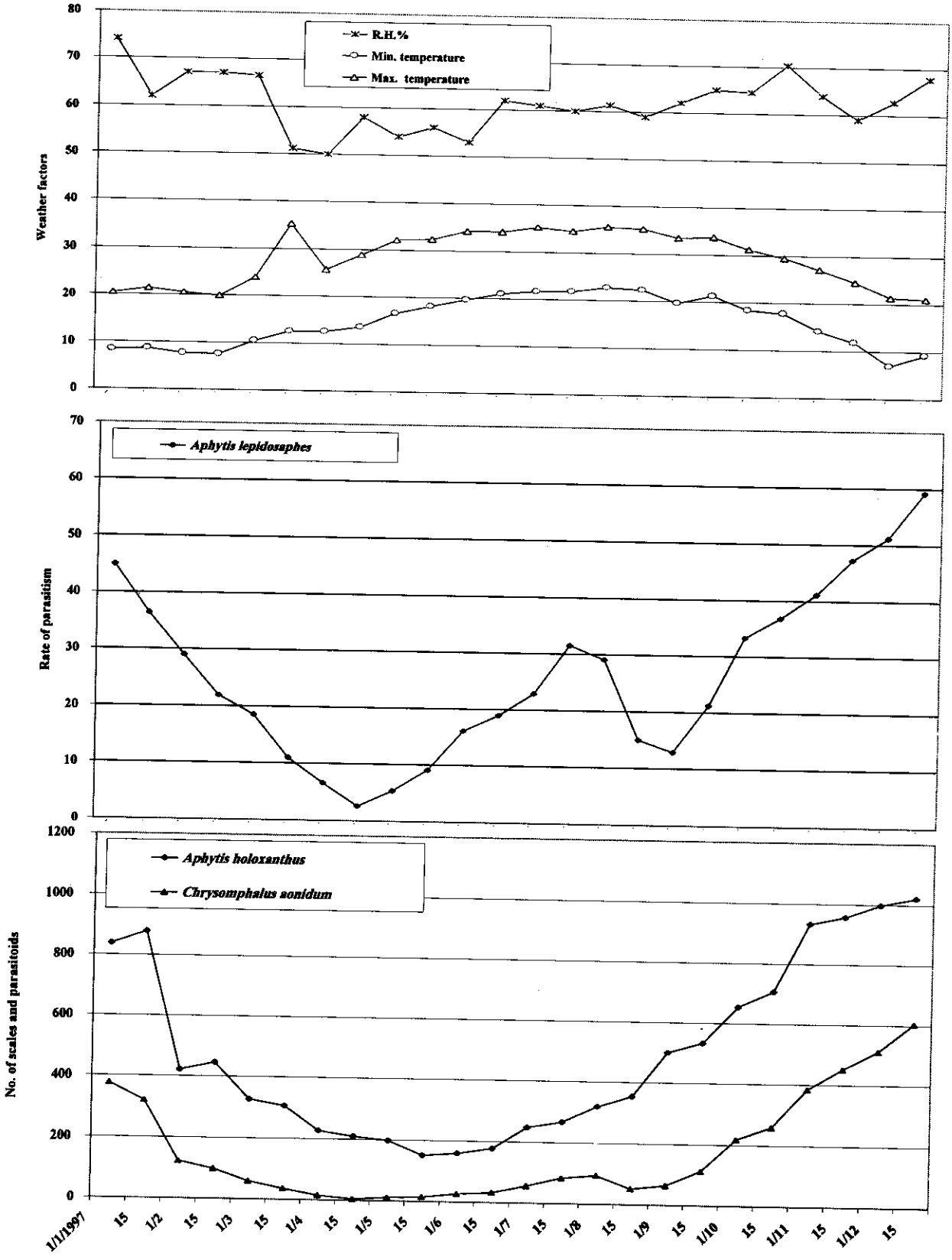

Fig. (36): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis lepidosaphes* resulted from *Lepidosaphes beckii* on *Mangifera* indica in Ismailia, in relation to weather factors during 1999.**

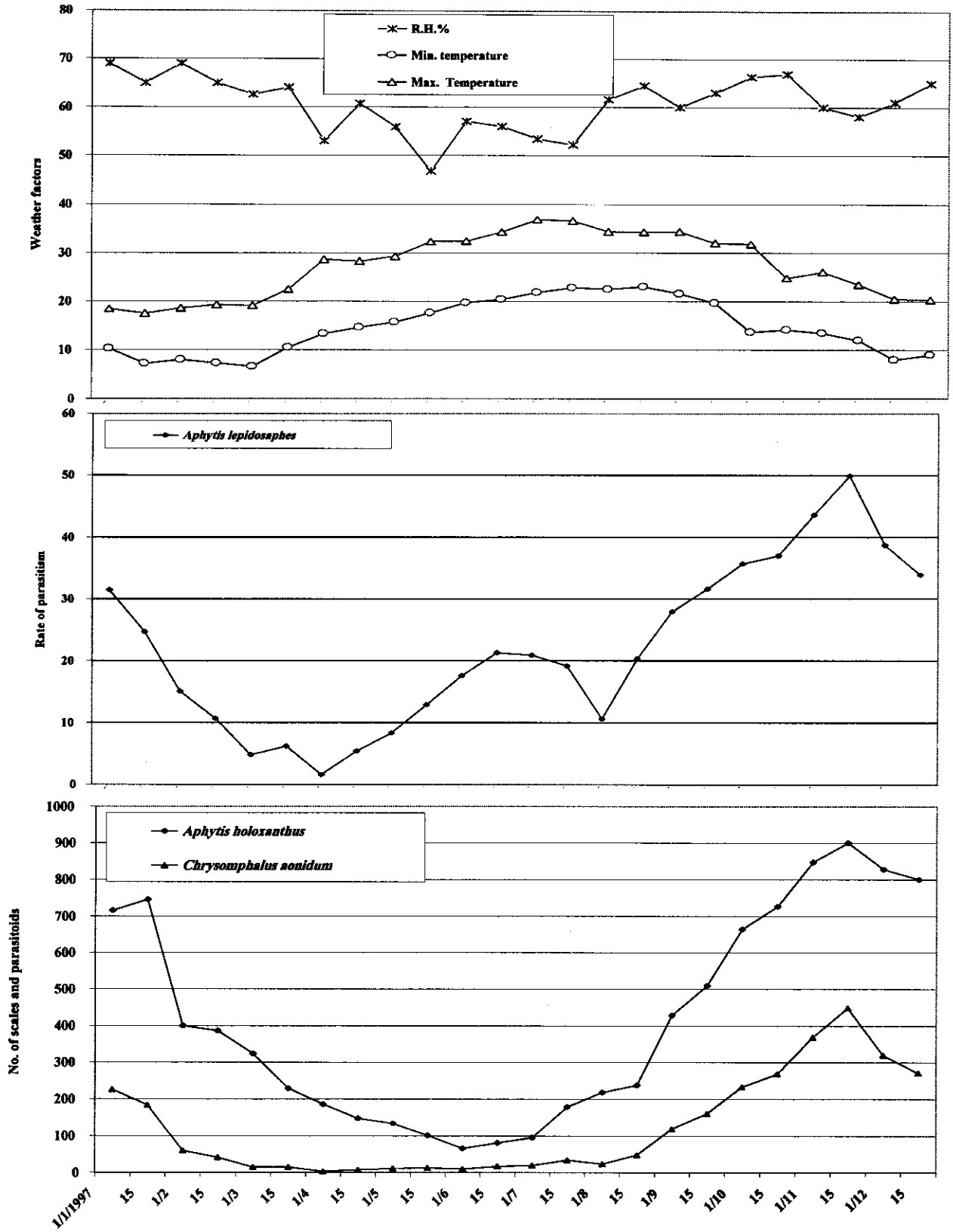

Fig. (37): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis lepidosaphes* resulted from *Lepidosaphes beckii* on *Mangifera* indica in Ismailia, during 2000.**

peak of 31.5% on January 1st. After peaking, the rate of parasitism decreased to 1.6% on April 1st (at 28.7°C max., 13.3°C min.and 53.0% RH), but began to increase gradually to reach another peak of 49.9% on November 15th (at 23.4°C max., 12.0°C min.and 58.0% RH). In the present work, the max.imum parasitism rates were 59.2% and 49.9% during the first and second years, respectively. Abdel-Fattah and El-Saadany (1979), Hafez (1987b) and Abd-Rabou (1997a) recorded the max.imum parasitism of this species on *L. beckii* as 84%, 38.9%and 43%, respectively. *A. lepidosaphes* is an effective parasitoid on the purple scale, *L. beckii* according to DeBach and Rosen (1976) and Rosen and DeBach (1979).

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 (Table, 19).

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

The data in Table, 20 and Fig. 38 shows that in the first year (1999) the numbers of *A. libinacus* on *L. riccae* began to increase on January 1st (at 22.0°C max., 9.0°C min.and 67.0% RH), recorded the first peak on April 15th (at 32.0°C max., 15.5°C min.and 57.5% RH)and then recorded another peak on November 1st (at 29.4°C max., 15.7°C min.and 62.5% RH). The numbers of parasitoids were 12, 131and 361 respectively. The rates of parasitism in these months were 1.7%, 12.8%and 18.7%, respectively.

In the second year (2000) (Table, 20 and Fig. 39), the numbers began an increase on January 15th (at 21.2°C max., 7.0°C min.and 64.0%

Table (19) : **Multiple regression values indicating the effect of weather factors on the percent parasitism of *Aphytis lepidosaphes* on *Lepidosaphes beckii* in Ismailia.**

Year	1997					1998				
Daily mean weather factors	SS	df	Ms	F	P	SS	df	Ms	F	P
D.MX.T.	32.786	1	32.786	1.062	0.3066	425.417	1	425.417	2.513	0.1177
D.MN. T.	56.577	1	56.577	1.493	0.2260	208.229	1	208.229	1.230	0.2714
D.M.R.H	92.240	1	92.240	0.064	0.8013	121.621	1	121.621	0.718	0.3997

Table (20): Number of scales, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis libinacus* resulted from *Lucaspis riccae* on *Olea* sp in Fayoum, in relation to weather factors during 1999 and 2000.

Date of sampling	1999						2000				
	No. of scales	Parasitoid		Daily mean weather factors			No. of scales	Parasitoid		Daily mean weather factors		
		No.	R%	Temperature		RH%		No.	R%	Temperature		RH%
				Min	Max					Min	Max	
Jan. 1st	732	12	1.7	9.0	22.0	67.5	525	20	3.9	10.1	20.9	67.0
15th	623	15	2.5	7.3	22.7	62.0	440	17	4.2	7.0	21.2	64.0
Feb. 1st	549	16	2.9	9.6	22.6	65.5	407	23	5.1	8.3	21.5	66.5
15th	505	18	3.5	7.5	22.0	68.0	319	18	5.6	8.3	22.0	62.5
Mar.1st	478	19	4.0	10.1	25.5	63.5	301	24	8.2	7.0	22.1	61.5
15th	629	32	5.2	12.8	28.2	59.5	324	32	10.0	11.2	26.3	61.0
April. 1st	785	81	6.7	11.6	28.8	56.5	376	40	10.9	14.2	32.3	58.0
15th	1020	132	12.8	15.5	32.0	57.5	460	64	14.0	14.0	33.1	55.0
May. 1st	1150	76	6.6	19.3	35.9	55.0	627	99	15.7	16.1	33.7	57.0
15th	1337	32	2.4	19.6	35.1	55.0	740	63	8.5	20.7	36.2	54.0
June. 1st	1562	67	4.3	20.9	37.6	56.0	911	69	7.8	22.0	36.7	58.5
15th	1328	18	1.4	21.3	37.4	59.0	943	57	6.1	20.8	38.3	58.5
July. 1st	1364	10	0.7	21.9	39.0	56.5	987	19	1.9	21.1	40.9	52.5
15th	1220	14	0.6	22.8	39.6	58.5	1006	7	0.7	22.6	39.3	58.0
Aug. 1st	1731	26	1.5	24.3	39.6	59.5	1185	34	2.9	22.0	36.8	59.5
15th	1917	160	8.3	23.1	39.3	59.0	1206	93	7.8	23.4	38.5	61.0
Sep. 1st	2026	229	11.6	21.9	36.9	66.5	1329	216	16.2	22.0	37.4	60.5
15th	2174	295	14.2	22.7	36.2	63.5	1443	239	17.5	20.7	34.6	60.0
Oct. 1st	2430	202	9.5	21.3	35.2	63.0	1576	261	18.6	19.2	33.6	59.0
15th	2532	173	6.8	20.4	32.4	63.5	1547	320	20.3	15.1	28.2	63.0
Nov. 1st	1935	361	18.7	15.7	29.4	62.5	1629	224	13.8	13.8	27.8	62.0
15th	1253	322	28.6	14.0	27.1	62.5	1876	160	8.4	13.0	26.0	60.8
Dec. 1st	920	191	2.1	10.0	23.7	64.5	1724	48	2.8	10.0	22.4	63.6
15th	864	66	7.5	9.2	23.4	65.5	1588	75	4.7	8.9	21.8	62.0

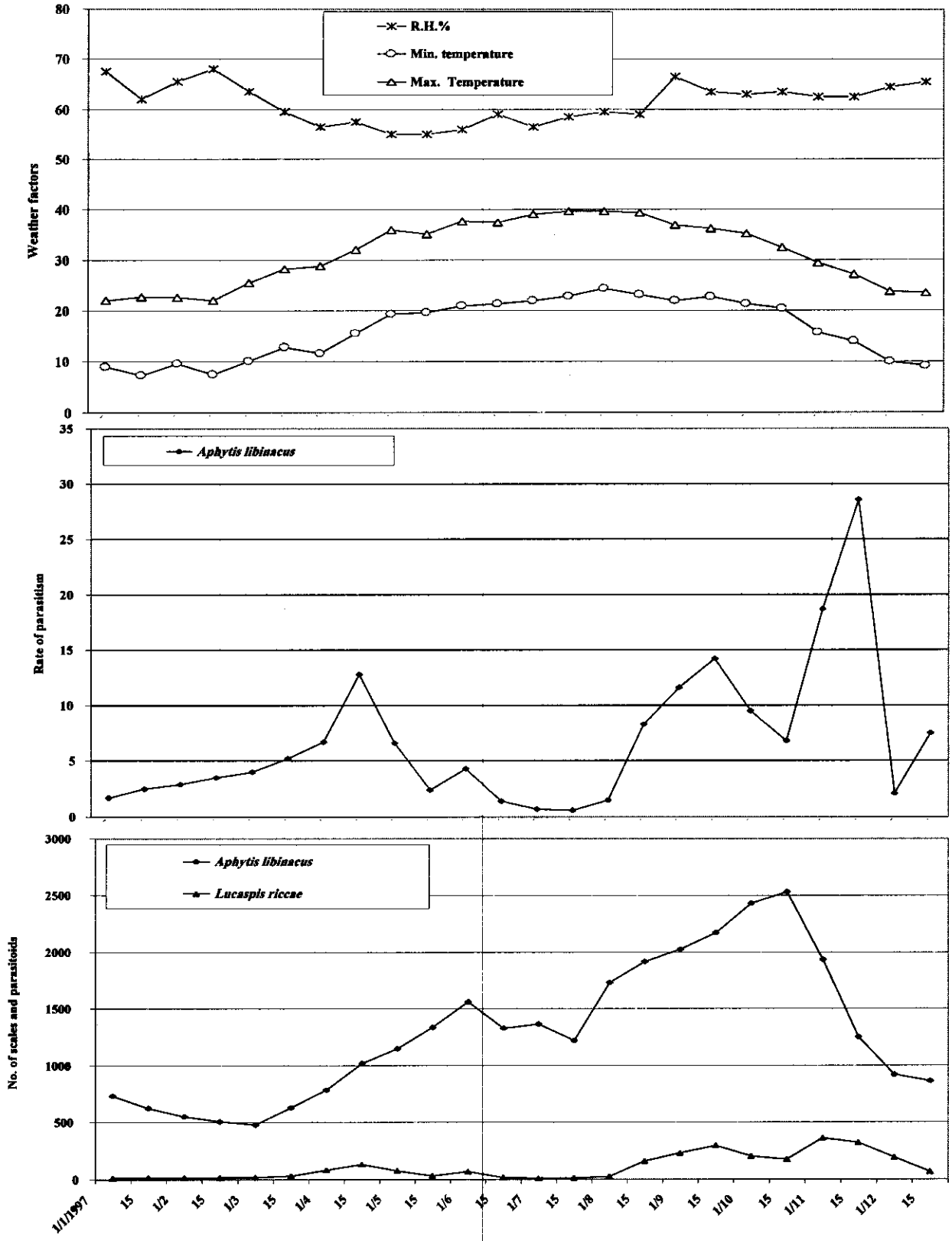

Fig. (38): **Number\ of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis libinacus* resulted from *Lucaspis riccae* on *Olea* sp in Fayoum, in relation to weather factors during 1997.**

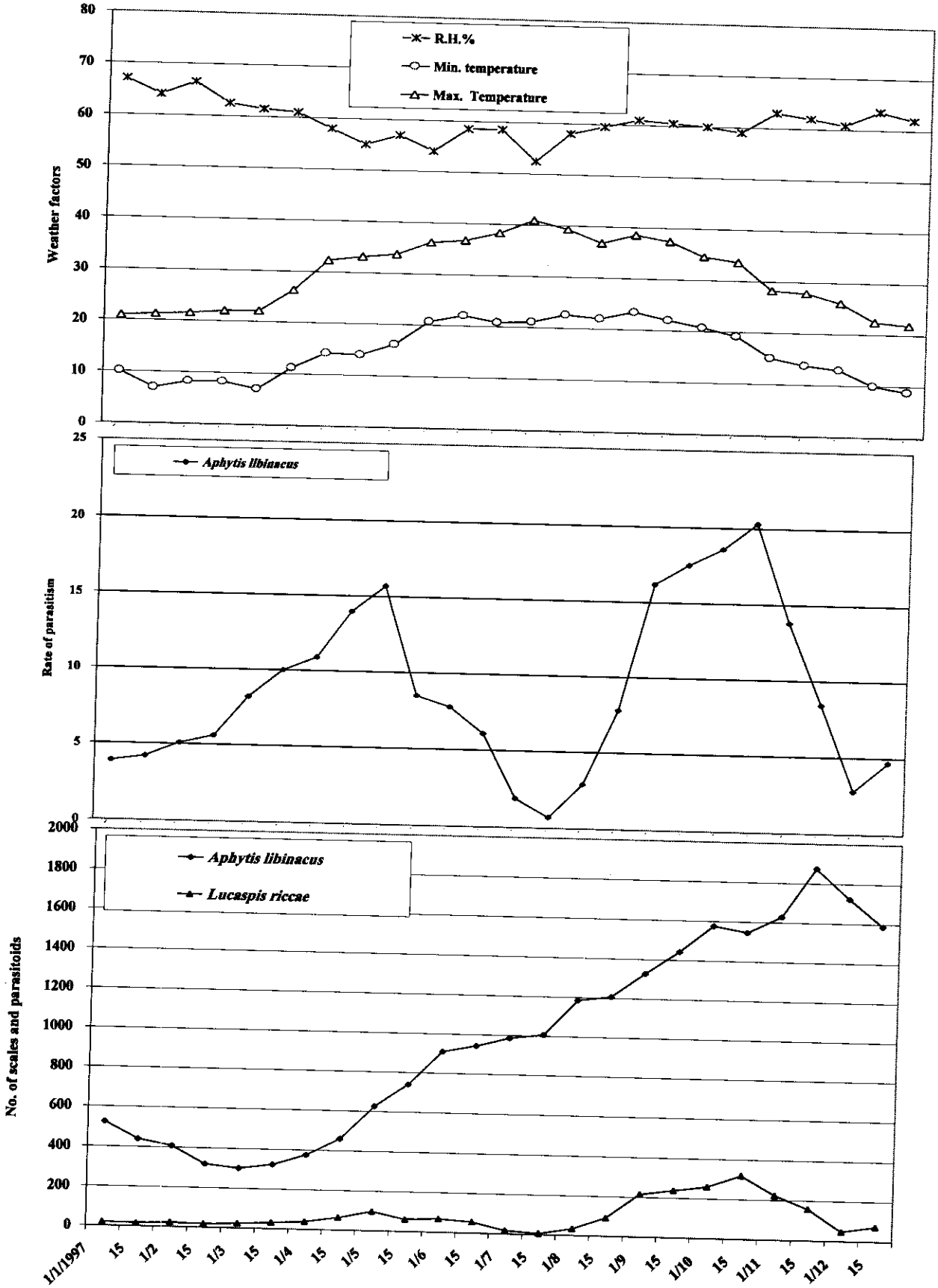

Fig. (39): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis libinacus* resulted from *Lucaspis riccae* on *Olea* sp in Fayoum, in relation to weather factors during 1998.**

R H). The first peak was recorded on May 1st (at 33.7°C max., 16.1°C min.and 57.0% RH) and the second peak occurred on October 15th (at 28.2°C max., 15.1°C min.and 63.0% RH). The numbers of parasitoids were 17, 99 and 320 respectively. The rates of parasitism in these months were 3.9%, 15.7%and 20.3%, respectively.

The observed data agree with those obtained by Moursi and Mesbah (1985) and Moursi and Hegazi (1983).

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 (R^2 = 0.9276, P < 0.01), while D.Mx.T. and D.M.R.H. remained of insignificant effect (Table, 21).

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

Table (22) and Figs (40 and 41) clearly reveal the average parasitism rates of this parasitoid to have been 25% and 16% during 1997 and 1998, respectively. Three peaks were recorded annually for *A. lingnanensis*. During the first year (1997) they occurred on March 15th (at 24.0°C max., 10.0°C min.and 57.5% RH) with 180 parasitoids, July 15th (at 35.8°C max., 22.9°C min.and 62.1% RH) with 345 parasitoids and November 15th (at 26.1°C max., 11.8°C min.and 63.9% RH) with 130 parasitoids. The parasitism rates were 33.0%, 43.2% and 34.8% respectively. In the second year (1998), the peaks were recorded on March 1st (at 22.3°C max., 9.7°C min.and 66.7% RH) with 125 parasitoids, August 1st (at 39.1°C max., 24.7°C min.and 58.2% RH) with 280 parasitoids and November 15th (at 26.9°C max., 16.0°C min.and 58.8% RH) with 38 parasitoids. The parasitism rates were 20.8%, 30.7% and 20.6%, respectively.

Table (21) : **Multiple regression values indicating the effect of weather factors on the percent parasitism of *Aphytis libinacus* on *Lucaspis riccae* in Fayoum.**

Year	1997					1998				
Daily mean weather factors	SS	df	Ms	F	P	SS	df	Ms	F	P
D.MX.T.	110.078	1	110.078	3.265	0.0764	6.238	1	6.238	2.268	0.1369
D.MN. T.	35.746	1	35.746	1.060	0.3078	49.275	1	49.275	17.910	0.0001
D.M.R.H	85.546	1	85.546	2.538	0.1171	4.946	1	4.946	1.798	0.1846

Table (22): Number of scales, number of parasitoid individuals ant rate of parasitism (R%) of *Aphytis lingnanensis* resulted from *Parlatoria ziziphi* on *Citrus* sp. in Giza, in relation to weather factors during 1997 and 1998.

Date of sampling	No. of scales	1997					No. of scales	1998				
		Parasitoid		Daily mean weather factors				Parasitoid		Daily mean weather factors		
		No.	R%	Temperature		RH%		No.	R%	Temperature		RH%
				Min	Max					Min	Max	
Jan. 1st	325	71	22.0	9.0	21.8	58.8	210	21	10.2	8.2	20.0	70.3
15th	313	101	26.7	8.0	20.0	65.0	214	28	13.3	8.6	22.5	62.2
Feb. 1st	350	108	29.0	5.7	19.0	67.6	230	39	19.8	9.3	23.9	60.5
15th	471	119	25.5	9.0	20.0	62.0	387	73	19.1	10.1	19.9	66.4
Mar.1st	726	128	25.6	9.0	22.0	58.5	603	125	20.8	9.7	22.3	61.7
15th	545	180	33.0	10.0	24.0	57.5	427	114	27.4	11.4	24.1	58.0
April. 1st	600	168	28.0	11.2	23.8	57.8	481	96	20.0	13.5	27.2	59.5
15th	662	144	24.2	14.8	29.3	59.2	538	77	12.9	17.1	29.9	57.0
May. 1st	696	157	22.6	15.7	30.3	54.7	585	48	8.0	13.5	27.2	84.6
15th	948	165	17.5	19.1	34.1	56.5	857	42	4.6	19.4	33.0	62.2
June. 1st	870	138	15.9	19.8	34.1	47.7	812	108	13.4	20.4	34.2	61.7
15th	752	142	18.7	22.0	39.6	58.1	786	119	13.9	20.8	34.8	58.9
July. 1st	810	205	25.3	22.7	36.9	52.0	623	127	20.7	22.3	38.1	56.9
15th	799	345	43.2	22.9	35.8	62.1	647	156	24.2	23.7	38.0	57.6
Aug. 1st	1030	306	29.8	22.5	35.1	62.5	914	28	30.7	24.7	39.1	58.2
15th	850	241	28.4	22.0	35.1	62.0	584	104	17.9	22.3	35.5	61.3
Sep. 1st	645	139	21.5	20.7	33.1	61.8	324	48	15.0	23.7	38.8	55.9
15th	667	124	18.7	19.2	32.5	55.7	340	33	9.9	21.3	33.9	60.3
Oct. 1st	435	80	17.8	17.6	32.0	63.7	168	13	8.1	21.0	34.7	57.4
15th	417	79	18.9	16.0	29.8	61.1	157	18	13.0	18.2	30.3	59.5
Nov. 1st	394	86	31.3	15.9	27.8	63.3	147	20	15.3	17.4	28.3	64.9
15th	375	130	34.8	11.8	26.1	63.9	186	38	20.6	16.0	26.9	58.8
Dec. 1st	360	93	25.9	9.9	23.1	58.6	212	35	16.7	14.6	25.4	61.2
15th	332	47	14.3	8.0	21.0	67.6	225	14	6.3	10.0	19.9	61.5

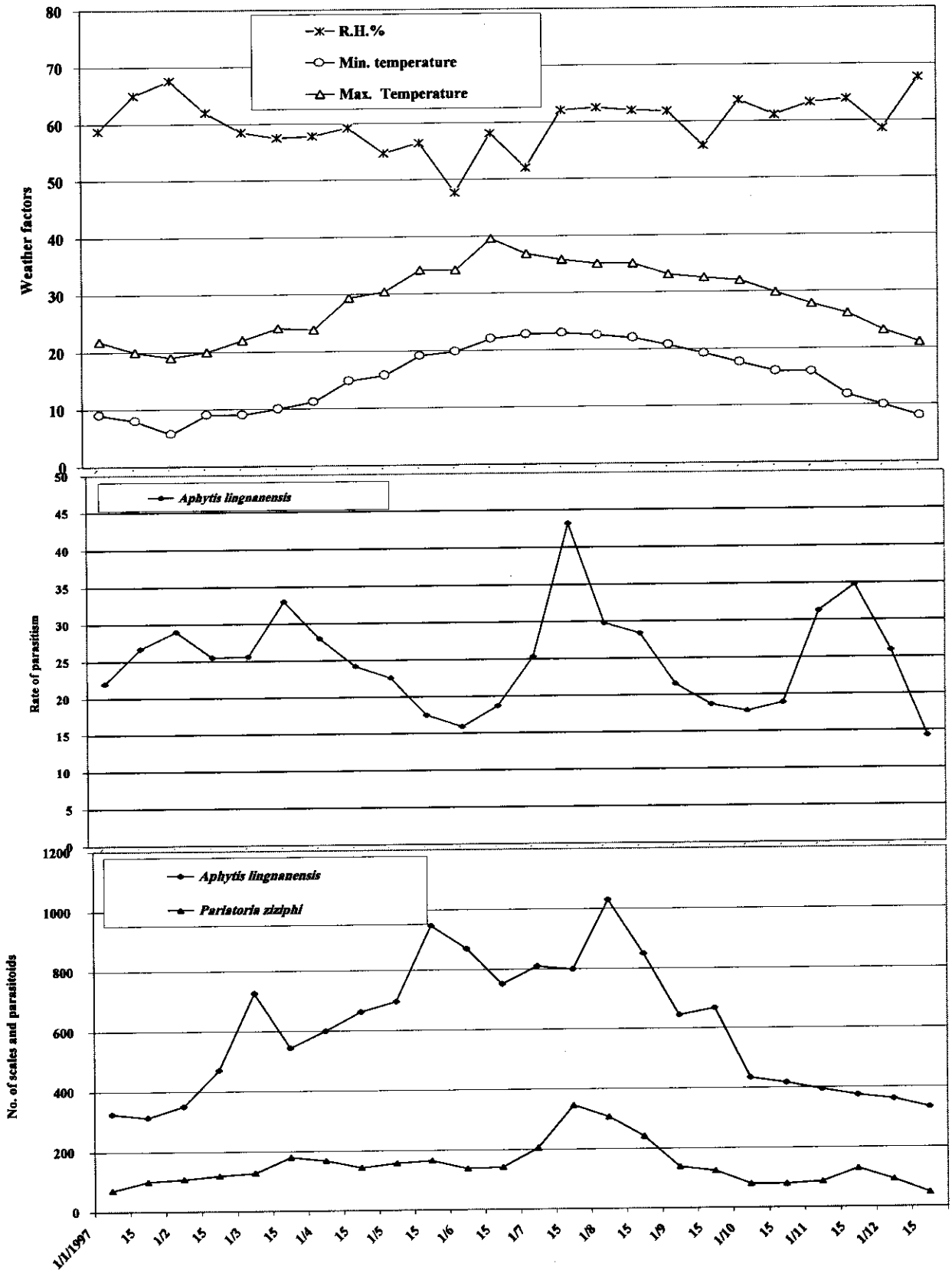

Fig. (40): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis lingnanensis* resulted from *Parlatoria ziziphi* on *Citrus* sp. in Giza, in relation to weather factors during 1997.**

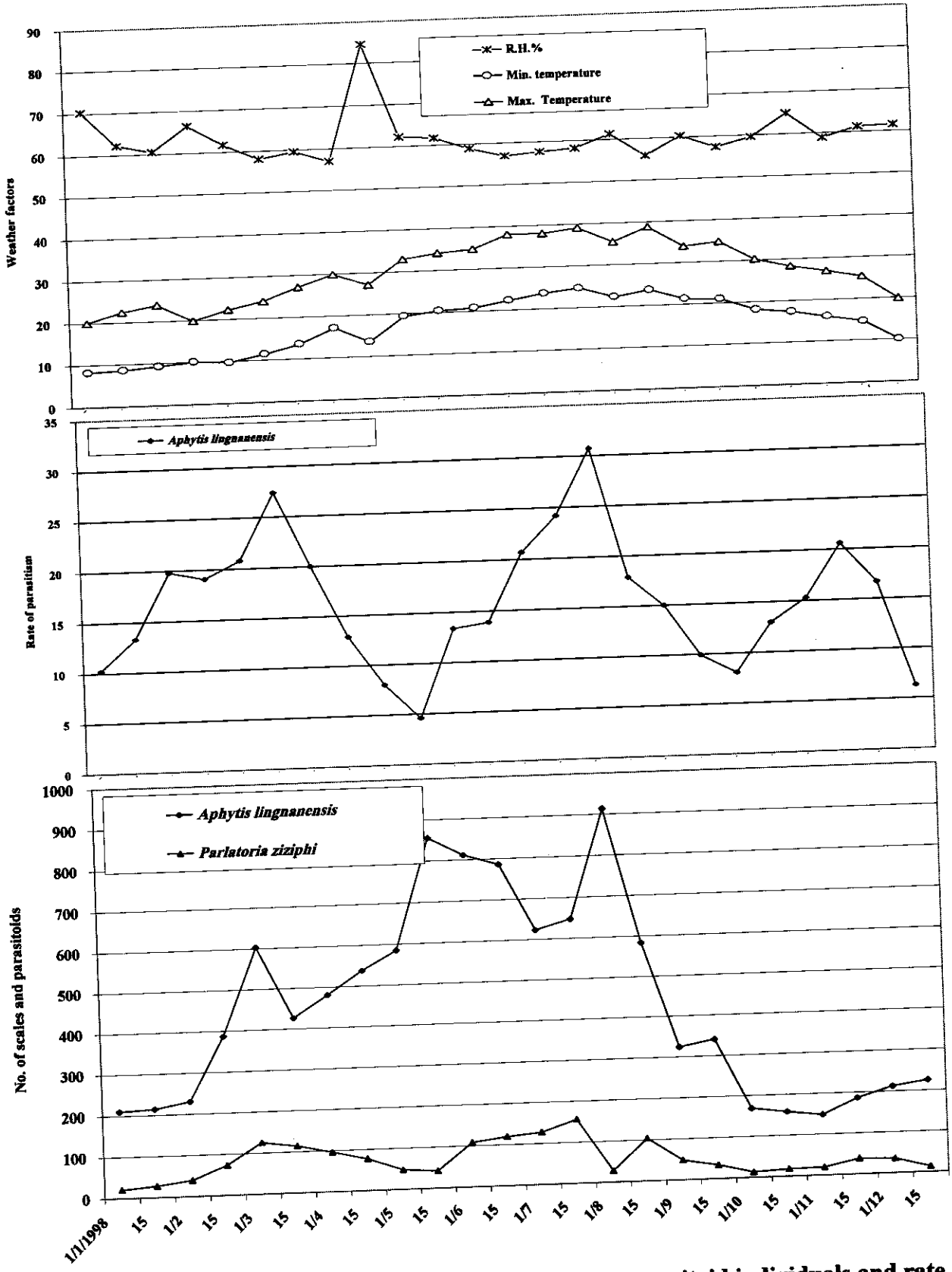

Fig. (41): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis lingnanensis* resulted from *Parlatoria ziziphi* on *Citrus* sp. in Giza, in relation to weather factors during 1998.**

During the present work *A. lingnanensis* had three peaks, contradicting the results obtained by Hafez (1988) who claimed that this species showed two peaks of parasitism, one occurring in January and the other in October.

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 (Table, 23).

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

The data in (Table, 24 and Fig. 42) shows that in the first year (1997) the numbers of *A. melinus* on *A. aurantii* began to increase on January 1st (at 20.3°C max., 5.9°C min. and 65% RH). The numbers then reached their first peak on February 1st (at 18.2°C max., 3.9°C min.and 59.0% RH), after which they recorded another peak on October 1st (at 31.8°C max., 19.3°C min. and 66.2% RH). The numbers of parasitoids were 192, 282and 984, respectively, with the rates of parasitism following a similar trend during these months, reaching 20.4%, 34.9%and 66.4%, respectively. In the second year (1998) (Table, 24 and Fig. 43), the numbers first began to increase on January 1st (at 18.6°C max., 6.7°C min.and 70.2% RH), reached their first peak on March 1st (at 21.1°C max., 7.6°C min. and 59.8% RH)and recorded another peak on November 1st (at 26.7°C max., 14.6°C min.and 61.0% RH). The numbers of parasitoids were 271, 450 and 1685 respectively. The rates of parasitism during these months were 15.4%, 41.3% and 56.5%, respectively. *A. melinus* is one of the more effective parasitoids in the

Table (23) : **Multiple regression values indicating the effect of weather factors on the percent parasitism of *Aphytis Lingnanensis* on *Parlatoria ziziphi* in Giza.**

Year	1997					1998				
Daily mean weather factors	SS	df	Ms	F	P	SS	df	Ms	F	P
D.MX.T.	96.354	1	96.354	0.938	0.3383	4.338	1	4.338	0.552	0.4673
D.MN. T.	56.879	1	56.879	0.572	0.4536	3.398	1	3.398	4.321	0.9948
D.M.R.H	32.427	1	32.427	0.016	0.8998	2.647	1	2.647	0.337	0.5690

Table (24): Number of scales, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis melinus* resulted from *Aonidiella aurantii* on *Citrus* sp. in Minya, in relation to weather factors during 1997 and 1998.

Date of sampling	No. of scales	1997					No. of scales	1998				
		Parasitoid		Daily mean weather factors				Parasitoid		Daily mean weather factors		
		No.	R%	Temperature		RH%		No.	R%	Temperature		RH%
				Min	Max					Min	Max	
Jan. 1st	942	192	20.4	5.9	20.3	65.0	1757	271	15.4	6.7	18.6	70.2
15th	865	224	25.8	5.8	17.8	68.0	1663	367	22.1	5.7	21.0	61.9
Feb. 1st	810	282	34.9	3.9	18.2	59.0	1389	425	30.6	7.6	23.7	63.0
15th	800	249	30.6	5.9	19.8	60.0	1195	436	36.4	8.1	20.3	62.5
Mar.1st	791	214	26.9	7.6	21.2	62.5	1090	450	41.3	7.6	21.1	59.8
15th	737	167	22.3	12.2	22.0	50.3	954	377	39.5	5.9	21.9	54.0
April. 1st	643	102	15.8	11.2	22.6	44.9	573	150	27.9	9.9	26.3	53.5
15th	429	56	14.5	16.7	29.2	49.7	736	141	19.7	13.2	28.9	51.5
May. 1st	384	23	6.1	17.4	31.5	47.8	879	163	16.2	18.6	39.0	47.5
15th	406	42	14.4	21.3	32.2	44.4	1291	200	15.5	18.5	34.6	49.5
June. 1st	414	70	16.9	23.4	34.4	41.4	1500	166	11.1	19.2	32.2	53.0
15th	495	108	21.8	21.9	36.0	44.7	1607	132	7.4	19.9	34.5	51.0
July. 1st	566	149	28.6	24.4	34.4	45.6	1683	118	7.0	21.2	37.2	50.0
15th	635	210	33.2	24.3	35.1	50.2	1238	43	3.5	21.0	37.8	53.5
Aug. 1st	756	272	36.0	23.8	33.0	57.0	1735	199	11.5	23.6	38.7	57.5
15th	817	439	53.8	18.4	31.9	66.0	1846	468	25.4	22.0	35.2	55.2
Sep. 1st	1138	628	55.3	19.5	33.8	50.0	2172	728	33.5	22.0	37.4	52.5
15th	1460	911	62.6	18.7	29.4	62.0	2358	886	37.6	18.5	32.5	58.0
Oct. 1st	1683	984	66.4	19.3	31.8	66.2	2744	1215	44.3	18.4	33.5	54.5
15th	1861	932	50.2	11.9	28.4	66.2	2118	1540	49.4	15.5	28.2	58.0
Nov. 1st	1810	886	49.0	13.4	25.4	67.0	2981	1685	51.5	14.6	26.7	61.0
15th	1627	634	38.9	9.5	24.4	67.5	2257	1009	44.7	12.1	28.1	58.0
Dec. 1st	1309	592	45.2	6.4	19.7	68.5	2123	393	18.5	10.2	23.9	57.0
15th	1285	384	29.9	6.6	19.4	66.7	1988	504	25.4	6.5	18.2	61.5

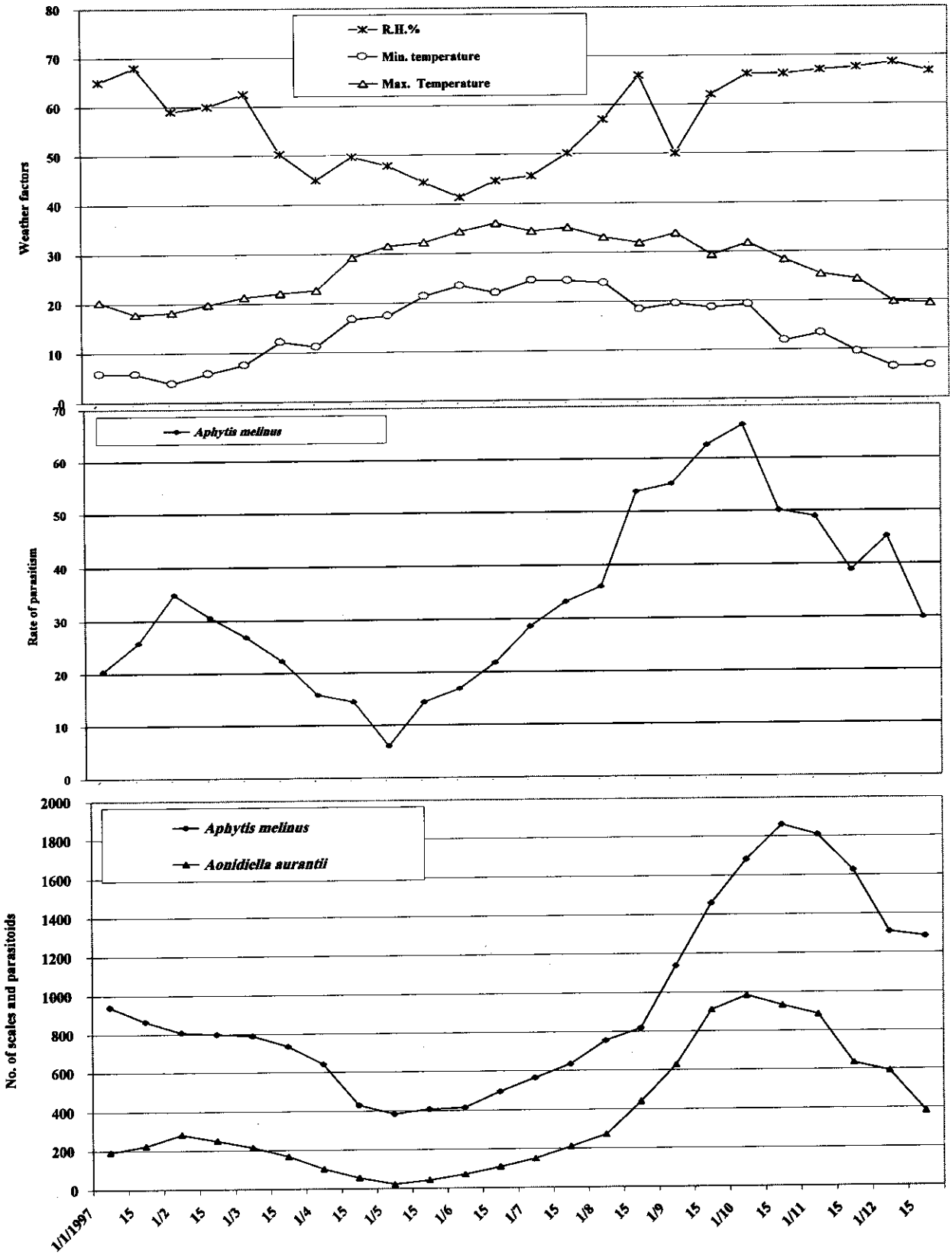

Fig. (42): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis melinus* resulted from *Aonidiella aurantii* on *Citrus* sp. in Minya, in relation to weather factors during 1997.**

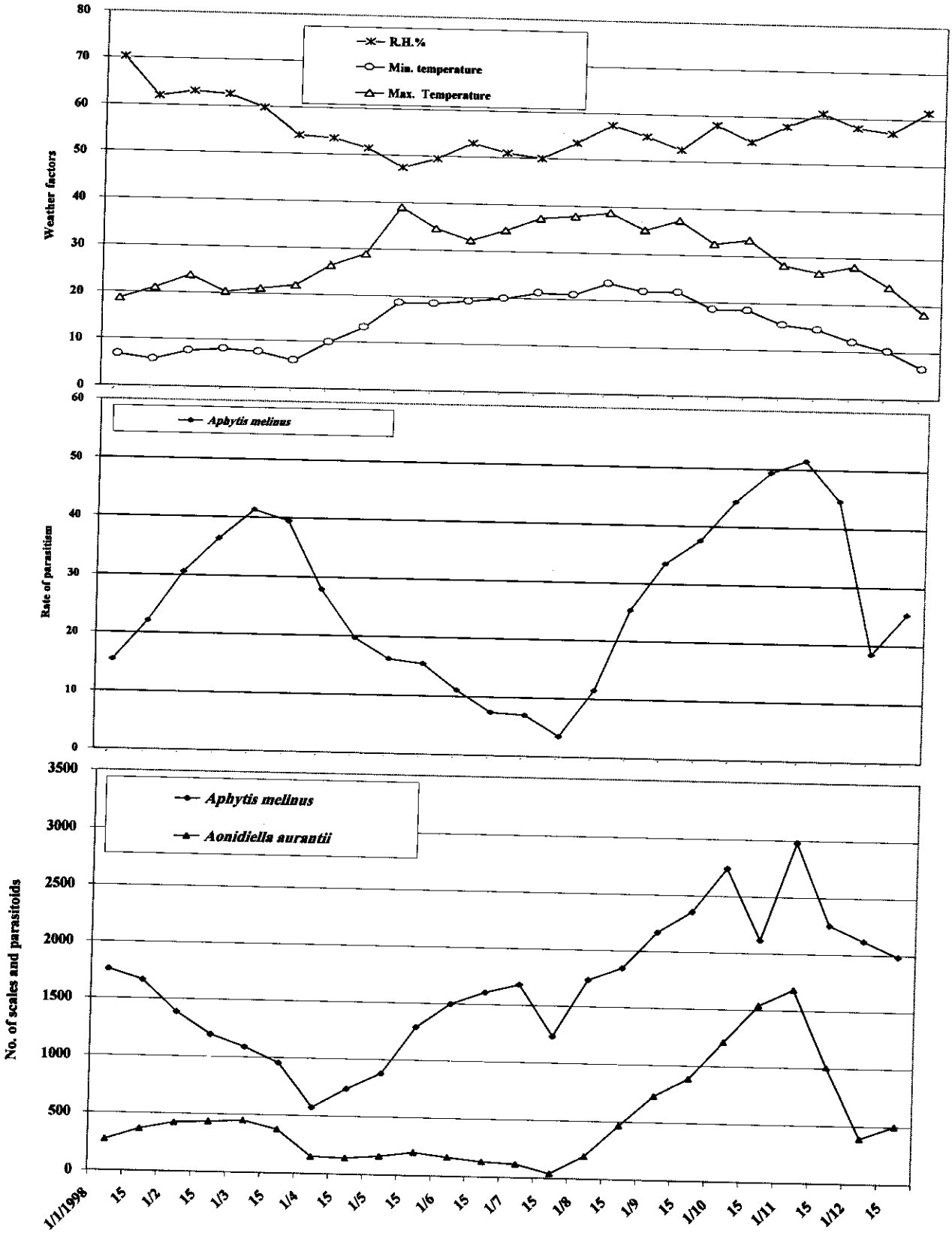

Fig. (43): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis melinus* resulted from *Aonidiella aurantii* on *Citrus* sp. in Minya, in relation to weather factors during 1998.**

control of *A. aurantii* in different localities of the world. (DeBach and Argyiou, 1967; Murdoch *et al.*, 1995; Siscaro *et al.*, 1999; Casas-Jerome *et al.*, 2000).

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 significant with $P < 0.01$ and $P < 0.05$, respectively ($R^2 = 0.5845$), while D.Mn.T. was insignificant (Table, 25).

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

Table, 26 and Figs 44, 45 shows the average parasitism rates of this species to be 30% and 18.9% during 1997 and 1998 respectively. Three peaks were recorded annually for *A. mytilaspidis*. During the first year (1997) they occurred on January 1st (at 21.7°C max., 7.9°C min. and 65.0% RH), June 15th (at 36.1°C max., 21.7°C min.and 53.8% RH)and November 1st (at 27.6°C max., 15.1°C min.and 61.0% RH), with parasitism rates being 40.3%, 37.4% and 66.0% respectively. In the second year (1998), the peaks were recorded on January 1st (at 18.0°C max., 7.1°C min.and 68.0% RH), June 15th (at 33.3°C max., 18.8°C min.and 48.0% RH)and November 1st (at 28.2°C max., 16.8°C min.and 62.5% RH) with parasitism rates of 33.8%, 25.9% and 48.7% respectively.

Rosen and DeBach (1976) stated that the parasitism rates of this species are between 67-100%. The same authors (1979) mentioned that *A. mytilaspidis* is recorded to be an important natural enemy of the oyster-shell scale, *L. ulmi* on apples in Nova Scotia, Canada and is quite capable of controlling heavy outbreaks of this damaging pest.

Table (25) : **Multiple regression values indicating the effect of weather factors on the percent parasitism of *Aphytis melinus* on *Aonidiella aurantii* in Minya.**

Year	1997					1998				
Daily mean weather factors	SS	df	Ms	F	P	SS	df	Ms	F	P
D.MX.T.	59.873	1	59.873	1.342	0.2509	11.327	1	11.327	16.913	0.0001
D.MN. T.	59.944	1	59.944	3.585	0.0627	97.824	1	97.824	1.033	0.3131
D.M.R.H	6.619	1	6.619	0.148	0.7013	93.978	1	93.978	6.273	0.0147

Table (26): Number of scales, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis mytilaspidis* resulted from *Parlatoria oleae* on *Prunus armeniaca* in Qalyubiya, in relation to weather factors during 1997 and 1998.

Date of sampling	No. of scales	1997					No. of scales	1998				
		Parasitoid		Daily mean weather factors				Parasitoid		Daily mean weather factors		
		No.	R%	Temperature		RH%		No.	R%	Temperature		RH%
				Min	Max					Min	Max	
Jan. 1st	374	151	40.3	7.9	21.7	65.0	240	81	33.8	7.1	18.0	68.0
15th	435	123	27.8	7.0	20.0	62.0	298	59	19.7	7.9	19.8	60.7
Feb. 1st	517	94	18.3	5.0	18.3	60.0	254	42	16.5	8.2	21.6	63.3
15th	476	70	14.6	8.0	20.0	55.0	223	25	11.3	7.8	19.5	65.0
Mar.1st	312	21	6.7	9.0	21.0	61.5	205	14	6.4	7.9	21.8	66.7
15th	268	16	5.9	8.9	23.7	60.4	194	4	2.0	7.4	21.2	58.5
April. 1st	459	18	3.7	10.6	24.1	59.9	176	3	1.6	16.2	26.1	57.5
15th	473	60	11.8	15.0	29.3	59.3	185	2	1.1	13.5	28.5	56.0
May. 1st	545	127	23.2	14.9	31.1	60.1	210	10	4.7	18.2	34.5	53.5
15th	709	208	29.4	19.0	34.5	55.5	239	23	9.6	17.7	32.1	58.0
June. 1st	731	257	35.2	19.5	34.4	56.0	248	42	16.7	18.4	34.1	55.0
15th	833	311	37.4	21.7	36.1	53.9	370	96	25.9	18.8	33.3	63.0
July. 1st	467	136	28.7	22.1	36.0	56.2	390	85	23.5	21.3	35.9	58.5
15th	409	80	19.5	22.3	35.3	64.1	349	73	20.8	21.3	35.9	58.5
Aug. 1st	378	206	14.5	22.4	34.5	61.5	323	54	16.9	24.5	37.7	61.8
15th	506	61	12.0	21.6	33.8	60..5	285	31	10.8	22.7	34.6	64.8
Sep. 1st	693	182	23.5	20.6	32.9	59.3	294	35	11.9	21.5	37.0	56.5
15th	558	197	36.4	18.5	31.7	58.3	316	81	25.6	18.4	33.6	56.8
Oct. 1st	491	230	47.0	17.0	30.9	59.6	340	114	33.5	19.0	33.8	57.0
15th	470	251	53.4	15.3	29.3	61.8	361	152	40.8	17.5	28.5	59.0
Nov. 1st	644	607	66.0	15.1	27.6	61.0	419	191	48.7	16.8	28.2	62.5
15th	1046	425	58.0	11.0	25.4	67.2	436	133	30.4	16.2	25.6	60.0
Dec. 1st	857	436	51.0	10.1	23.7	62.7	319	86	27.0	14.7	26.7	58.5
15th	568	314	55.4	7.4	20.8	69.3	303	45	14.8	9.7	20.9	57.5

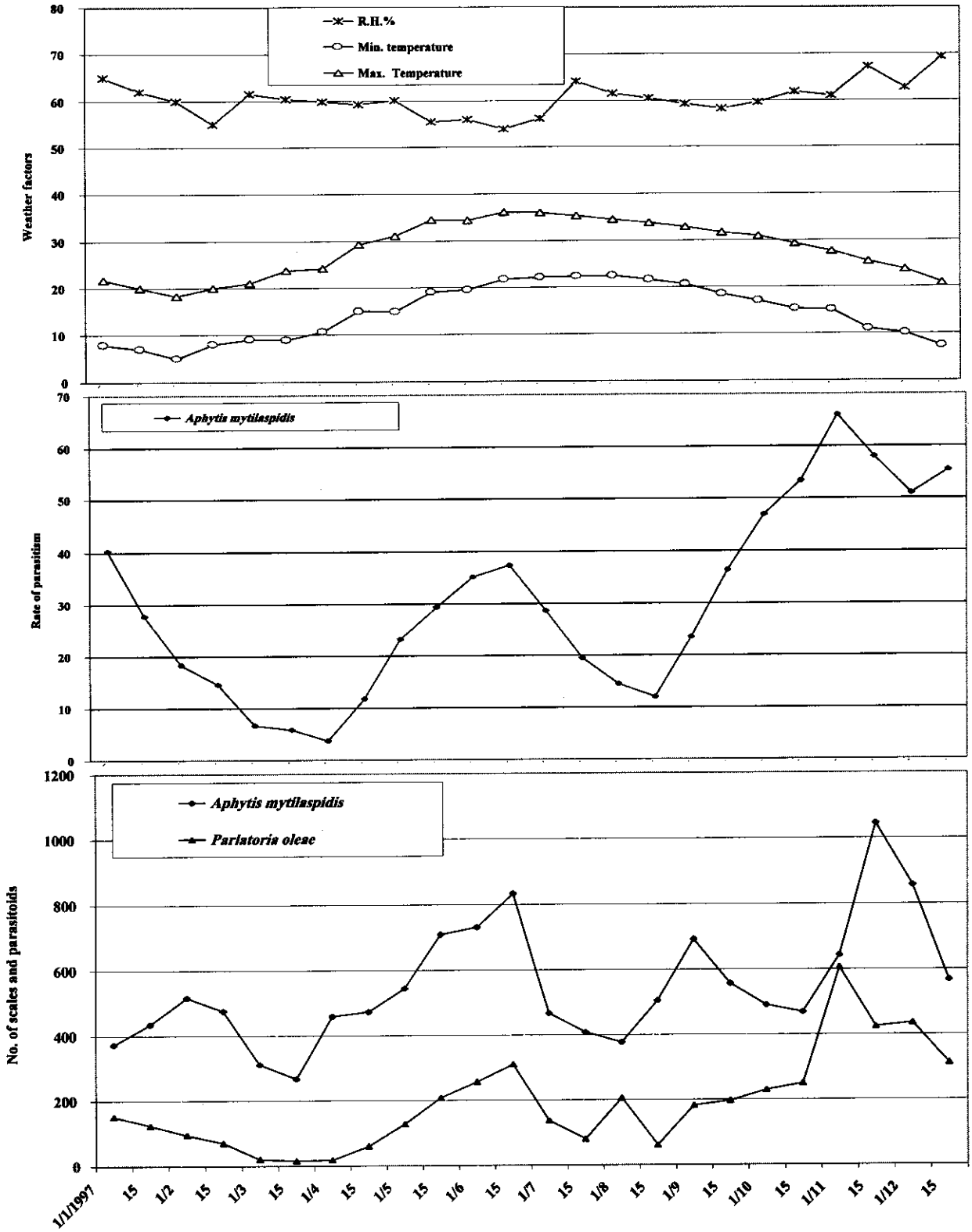

Fig. (44): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis mytilaspidis* resulted from *Parlatoria oleae* on *Prunus armeniaca* in Qalyubiya, in relation to weather factors during 1997.**

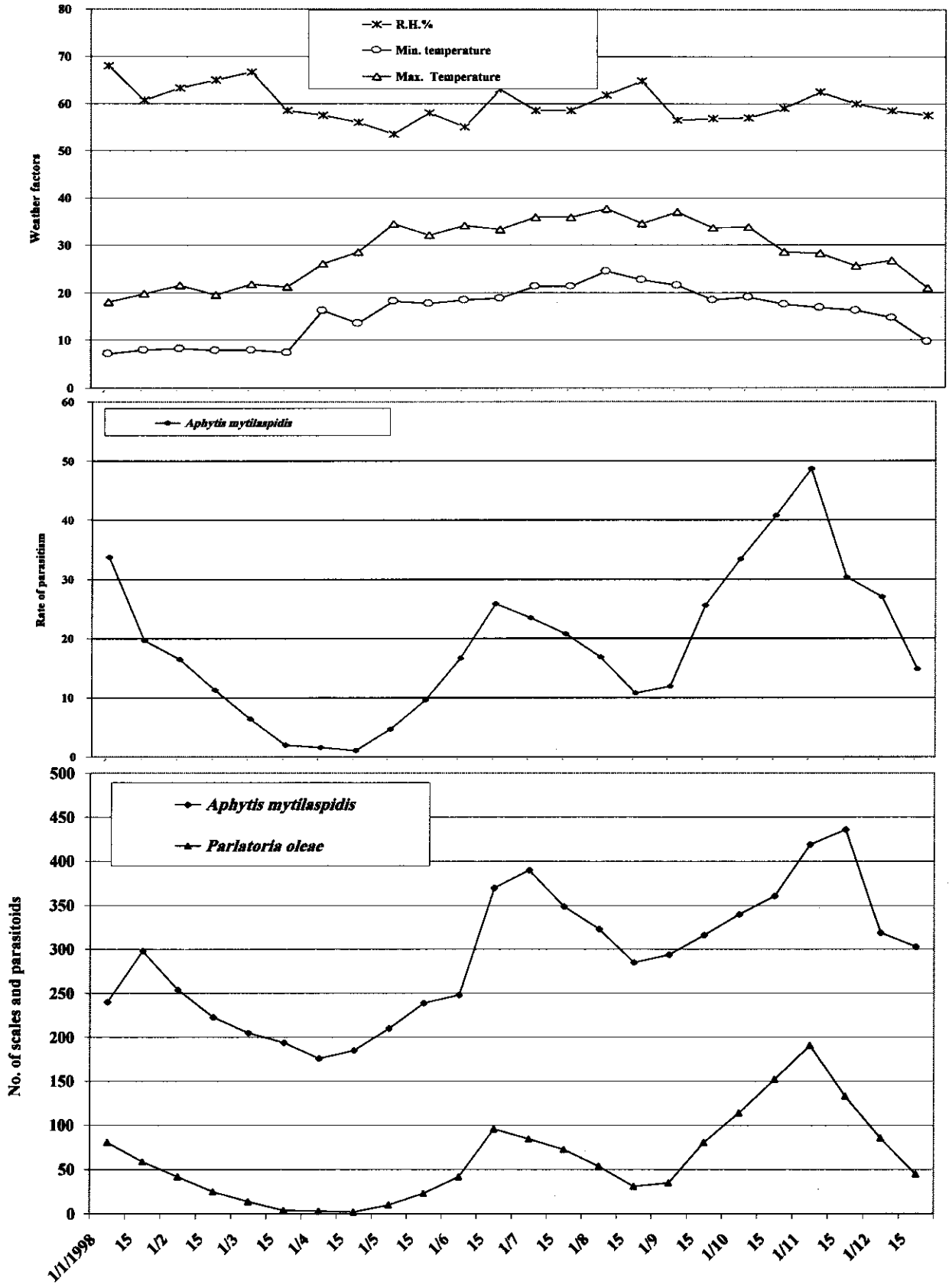

Fig. (45): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis mytilaspidis* resulted from *Parlatoria oleae* on *Prunus armeniaca* in Qalyubiya, in relation to weather factors during 1998.**

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 (Table, 27).

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

During both the first and second years of the present work, *A. opuntiae* was absent from April 1st (at 19.1°C max., 9.8°C min.and 62.2% RH) to July 15th (at 30.6°C max., 24.4°C min.and 66.4% RH).

In 1997 (Table, 28 and Fig. 46), two peaks were recorded, the first peak of parasitism being 3.4% recorded on January 1st (at 19.8°C max., 8.8°C min.and 71.6% RH). After this peak, the percentage of parasitism declined gradually to reach 0.2% on August 1st (at 30.0°C max., 23.5°C min.and 68.4% RH). The second peak was 7.1%, recorded on December 1st (at 22.0°C max., 9.7°C min.and 62.1% RH).

During 1998 (Table, 28 and Fig. 47), the peak of parasitism was estimated at 7.1% and occurred on January1st (at 18.6°C max., 8.9°C min.and 73.6% RH). The rate of parasitism then declined sharply after this peak to reach 0.9% on August 1st (at 32.1°C max., 26.1°C min.and 76.0% RH). Parasitoid activity was observed gradually increased to reach its highest peak of 9.8% on December 15th (at 18.8°C max., 9.6°C min.and 72.0% RH).

These results indicated that this species of genus *Aphytis* is rarely present in Egypt, its average parasitism rates being 1.9% and 2.6% during 1997 and 1998, 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.

Table (27) : **Multiple regression values indicating the effect of weather factors on the percent parasitism of *Aphytis mytilaspidis* on *Prunnus armeniaca* in Qalyubiya.**

Year	1997					1998				
Daily mean weather factors	SS	df	Ms	F	P	SS	df	Ms	F	P
D.MX.T.	43.604	1	43.604	2.098	0.1522	40.548	1	40.548	1.261	0.2656
D.MN. T.	39.839	1	39.839	1.917	0.1708	68.627	1	68.627	2.134	0.1488
D.M.R.H	15.012	1	15.012	0.722	0.3895	9.665	1	9.665	0.301	0.5854

Table (28): Number of scales, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis opuntiae* resulted from *Aonidiella aurantii* on *Psidium guajava* in Alexandria, in relation to weather factors during 1997 and 1998.

Date of sampling	No. of scales	1997					No. of scales	1998				
		Parasitoid		Daily mean weather factors				Parasitoid		Daily mean weather factors		
		No.	R%	Temperature		RH%		No.	R%	Temperature		RH%
				Min	Max					Min	Max	
Jan. 1st	1233	42	3.4	8.8	19.8	71.6	1139	80	7.1	8.9	18.6	73.6
15th	1415	10	2.0	10.0	18.0	68.0	1685	107	6.4	7.8	19.4	71.4
Feb. 1st	1560	15	0.9	7.2	16.0	68.4	1833	52	2.9	9.4	19.8	75.5
15th	2025	11	0.5	11.1	18.4	63.2	1952	34	2.3	9.2	18.0	65.7
Mar.1st	1926	8	0.4	10.8	19.3	63.8	2134	19	1.6	9.4	20.2	71.0
15th	2159	3	0.2	9.6	19.4	61.6	2365	26	1.3	9.7	19.3	60.0
April. 1st	2927	-	-	9.8	19.1	62.2	2741	-	-	9.8	22.9	64.0
15th	3161	-	-	13.7	24.3	66.5	2897	-	-	14.3	24.1	64.0
May. 1st	3430	-	-	13.7	26.3	63.5	2538	-	-	17.2	27.7	63.6
15th	3217	-	-	17.8	27.6	70.4	2153	-	-	17.6	26.3	67.0
June. 1st	2968	-	-	18.5	29.1	65.0	1826	-	-	19.6	27.3	72.0
15th	2742	-	-	22.5	30.9	68.1	1652	-	-	15.8	29.8	64.0
July. 1st	2527	-	-	23.3	30.1	72.2	1571	-	-	22.4	30.5	68.0
15th	1140	-	-	24.4	30.6	66.4	1285	-	-	23.2	31.1	74.0
Aug. 1st	920	2	0.2	23.5	30.0	68.8	1071	10	0.9	26.1	32.1	76.0
15th	931	6	0.6	23.7	29.8	64.6	979	12	1.2	25.5	31.4	70.0
Sep. 1st	1154	8	0.5	22.3	28.9	77.6	892	13	2.0	24.6	32.7	64.0
15th	1323	19	1.5	17.9	27.6	88.0	1023	15	1.4	20.7	29.3	59.0
Oct. 1st	1496	65	4.2	18.6	27.9	66.5	1188	24	2.0	19.9	29.7	66.0
15th	1663	88	5.3	16.0	26.7	63.8	1940	68	3.5	16.9	26.7	65.0
Nov. 1st	1738	109	6.1	15.1	24.6	73.5	2148	106	5.0	15.4	25.8	70.0
15th	1817	126	7.0	11.8	23.4	73.3	2335	173	7.5	13.4	23.8	70.0
Dec. 1st	1488	105	7.1	9.7	22.0	62.1	2103	187	8.9	13.5	22.8	69.0
15th	1501	89	6.0	17.1	19.6	74.4	1954	190	9.8	9.6	18.8	72.0

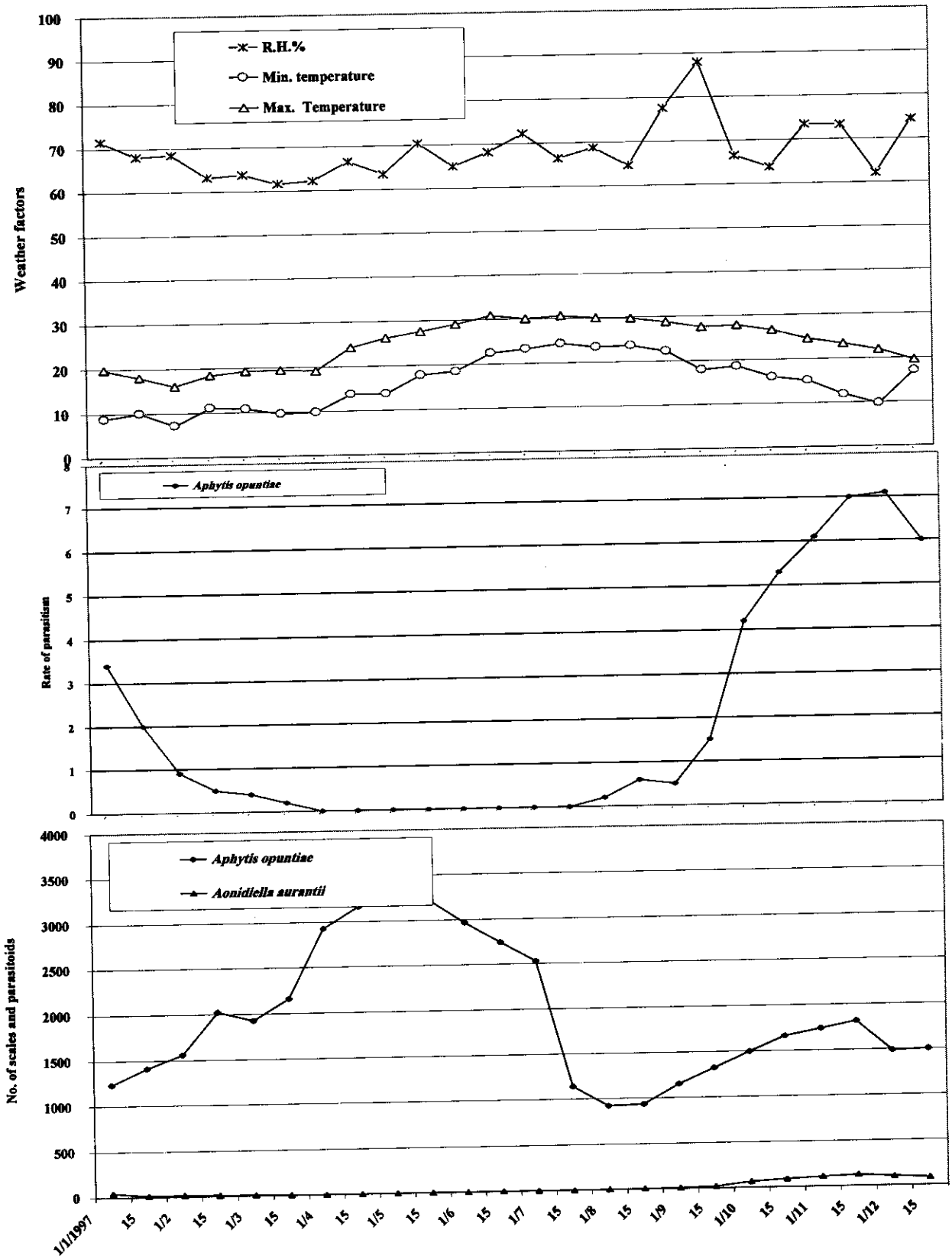

Fig. (46): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis opuntiae* resulted from *Aonidiella aurantii* on *Psidium guajava* in Alexandria, in relation to weather factors during 1997.**

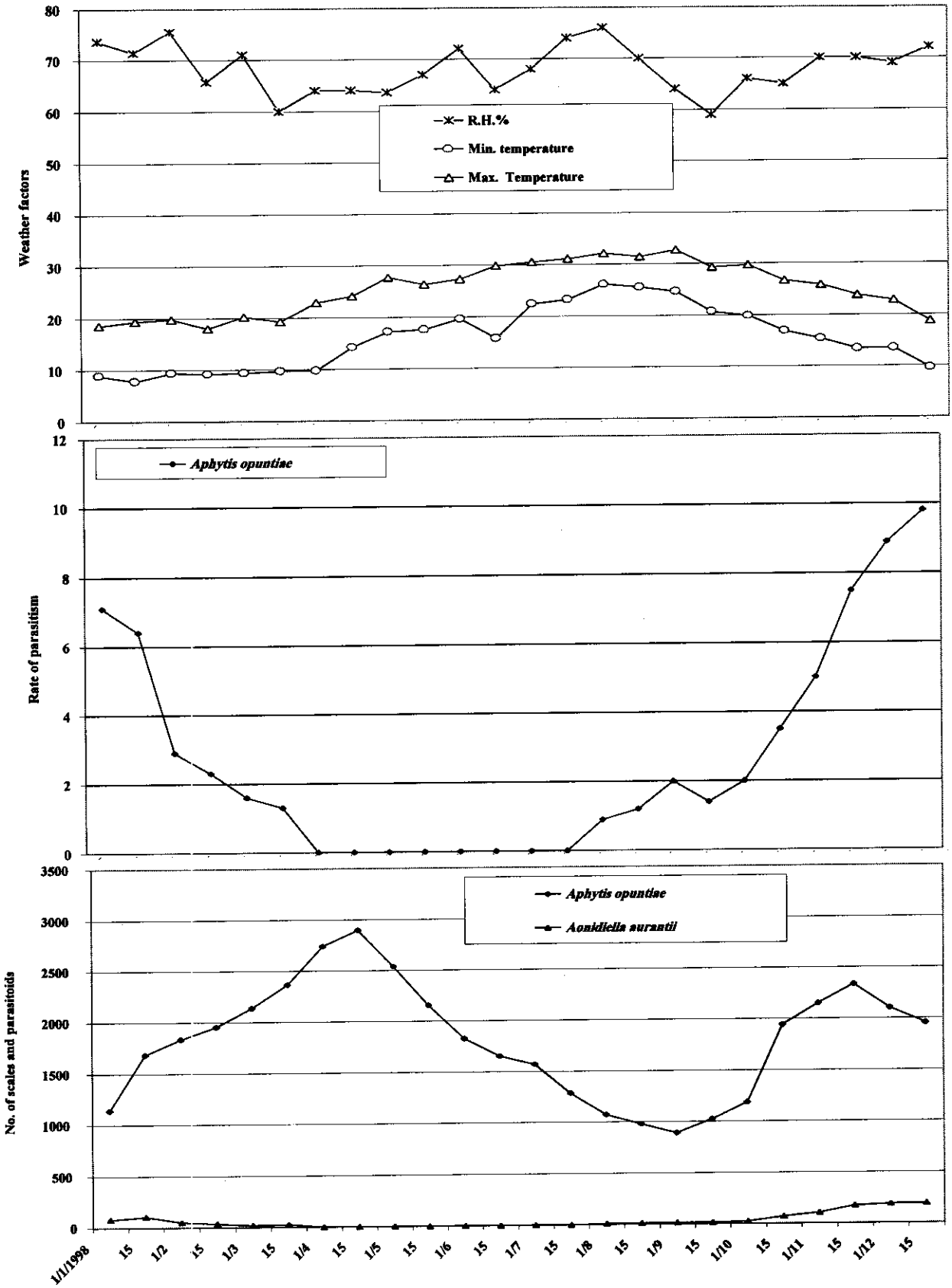

Fig. (47): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis opuntiae* resulted from *Aonidiella aurantii* on *Psidium guajava* in Alexandria, in relation to weather factors during 1998.**

However, in the second year, the effect of D.Mx.T. on the rate of parasitism was highly significant ($R^2 = 0.9586$, $P < 0.01$), while those of D.Mn.T. and D.M.R.H. were insignificant (Table, 29).

2.15. *Aphytis paramaculicornis* associated with *Parlatoria oleae* on *Olea* sp. in the Northern Coast:

An abundance of *A. paramaculicornis* was recorded during the two successive years of this work. In 1999 (Table, 30 and Fig. 48), two peaks were recorded. The first peak of parasitism was 57.0% on May 15th (at 26.2°C max., 17.7°C min.and 68.0% RH), after which the parasitism rate declined gradually to reach 7.7% on September 15th (at 28.4°C max., 20.1°C min.and 73.0% RH). The second peak was 21.7%, recorded on November 15th (at 22.1°C max., 13.1°C min.and 65.0% RH).

During 2000 (Table, 30 and Fig. 49), the peak rate of parasitism was estimated at 38.7% and occurred on May 15th (at 26.6°C max., 17.3°C min.and 73.6% RH). After this peak, the parasitism rate declined sharply to reach 1.1% on September 15th (at 28.2°C max., 21.2°C min.and 72.1% RH). The second peak was 15.2% recorded on November 15th (at 20.8°C max., 13.4°C min.and 63.5% RH).

This species is an important parasitoid in the control of the olive scale, *P. oleae* on olive trees. (Doutt, 1954; Huffaker *et al.*, 1962; Rosen and DeBach, 1979)

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 (Table, 31).

Table (29) : Multiple regression values indicating the effect of weather factors on the percent parasitism of *Aphytis opuntiae* on *Aonidiella aurantii* in Alexandria.

Year	1997					1998				
Daily mean weather factors	SS	df	Ms	F	P	SS	df	Ms	F	P
D.MX.T.	0.140	1	0.140	1.454	0.2326	10.439	1	10.439	23.997	0.0001
D.MN. T.	0.069	1	0.069	0.725	0.3980	0.844	1	0.844	1.941	0.1682
D.M.R.H	0.001	1	0.001	0.012	0.9115	0.049	1	0.049	0.113	0.7374

Table (30): Number of scales, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis paramaculicornis* resulted from *Parlatoria oleae* on *olea* sp. in Northern Coast, in relation to weather factors during 1999 and 2000.

Date of sampling	No. of scales	1999					No. of scales	2000				
		Parasitoid		Daily mean weather factors				Parasitoid		Daily mean weather factors		
		No.	R%	Temperature		RH%		No.	R%	Temperature		RH%
				Min	Max					Min	Max	
Jan. 1st	896	283	31.6	10.5	18.3	73.0	800	150	18.8	10.4	15.5	72.0
15th	835	248	29.7	10.7	18.9	63.0	795	133	16.7	8.6	16.2	72.0
Feb. 1st	689	237	34.4	8.7	18.9	65.0	545	131	24.5	10.1	17.1	70.0
15th	773	291	37.6	8.7	19.4	59.0	579	164	28.3	8.6	15.9	64.0
Mar.1st	985	432	43.4	10.2	19.7	67.7	832	211	25.4	9.1	17.4	67.6
15th	1053	384	36.5	11.7	21.0	57.7	847	196	23.2	10.7	20.3	66.2
April. 1st	1138	505	45.1	11.6	20.6	61.0	853	254	29.8	13.9	25.7	54.9
15th	1384	658	47.6	13.8	23.0	71.0	1011	410	40.1	12.8	21.8	74.5
May. 1st	1533	831	54.2	16.8	25.9	58.0	1302	479	36.8	14.8	23.1	73.8
15th	1621	924	57.0	17.7	26.2	68.0	1385	535	38.7	17.3	26.6	73.6
June. 1st	1596	792	49.6	19.3	27.7	70.0	1312	384	31.7	17.0	26.3	70.0
15th	998	463	46.5	21.3	27.8	75.0	921	256	27.8	20.4	27.3	75.0
July. 1st	799	234	29.2	21.1	29.9	71.0	730	169	23.2	18.7	29.9	71.0
15th	738	160	21.7	22.8	29.2	71.0	904	161	17.8	22.2	29.2	70.3
Aug. 1st	815	159	19.0	23.0	30.1	71.0	1103	76	7.0	23.0	29.2	70.3
15th	1018	144	14.2	22.8	30.2	72.0	1428	49	3.4	23.0	29.3	72.0
Sep. 1st	1227	156	12.6	21.9	29.2	71.0	1715	38	2.3	21.9	29.2	71.0
15th	1909	147	7.7	20.1	28.4	73.0	1817	19	1.1	21.2	28.2	72.1
Oct. 1st	2061	203	9.8	19.4	28.1	74.7	1922	90	4.6	19.4	28.1	73.9
15th	2252	254	11.3	16.7	23.8	62.3	2019	157	7.8	16.7	23.8	62.3
Nov. 1st	3130	452	14.9	14.1	22.0	64.0	1812	175	9.7	14.1	22.0	64.0
15th	2876	623	21.7	13.1	22.1	65.0	1338	213	15.2	13.4	20.8	63.5
Dec. 1st	2915	582	20.0	11.5	20.6	63.3	935	129	13.8	11.5	19.6	63.3
15th	2347	347	14.8	9.0	17.5	62.0	816	173	11.3	9.0	17.5	62.0

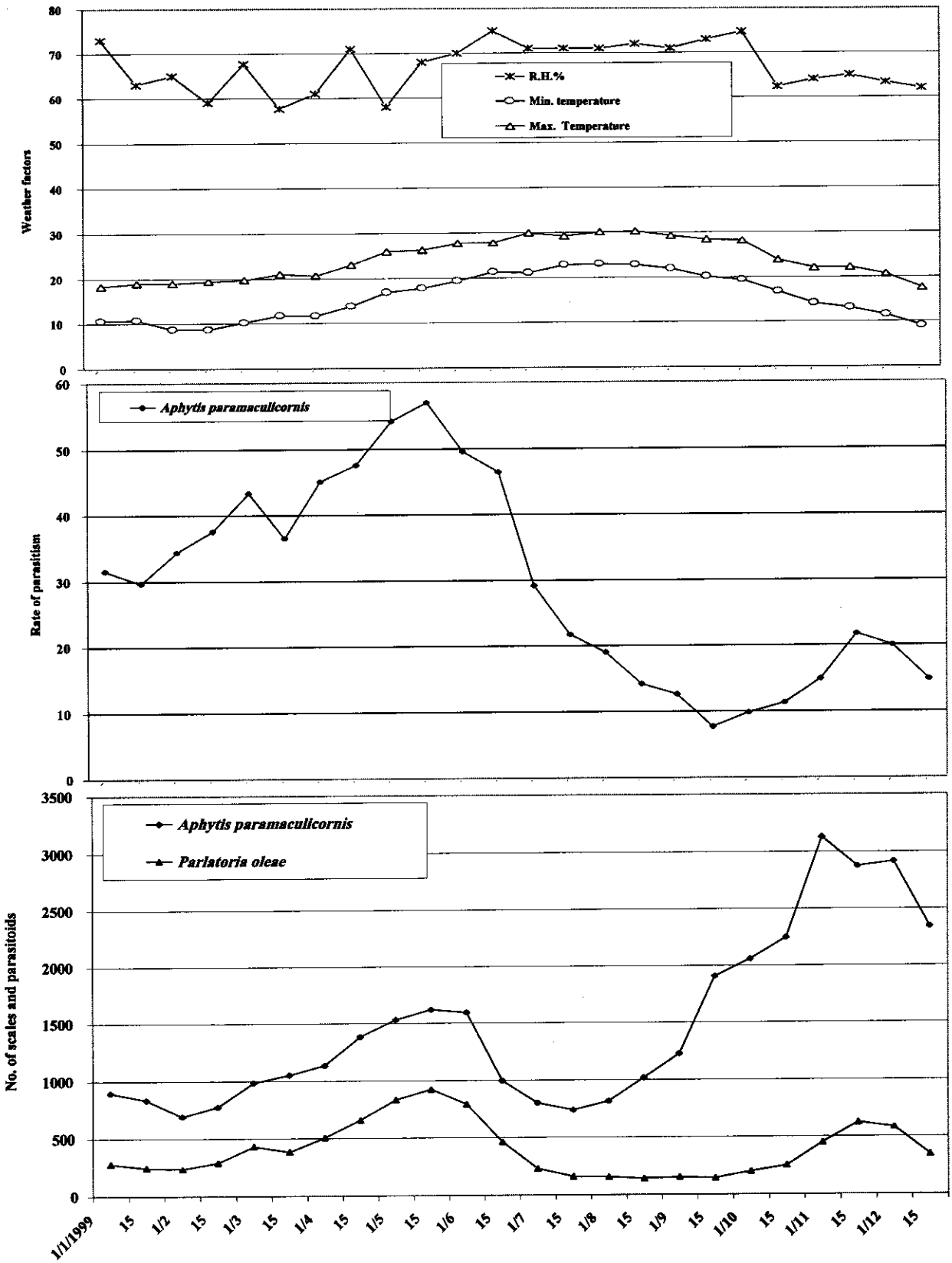

Fig. (48): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis paramaculicornis* resulted from *Parlatoria oleae* on *olea* sp. in Northern Coast, in relation to weather factors during 1999.**

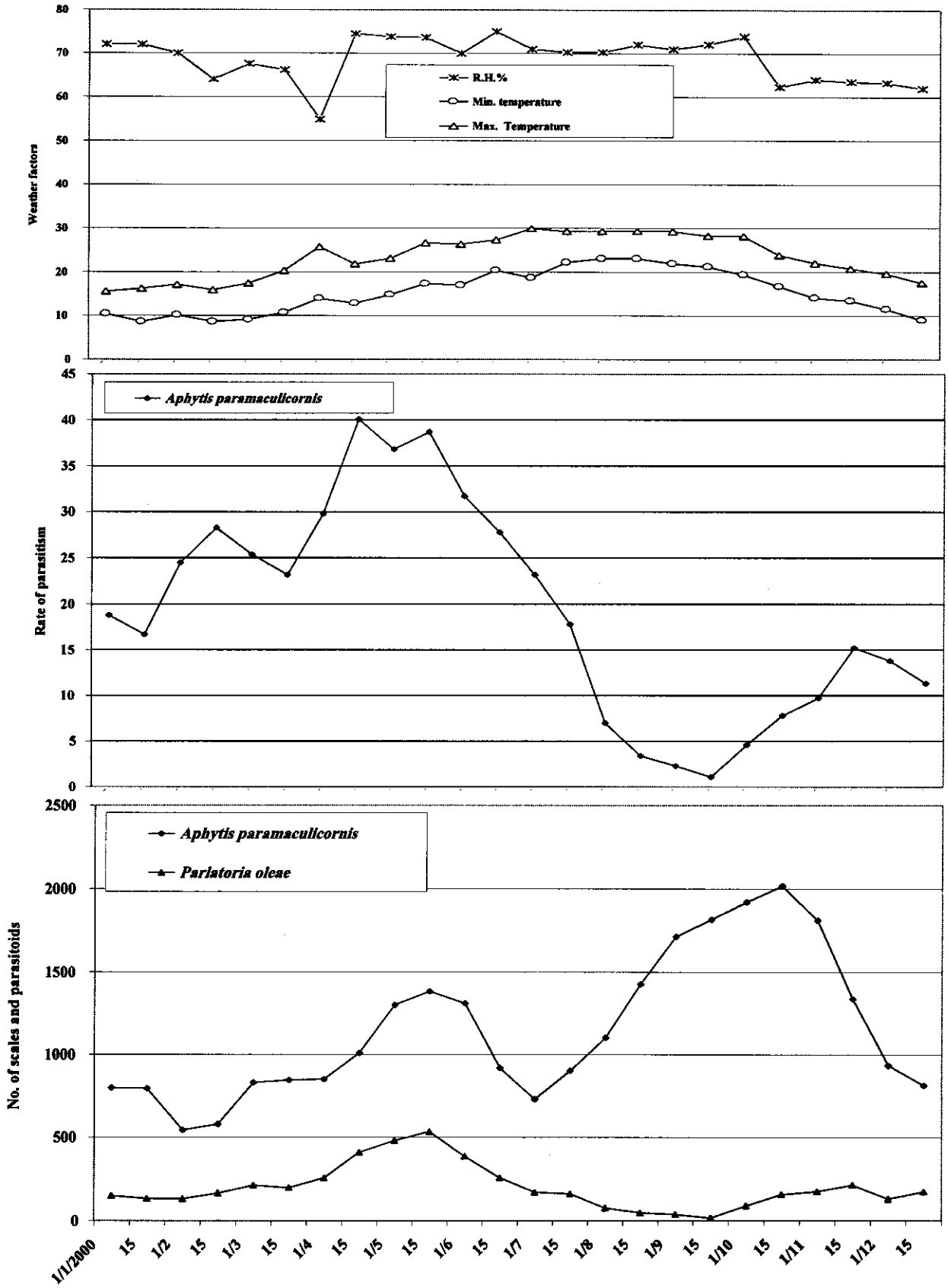

Fig. (49): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis paramaculicornis* resulted from *Parlatoria oleae* on *olea* sp. in Northern Coast, in relation to weather factors during 2000.**

Table (31) : **Multiple regression values indicating the effect of weather factors on the percent parasitism of *Aphytis paramaculicornis* on *Parlatoria* oleae in Northern Coast.**

Year	1997					1998				
Daily mean weather factors	SS	df	Ms	F	P	SS	df	Ms	F	P
D.MX.T.	335.45	1	335.45	3.652	0.0604	38.344	1	38.344	0.927	0.3392
D.MN. T.	894.22	1	894.22	0.976	0.3268	3.096	1	3.096	0.075	0.7853
D.M.R.H	122.35	1	122.35	1.334	0.2522	2.397	1	2.397	0.058	0.8105

2.16. *Aphytis philippinensis* associated with *Chrysomphalus aonidum* on *Jasminum* sp. in Alexandria:

Rates of parasitism by this species during the two seasons were very low (Table, 32 and Figs 50, 51). Only one female was collected on January 1st (at 21.8°C max., 9.0°C min.and 58.8% RH), ten females were collected on December 1st (at 23.1°C max., 9.9°C min.and 58.6% RH)and seven on December 15th (at 21.0°C max., 8.0°C, min.and 67.6% RH) respectively. In 1998, seven females were collected on December 1st (at 25.4°C max., 14.6°C min.and 61.2% RH) and three on December 15th (at 19.9°C max., 10.0°C min.and 61.5% RH).

These results indicated that this species of genus *Aphytis* is rarely present in Egypt, its average parasitism rates being 0.1% and 0.2% during 1997 and 1998, respectively.

2.17. *Aphytis phoenicis* associated with *Parlatoria blanchardi* on *Phoenix dactylifera* in Ismailia:

In the first year (1999) (Table, 33 and Fig. 52), the numbers of *A. phoenicis* that attacked *P. blanchardi* on *P.dactylifera* began to increase on January 1st (at 20.4°C max., 8.4°C min.and 74.0% RH) and recorded the first peak on February 1st (at 20.5°C max., 7.7°C min.and 67.0% RH). Another peak occurred on October 1st (at 31.3°C max., 18.4°C min.and 64.5% RH). The numbers of parasitoids were 35, 42 and 38, respectively. The rate of parasitism recorded the first peak of 17.5% on February 15th (at 19.9°C max., 7.6°C min.and 67.0% RH), after which it decreased, then increased once more to record a second peak of 20.4% on August 1st (at 35.6°C max., 22.8°C min.and 61.4% RH).

Table (32): Number scale, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis philippinensis* resulted from *Chrysomphalus aonidium* on *Jasminum* sp. in Giza, in relation to weather factors during 1997 and 1998.

Date of sampling	1997						1998				
	No. of scales	Parasitoid		Daily mean weather factors			No. of scales	Parasitoid		Daily mean weather factors		
		No.	R%	Temperature		RH%		No.	R%	Temperature		RH%
				Min	Max					Min	Max	
Jan. 1st	301	1	0.5	9.0	21.8	58.8	391	-	-	8.2	20.0	70.3
15th	326	-	-	8.0	20.0	65.0	441	-	-	8.6	22.5	62.2
Feb. 1st	418	-	-	5.7	19.0	67.5	482	-	-	9.3	23.9	60.3
15th	585	-	-	9.0	20.0	62.0	558	-	-	10.1	19.9	66.4
Mar.1st	778	-	-	9.0	22.0	58.5	690	-	-	9.7	22.3	61.7
15th	836	-	-	10.0	24.0	57.5	704	-	-	11.4	24.1	58.0
April. 1st	889	-	-	11.2	23.8	57.8	825	-	-	13.5	27.2	59.0
15th	920	-	-	14.8	29.3	59.2	885	-	-	17.1	29.9	57.0
May. 1st	981	-	-	15.7	30.3	54.7	927	-	-	13.5	27.2	84.6
15th	1419	-	-	19.1	34.1	56.5	1004	-	-	19.4	33.0	62.2
June. 1st	1602	-	-	19.8	34.1	47.7	1095	-	-	20.4	34.2	61.7
15th	1614	-	-	22.0	39.6	58.1	1317	-	-	20.8	34.8	58.9
July. 1st	1283	-	-	22.7	36.9	52.0	1380	-	-	22.3	38.1	56.9
15th	1104	-	-	22.9	35.8	62.1	1504	-	-	23.7	38.0	57.6
Aug. 1st	893	-	-	22.5	35.1	62.5	1398	-	-	24.7	39.8	58.2
15th	838	-	-	22.0	35.1	62.0	1176	-	-	22.3	35.5	61.3
Sep. 1st	675	-	-	20.7	33.1	61.8	879	-	-	23.7	38.8	55.9
15th	649	-	-	19.2	32.5	55.7	807	-	-	21.3	33.9	60.3
Oct. 1st	700	-	-	17.6	32.0	63.7	758	-	-	21.0	34.7	57.4
15th	937	-	-	16.0	29.8	61.1	713	-	-	18.2	30.3	59.5
Nov. 1st	1095	-	-	15.9	27.8	63.3	787	-	-	17.4	28.3	64.9
15th	1311	-	-	11.8	26.1	63.9	1099	-	-	16.0	26.9	58.8
Dec. 1st	975	10	1.4	9.9	23.1	58.6	1126	7	3.3	14.6	25.4	61.2
15th	809	7	0.9	8.0	21.0	67.6	984	3	0.3	10.0	19.9	61.5

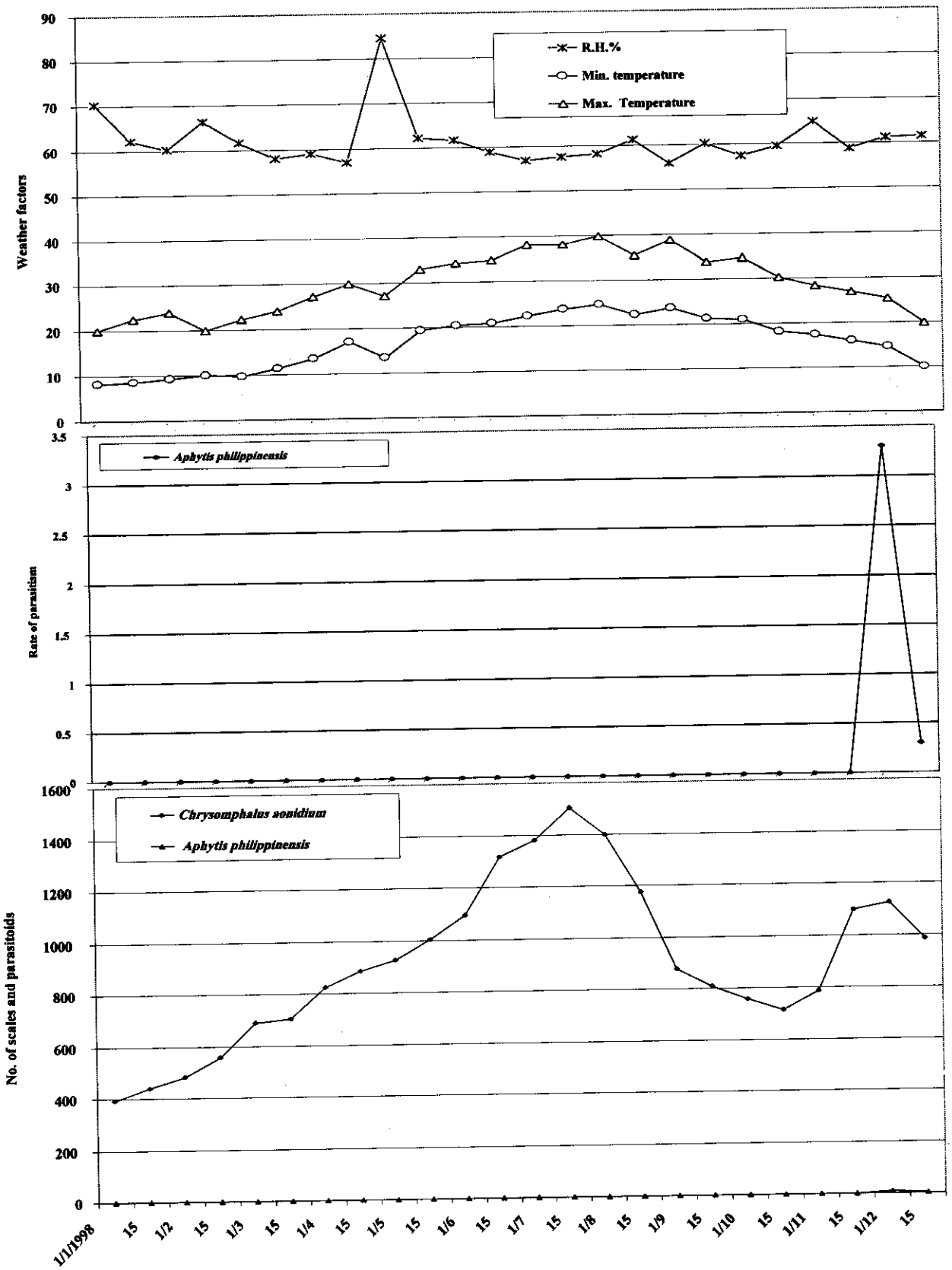

Fig. (51): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis philippinensis* resulted from *Chrysomphalus aonidium* on *Jasminum* sp. in Giza in relation to weather factors during 1998.**

Table (33): Number of scales , number of parasitoid individuals and rate of parasitism (R%) of *Aphytis phoenicis* resulted from *Parlatoria blanchardi* on *Phoenix dactylifera* in Ismailia, in relation to weather factors during 1999 and 2000.

Date of sampling	1999						2000					
	No. of scales	Parasitoid		Daily mean weather factors			No. of scales	Parasitoid		Daily mean weather factors		
		No.	R%	Temperature		RH%		No.	R%	Temperature		RH%
				Min	Max					Min	Max	
Jan. 1st	277	35	12.5	8.4	20.4	74.0	196	7	4.5	10.3	18.4	69.0
15th	264	39	14.7	8.7	21.4	62.0	225	17	7.6	7.2	17.5	65.0
Feb. 1st	250	42	16.8	7.7	20.5	67.0	287	30	11.2	8.0	18.6	69.0
15th	204	36	17.5	7.6	19.9	67.0	309	47	13.9	7.3	19.3	65.0
Mar.1st	191	30	16.0	10.5	23.9	66.5	322	23	7.3	6.6	19.1	62.6
15th	184	28	15.1	12.5	35.3	51.2	354	21	6.0	10.5	22.5	64.1
April. 1st	195	30	15.3	12.6	25.7	50.0	299	7	2.3	13.3	28.7	53.0
15th	173	17	10.1	13.6	28.9	58.0	278	6	1.9	14.6	28.3	60.7
May. 1st	215	15	7.0	16.6	32.2	54.0	235	3	1.3	15.7	29.3	55.9
15th	179	8	4.6	18.2	32.4	56.0	209	5	1.5	17.6	32.3	46.8
June. 1st	186	6	3.2	19.7	34.2	53.0	185	6	3.2	19.7	32.4	57.0
15th	163	11	6.8	21.1	34.2	62.0	167	9	5.3	20.4	34.3	56.0
July. 1st	141	31	13.6	21.7	35.3	61.0	140	13	9.2	21.8	36.9	53.4
15th	167	25	19.0	21.8	34.6	60.0	128	17	13.1	22.8	36.6	52.2
Aug. 1st	200	37	20.4	22.8	35.6	61.4	136	24	17.9	22.5	34.4	61.6
15th	145	28	19.3	22.4	35.3	59.0	162	26	18.5	23.0	34.3	64.5
Sep. 1st	134	25	18.5	19.7	33.5	62.1	198	25	15.3	21.6	34.4	60.0
15th	169	30	17.6	21.3	33.8	65.0	251	24	10.0	19.6	32.0	63.0
Oct. 1st	278	38	13.8	18.4	31.3	64.5	280	9	3.3	13.7	31.8	66.3
15th	292	25	8.7	17.8	29.5	70.4	283	12	2.7	14.2	24.8	66.9
Nov. 1st	348	34	9.6	14.2	27.2	64.0	359	9	1.6	13.5	26.1	60.0
15th	370	23	6.2	11.9	24.6	59.0	347	8	2.4	12.0	23.4	58.0
Dec. 1st	351	31	8.9	7.0	21.4	62.8	312	11	3.6	8.0	20.5	61.0
15th	306	36	10.7	9.3	21.1	67.8	285	24	8.5	9.0	20.3	65.3

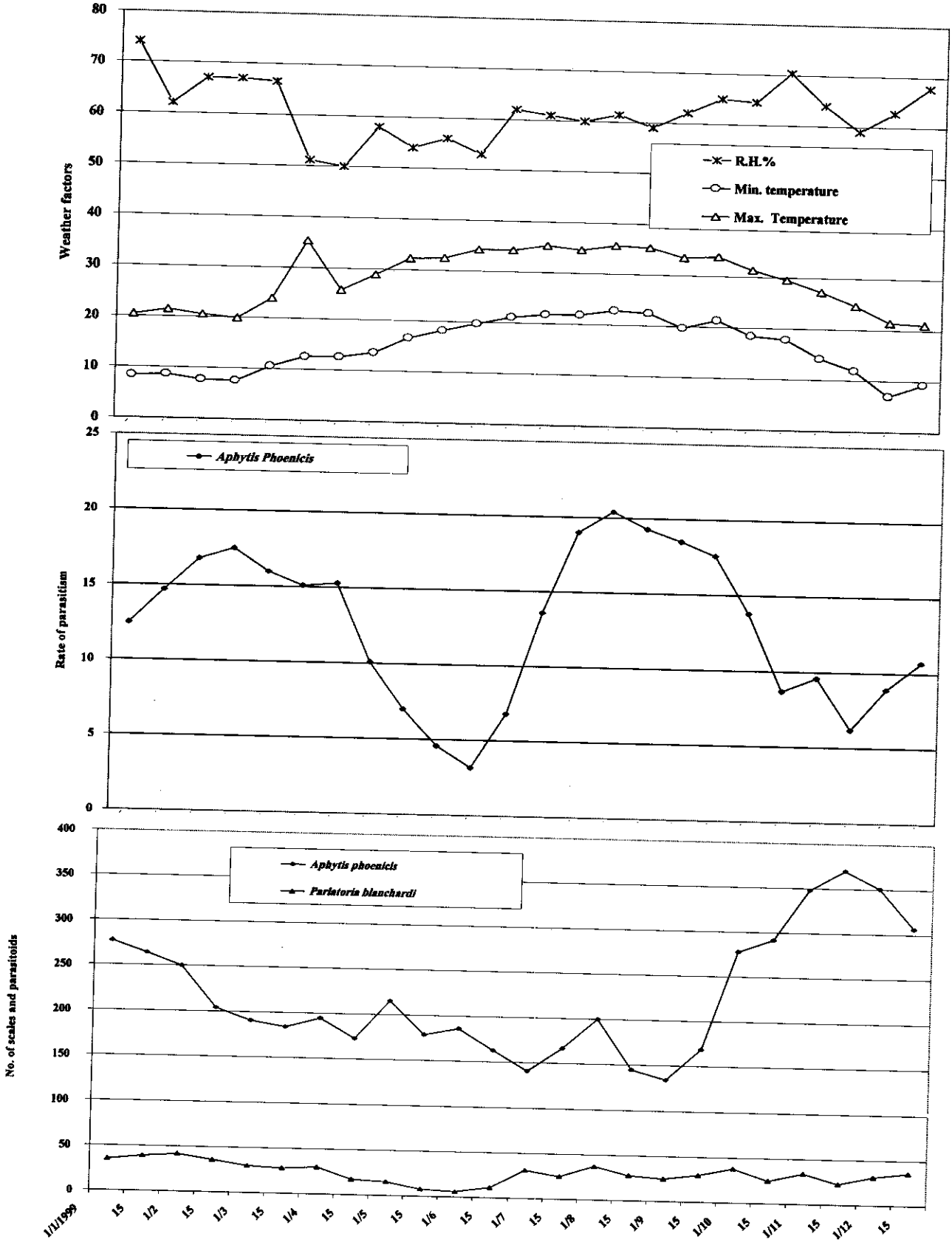

Fig. (52): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis phoenicis* resulted from *Parlatoria blanchardi* on *Phoenix dactylifera* in Ismailia, in relation to weather factors during 1999.**

During the second year (2000) (Table, 33 and Fig. 53), the numbers of parasitoids began to increase on January 1st (at 18.4°C max., 10.3°C min.and 69.0% RH), then recorded their highest peak on February 15th (at 19.3°C max., 7.3°C min. and 65.0% RH)and reached another peak on August 15th (at 34.3°C max., 23.0°C min.and 64.5% RH). The numbers of parasitoids were 7, 47 and 26 respectively. The rate of parasitism recorded the first peak of 13.9% on February 15th, after which it decreased, then increased again to record a second peak of 18.5% on August 15th. The parasitism rates reached max.ima of 20.4% and 18.5% during 1999 and 2000, respectively. This species is quite an important parasitoid species of genus *Aphytis* that attacks *P. blanchardi*.

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. In the second year, the effects of D.Mx.T. and D.Mn.T. were highly significant ($R^2 = 0.9218$, $P < 0.01$), while D.M.R.H. did not show any significant effect on the rate of parasitism (Table, 34).

2.18. *Aphytis vandenboshi* associated with *Aspidiotus nerii* on *Oleander* sp. in Qalyubiya:

Rates of parasitism by this species during the two seasons were very low. Only five females were recorded during the first yearand only seven in the second year (Table, 35 and Figs 54, 55).

These results indicate that this species is not an effective parasitoid of the genus *Aphytis* in Egypt.

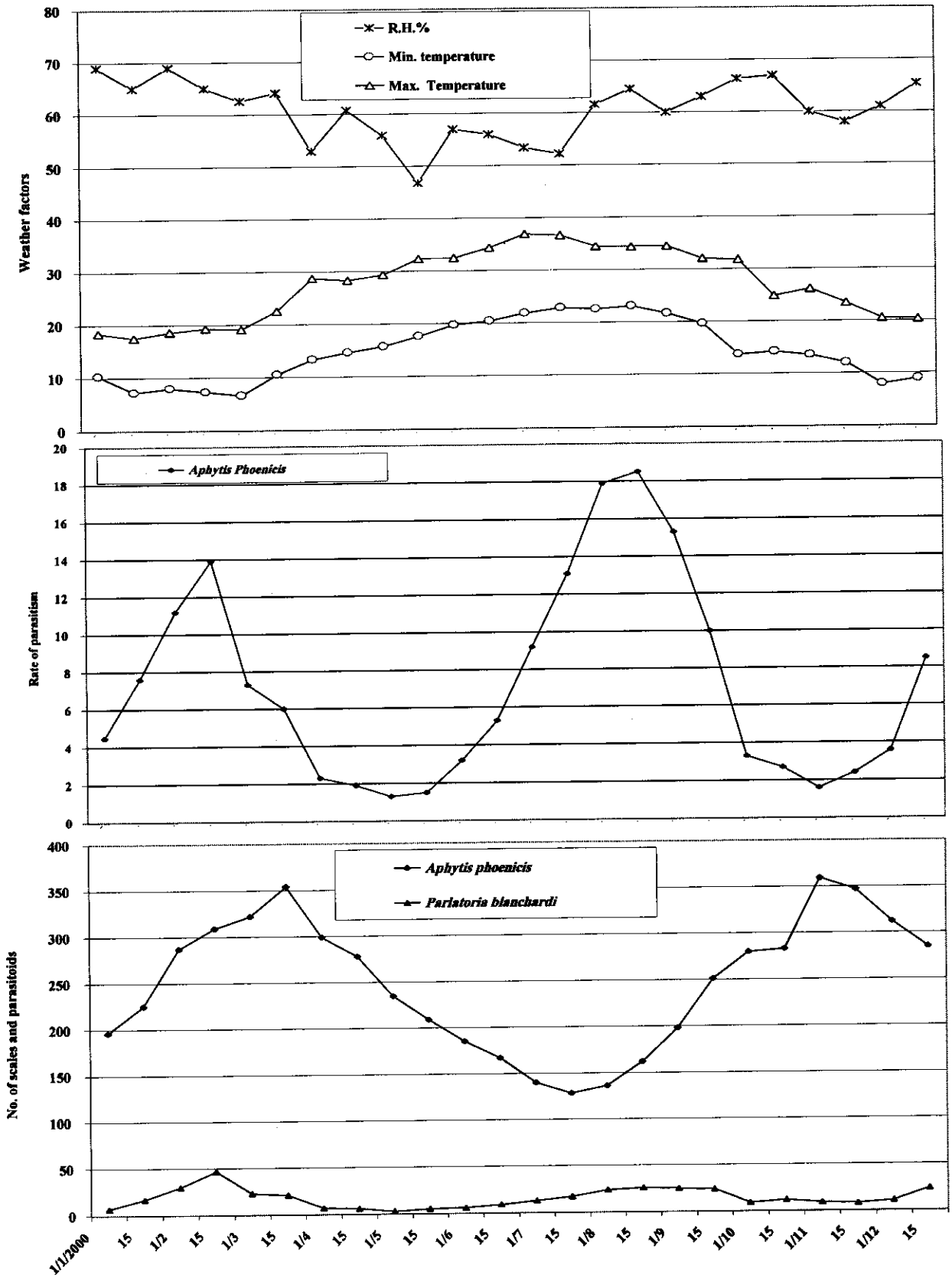

Fig. (53): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis phoenicis* resulted from *Parlatoria blanchardi* on *Phoenix dactylifera* in Ismailia, in relation to weather factors during 2000.**

Table (34) : **Multiple regression values indicating the effect of weather factors on the percent parasitism of *Aphytis paramaculicornis* on *Parlatoria* oleae in Northern Coast.**

Year	1997					1998				
Daily mean weather factors	SS	df	Ms	F	P	SS	df	Ms	F	P
D.MX.T.	0.689	1	0.689	0.170	0.6811	16.729	1	16.729	8.125	0.0058
D.MN. T.	1.109	1	1.109	0.274	0.6022	29.221	1	29.221	14.191	0.0004
D.M.R.H	1.079	1	1.079	0.267	0.6072	3.183	1	3.183	1.546	0.2182

Table (35): Number scales, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis vandenboshi* resulted from *Aspidiotus nerii* on *Oleander* sp in Qalyubiya, in relation to weather factors during 1997 and 1998.

Date of sampling	1997						1998				
	No. of scales	Parasitoid		Daily mean weather factors			No. of scales	Parasitoid		Daily mean weather factors		
		No.	R%	Temperature		RH%		No.	R%	Temperature		RH%
				Min	Max					Min	Max	
Jan. 1st	140	1	0.7	7.9	21.7	65.0	110	1	0.9	7.1	18.0	68.0
15th	154	0	-	7.0	20.0	62.0	181	-	-	7.9	19.8	60.7
Feb. 1st	170	0	-	5.0	18.3	60.0	208	-	-	8.2	21.6	63.3
15th	177	0	-	8.0	20.0	55.0	231	-	-	7.8	19.5	65.0
Mar.1st	196	0	-	9.0	21.0	61.5	292	-	-	7.9	21.8	66.7
15th	208	0	-	8.9	23.7	60.4	310	-	-	7.4	21.2	58.5
April. 1st	271	0	-	10.6	24.1	59.9	298	-	-	16.2	26.1	57.5
15th	232	0	-	15.0	29.3	59.3	285	-	-	13.5	28.5	56.0
May. 1st	213	0	-	14.9	31.1	60.1	260	-	-	18.2	34.5	53.5
15th	205	0	-	19.0	34.5	55.5	254	-	-	17.7	32.1	58.0
June. 1st	188	0	-	19.5	34.4	56.0	244	-	-	18.4	34.1	55.0
15th	159	0	-	21.7	36.1	53.9	239	-	-	18.8	33.3	63.0
July. 1st	163	0	-	22.1	36.0	56.2	224	-	-	21.3	35.9	58.5
15th	142	0	-	22.3	35.3	64.1	210	-	-	21.3	35.9	58.5
Aug. 1st	194	0	-	22.4	34.5	61.5	235	-	-	24.5	37.7	61.8
15th	198	0	-	21.6	33.8	60.5	269	-	-	22.7	34.6	64.8
Sep. 1st	235	0	-	20.6	32.9	59.3	330	-	-	21.5	37.0	56.5
15th	314	0	-	18.5	31.7	58.3	295	-	-	18.4	33.6	56.8
Oct. 1st	328	0	-	17.0	30.9	59.6	287	-	-	19.0	33.8	57.0
15th	304	0	-	15.3	29.3	61.8	276	1	0.4	17.5	28.5	59.0
Nov. 1st	215	0	-	15.1	27.6	61.0	233	2	0.8	16.8	28.2	62.5
15th	189	2	1.1	11.0	25.4	67.2	201	1	0.5	16.2	25.6	60.0
Dec. 1st	168	1	0.6	10.1	23.7	62.7	182	1	0.6	14.7	26.7	58.5
15th	151	1	0.7	7.4	20.8	69.3	193	1	0.5	9.7	20.9	57.5

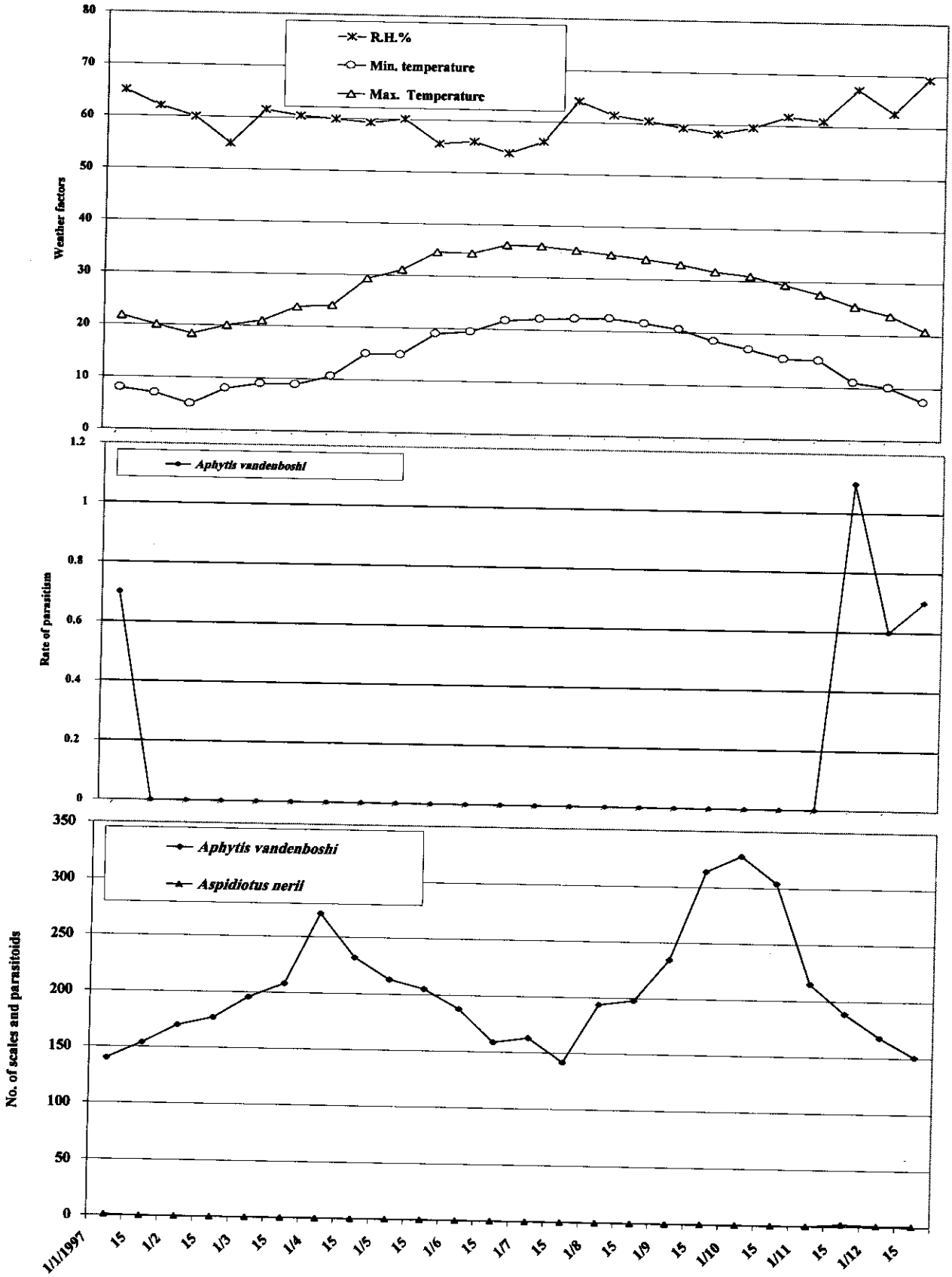

Fig. (54): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis vandenboshi* resulted from *Aspidiotus nerii* on *Oleander* sp in Qalyubiya, in relation to weather factors during 1997.**

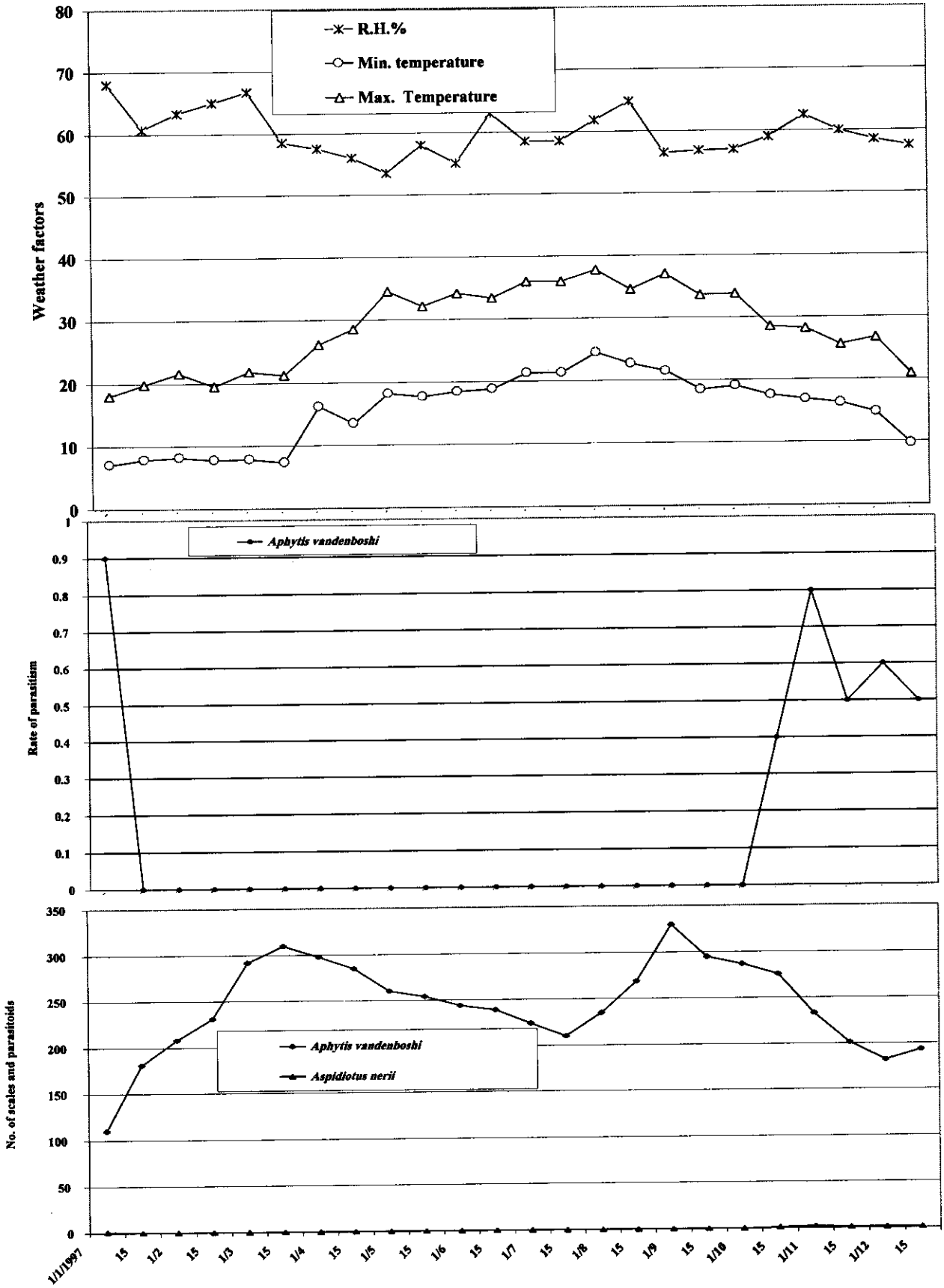

Fig. (55): **Number of scale stages, number of parasitoid individuals and rate of parasitism (R%) of *Aphytis vandenboshi* resulted from *Aspidiotus nerii* on *Oleander* sp in Qalyubiya, in relation to weather factors during 1998.**