SEASONAL ACTIVITY OF ACUMINATA SCALE, *Kilifia acuminata* (SIGN.) (HEMIPTERA: COCCIDAE) ON MANGO TREES AT GIZA GOVERNORATE, EGYPT

Abd-Al-Razzik, Maha I.

Plant Protection Research Institute, Agricultural Research Centre, Dokki, Giza, Egypt

ABSTRACT

The seasonal activity of *Kilifia acuminate* (Sign.) on mango trees was studied for two successive years (March, ٢٠١١ to mid-February, ٢٠١٣) in a privet farm cultivated with mango trees at El-Saff, Giza Governorate. The obtained results revealed that, *K. acuminata* has two overlapping generations on mango trees per year. The ١st generation (spring generation) started from early March in the both years, peaked in early May and extended to mid-August in the ١st year and late July in the ٢nd one. The generation duration ranged ٥,٠ - ٥,٥ months in the two years at ٢٤,٦ - ٢٥,٠ºC & ٥٥,٣ - ٥٦,٢٪R.H. The generation size ranged ٩٢,٠ - ٩٩,٦ nymph/leaf and ٦٩,٦ - ٧٩,٣ adult/leaf with total population ranged ١٦١,٦ - ١٧٨,٩ insect/leaf in the two years, respectively. The ٢nd generation (autumn generation) occurred between early July and mid-February, peaked in early/mid-October in the both years. The generation duration lasted for ٨ months in the two years at ٢٢,٣ - ٢٢,٦ºC & ٦٥٩,٧ - ٦٠,١%R.H. The generation size ranged ١٢١,٤ - ١٢٩.٧ nymph/leaf and ٩٩,١ - ١٠٩,١ adult/leaf with total population ranged ٢٢٠,٥ - ٢٣٨,٨ insect/leaf in the two years, respectively. The insect population recorded with minimum numbers in June, July and early August in the two years. The population of both nymphs and adult females ranged ٦٣,٩-٧٥,٢ nymph/leaf and ٤٥,١-٧١,٣ adult/leaf; the total population ranged ١٠٩ - ١٥٠,٤ insect/leaf at ٢٩,٤-٣٠,٥ºC & ٥٦,١ - ٥٧,١ R.H. %, respectively. The optimum range for insect activity ranged ٢٤,٦ - ٢٥,٠ºC for spring generation and ٢٢,٣ - ٢٢,٦ºC for autumn generation. Statistical analysis indicated that the insect population exhibited positive response to the increase of daily mean temperature in both years. The changes in the half monthly counts of nymphs and adult females population referred to the combined effect of daily mean temperature and %R.H. on the spring generation (١st generation) were ٨٢,١- ٨٢,٥٪ & ٧٣,٥ - ٨٢,٤٪ for ١st and ٢nd year, respectively. The effect of both tested weather on the nymph and adults in the autumn generation (٢nd generation) were ٨٥,١ - ٩٠,٩٪ & ٧٥ - ٧٩,٥٪ for the ١st and ٢nd year, respectively.

INTRODUCTION

Acuminata scale, *Kilifia acuminata* (Sign.) (Hemiptera: Coccidae) is common scale pest on mango trees in Egypt. The scale has a wide range of host plants and distributed in many countries in the world (Hosney, ١٩٤٣; Reddy, ١٩٦٥; Hamon and Williams, ١٩٨٤). Hosney (١٩٤٣) recorded the scale for the ١st time in Egypt on mango trees, *Mangifera indica*; guava, *Psidium guajava* and on pears, *Pyrus communis*, it spread on the lower surface of the mango leaves around the main ribs and sub-main ribs. The insect feed on the sap suck from the leaves tissues and execrate large amount of honeydew which offers a suitable medium for growth the sooty mould. The severe infestation causes defoliation of the leaves and weakened the infested trees. The present work was conducted to study the seasonal activity of *K.*

acuminata on mango trees, number and duration of annual field generations and effect of daily mean temperature and %R.H. on the insect activity in the both studied years to design an integrated pest management program for its control.

MATERIALS AND METHODS

The seasonal activity of the acuminata scale, *Kilifia acuminate* (Sign.) was carried out for two successive years (March, ٢٠١١ to mid-February, ٢٠١٣) in a privet farm cultivated with mango trees (Cult. Alfanso-naser) at El-Saff, Giza Governorate. Four infested mango trees with *K. acuminata* were selected for samplings, the infested trees has the same age (٢٥ years) , height (٤ - ٥ m) and vigor growth as well as homogenous in their infestation score . The mango orchard received the normal agricultural practices without application any chemicals control before and during the period of study. The half monthly samplings were picked up at random from the cardinal directions and center core of each mango tree with rate of ٢٥ leaves / tree (٢٥ leaves x ٤ mango trees).

The collected samples were kept in pored paper bags and transferred to the laboratory for examination by using stereoscopic-microscope. In each sample, the alive individuals of *K. acuminata* on the lower surface of each mango leaf were counted and sorted into nymphs and adults. Records of the Meteorological data, mainly daily mean temperature and %R.H were obtained from the Meteorological Center Laboratory, Agricultural Research Center. The Meteorological data of the half monthly means of the tested factors were correlated with the insect population and the simultaneous effect (Fisher,١٩٥٠) of the two weather factors on the variability within the insect population was done by computer (MATATC Program) to determine their effect on the insect activity in the both studied years.

RESULTS AND DISCUSSION

I- Seasonal activity of *K. acuminata* **on mango trees**

Data illustrated in Figs. (١&٢) showed the half-monthly variation in the seasonal activity of *K. acuminata* on mango trees at El-Saff, Giza Governorate for the both studied years as follows:

A- Nymphal population

The nymphal population (Figs., ١& ٢) showed gradual increase in March (٧٥,٨ - ٨٠ nymph/leaf) at ١٦,١ - ١٦,٧ºC and ٥٥,١ - ٥٥,٢٪R.H. in the ١st year. The same trend was observed in the ٢nd year, the population increased from ٥٠ - ٨٥ nymph/leaf at ١٦,١- ٢٠,٤ºC and ٥٧ - ٦٠%%R.H. The nymphal population increased rapidly in April in the both studied years, it increased to ٩٥ nymph/leaf in early April and reached to ١٤٠,٥ nymph/leaf by mid-April in the ١st year at ٢٠,٤ - ٢١,٧ºC & ٥٤,٢ - ٥٥٪R.H. A continuous increase was recorded for the nymphal population in the ٢nd year ranged ١٠٥ - ١٢٦ nymph/leaf at ٢١,٧ - ٢٣.٤ºC & ٥٠.٥ - ٥٥,٢٪ R.H., respectively.

The population rapidly increased by early May recording the ١st peak for the nymphal activity in the both studied years (١٨٥,٠ - ١٨٨,٣ nymph/leaf) under field conditions ranged ٢٣,٤ - ٢٥,٢ºC and ٥٥.١٪R.H. The population slightly decreased by mid-May (١٤٠,٥ - ١٣٥,٠ nymph/leaf) in the two years at ٢٥.٥ - ٢٧.٢ºC & ٥٣,٤ - ٥٤,٢٪R.H.

Gradual decrease was observed in the nymphal population during June, the population decreased from ١١٠ - ٨٥ nymph/leaf in the ١st year and ٧٩ - ٦٣,٢ nymph/leaf in the ٢nd one under field conditions ranged ٢٦.٥ - ٣١,٨ºC & ٥٤,٢ - ٥٥,٤٪R.H. in the both years, respectively. The nymphal population decreased in July (٦٣,٥ - ٤٠,٨ nymph/leaf) for the two years at ٣٠,٢- ٣٢.٥ºC. In August, the population starts to increase gradually in the two years, it increased from ٧٦,٥ - ١٠٦,٦ nymph/leaf in the ١st year and ٨٥,٦ - ١٥٦ nymph/leaf in the ٢nd year under prevailing field conditions ranged ٢٧.٢ - ٣٠,٢ºC & ٥٧,٣ - ٦٠,٥٪R.H. in the two years, respectively.

The population of *k. acuminata* showed rapidly increase during September, reached to ١٣٠,٥ - ١٩٥ nymph/leaf in the ١st year and ١٧١ - ٢٢٥,٢ nymph/leaf in the ٢nd one at field conditions ranged ٢٦,٤ - ٢٧,٥ºC & ٥٧,٩ - ٦٠,٦٪R.H. During October, the nymphal population rapidly increased to ٢٤٣ - ٢٨٠ nymph/leaf recording ٢nd peak for the nymphal activity in mid-October in the ١st year at ٢٥,١ºC & ٥٨,١٪R.H. The same trend was observed in the ٢nd year, the population increased (٢٥٣ nymph/leaf) in early October recording ٢nd peak for the nymphal activity in the ٢nd year at ٢٥,٦ºC & ٦٠,٢٪R.H.

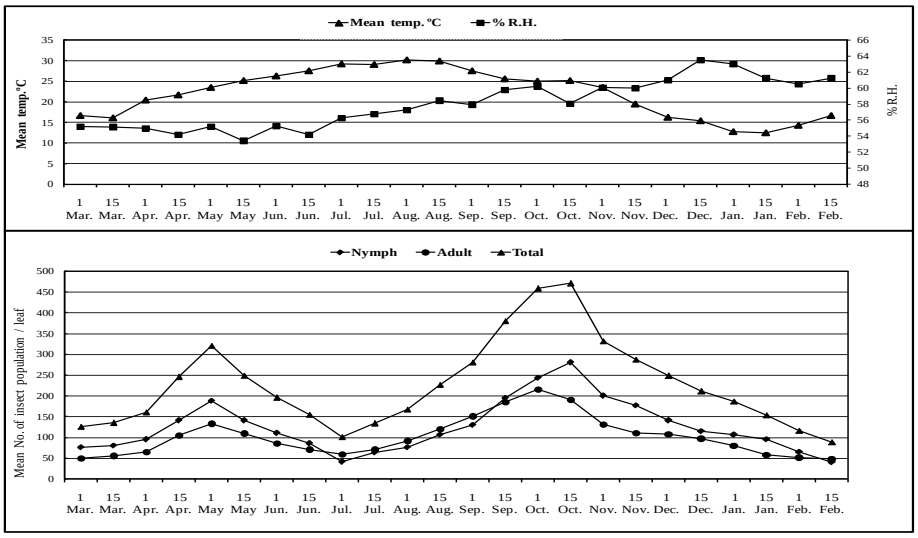

Fig. (١): Seasonal activity of *Kilifia acuminata* (Sign.)population in response to mean temperature and relative humidily on mango trees at El-Saff, Giza governorate during the ١st year (٢٠١١/٢٠١٢).

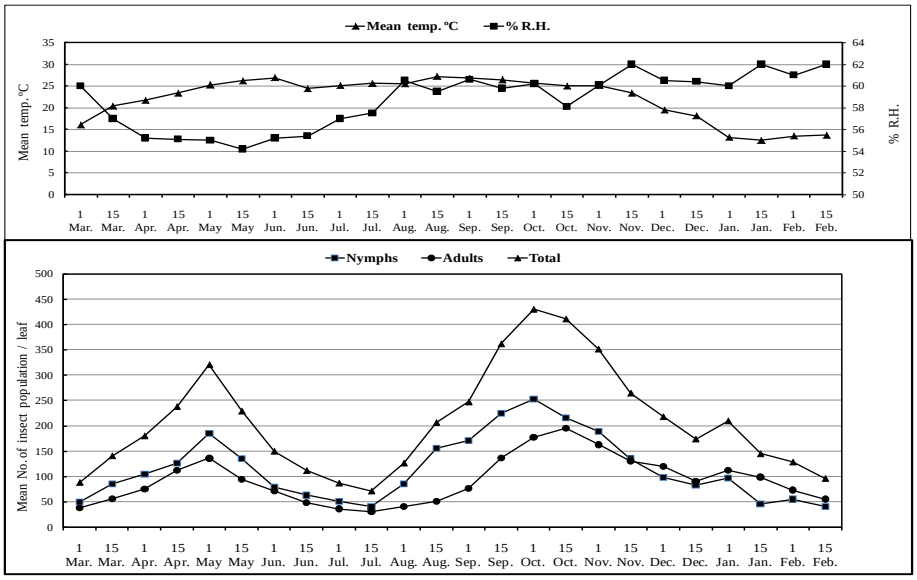

Fig. (٢): Seasonal activity of *Kilifia acuminata* (Sign.)population in response to mean temperature and relative humidily on mango trees at El-Saff, Giza governorate during the ٢nd year (٢٠١٢/٢٠١٣).

During November and December, the nymphal population decreased in the both years, from ٢٠٠ - ١١٥ nymph/leaf at ٢٣,٤ - ١٥,٤ºC & ٦٠ -٦٣,٥٪R.H in the ١st year and from ١٨٨,٨ to ٨٣,٥ nymph/leaf at ٢٥.١ - ١٨,١ºC & ٥٨,١ - ٦٠,٥٪R.H. in the ٢nd one. The population continuously decreased during January in the both years from ١٠٦ - ٩٥,٨ nymph/leaf at ١٢,٧ - ١٢,٥ºC in the ١st year and ٩٧,٢ - ٤٦ nymph/leaf in the ٢nd year at ١٣,٢ - ١٢,٥ºC whereas relative humidity ranged ٦٠ - ٦٣٪R.H. in the two years, respectively. In February, the nymphal population declined to lower numbers, reached to ٤٠ - ٤٠.٩ nymph / leaf by mid-February at ١٣,٧ - ١٦,٧ºC & ٦١,٢ - ٦٢٪ R.H. in both studied years, respectively.

B- Adult female population

Gradual increase was observed in the adult population during March and April, reached to ١٠٥-١١٢ adult/leaf by mid-April in the two year at ٢١,٧-٢٣,٤ºC & ٥٤,٢- ٥٥,١٪R.H., respectively. The population greatly increased in early May recording the ١st peak for the adult population (١٣٢ - ١٣٦ adult/leaf) at ٢٣,٤ - ٢٥,٢ºC & ٥٥٪R.H. in the both years, respectively. The population decreased in June (٨٥,٥ - ٧٠ adult/ leaf) in the ١st year at ٢٦,٢ - ٢٨,٥ºC & ٥٤,٢ - ٥٧,٥٪R.H.and ٧٠,٧ - ٤٨,٢ adult/leaf in the ٢nd year at ٢٩,٤ - ٣١,٨ºC & ٥٥.٢ - ٥٥.٤%R.H., respectively. In July, the population showed continuous decrease reached to ٦٠ - ٥٠ adult/leaf in the ١st year at ٣٠,٢ - ٣١,٦ºC & ٥٦,٨ - ٥٦,٣٪R.H. in the ١st year and ٣٥,٧ - ٣٠,٢ adult/leaf at ٣٢.٥ - ٣٠,٥C & ٥٧,٥ - ٥٧,٠٪R.H

During August, the adult population showed gradual increased in the ١st year (٩٠,٦ -١٢٠ adult/leaf) at ٢٩,٩ - ٣٠,٢ºC & ٥٧,٣ - ٥٨,٤%R.H. whereas the population slightly increased in the ٢nd year (٤٠,٦ - ٥٠,٦ adult/leaf) at ٢٧.٢ -

٢٨,٥ºC & ٥٩,٥ - ٦٠,٥٪ R.H., respectively. In September, the population increased rapidly in the 1st year (١٥٠.٣ - ١٨٥ adult/leaf) at ٢٥.٦ - ٢٧,٥ºC and ٥٧,٩ - ٥٩,٨٪R.H. compared with ٧٦,١-١٣٧ adult/leaf in the 2nd year at ٢٦,٤-٢٦,٨ºC & ٥٩,٨ - ٦٠,٦٪R.H. The adult population reached to maximum number in October (١٩٥,٥ - ٢١٥,٣ adult/leaf) in both years, recording the 2nd peak for adult activity in early October in the 1st year and mid-October in the 2nd one at ٢٥ - ٢٥,٦ºC & ٥٨,٢ - ٦٠,٢٪R.H., respectively.

In November and December, the population showed gradual decrease in the both years, ranged ١٣١,٦ - ٩٦ adult/leaf in the 1st year at ٢٣,٤ - ١٥,٤ºC and ١٦٣ - ٩٠,٣ adult/leaf in the 2nd year at ٢٥,١ - ١٨,١ºC, respectively. Gradual decrease was recorded in the adult population during both January and February reached to ٤٨,٥ - ٥٤,٩ adult/leaf in the both years, respectively.

The obtained results revealed that, *K. acuminata* has two overlapping generations a year occurred in spring and autumn seasons. The insect population reached its maximum activity by early May and October in the both years where the environmental conditions become more suitable for insect activity in the two years. The insect population (nymphs & adult females) peaked in early May in the 1st generation (spring generation) under field conditions ranged ٢٣,٤ - ٢٥,٢ºC and ٥٣,١٪R.H.whereas the 2nd generation (autumn generation) peaked in early October/ mid-October at ٢٥ - ٢٥,٦ºC & ٥٨,٢ - ٦٠,٢٪R.H., respectively.

On the other hand, the insect population was recorded with minimum numbers in June, July and early August in the two years. The population of both nymphs and adult females ranged ٦٣,٩ - ٧٥,٢ nymph/leaf and ٤٥,١ - ٧١,٣ adult/leaf with total population ranged ١٠٩ - ١٥٠,٤ insect/ leaf at ٢٩,٤ - ٣٠,٥ºC & ٥٦,١ - ٥٧,١٪R.H., respectively. Habib *et al.* (١٩٧١) mentioned that, the best conditions for the insect activity ranged ٢٣,٨ - ٢٥,٧ºC and ٦٣٪R.H.

III- Number and duration of annual field generations

١- The 1st generation (spring generation)

The 1st generation started from early March in the both years, peaked in early May and extended to mid-August in the 1st year and late July in the 2nd one. The generation duration ranged ٥,٠ - ٥,٥ months in the two years at ٢٤,٦ - ٢٥,٠ºC & ٥٥,٣ - ٥٦.٢%R.H., respectively. The generation size ranged ٩٢,٠ - ٩٩,٦ nymph/leaf and ٦٩,٦ - ٧٩,٣ adult/leaf with total population ranged ١٦١,٦ - ١٧٨,٩ insect/leaf in the two years, respectively.

٢-The 2nd generation (autumn generation)

The 2nd generation occurred between early July and mid-February, peaked in early/mid-October in the both years. The generation duration lasted for ٨ months in the two years under field conditions ranged ٢٢,٣ - ٢٢,٦ºC& ٥٩,٧ - ٦٠.١%R.H in the two years. The generation size ranged ١٢١,٤ - ١٢٩,٧ nymph/leaf and ٩٩,١ - ١٠٩,١ adult/leaf with total population ranged ٢٢٠,٥ - ٢٣٨,٨ insect/leaf in the two years, respectively.

The obtained results showed that, the generation duration of *K. acuminata* was varied in the two studied years (Tables, ١&٢ and Fig., ٣). The shortest generation occurred in spring and lasted ٥ - ٥,٥ months at ٢٤,٦ - ٢٥,٠ºC & ٥٥,٣ - ٥٦,٢٪R.H. whereas the longest one occurred in autumn with duration of ٨ months at ٢٢,٣ - ٢٢,٦ºC& ٦٥٩,٧ - ٦٠,١٪R.H. On the other hand,

the population density was varied in the two generations, the autumn generation was the largest one with total population ranged ٢٢٠,٥ - ٢٣٨,٨ insect/leaf followed by spring generation with total population ranged ١٦١,٦ - ١٧٨,٩ insect/leaf, respectively.

Table (١): Number and duration of annual field generations of *Kilifia acuminata* (Sign.)on mango trees at El-Saff, Giza Governorate in the ١st year (٢٠١١/٢٠١٢).

Generation	Insect stage	Generation period				Generation size		Mean Temp. °C	Mean R.H %
		From	To	Peak	Duration (month)	Population / leaf	Total population		
١st Generation	Nymph	Early March	Mid. August	Early May	٥,٥	٩٩,٦	١٧٨,٩	٢٤,٦	٥٥,٣
	Adult	Early March	Mid. August	Early May	٥,٥	٧٩,٣			
٢nd Generation	Nymph	Early July	Mid. February	Mid. October	٨	١٢٩,٧	٢٣٨,٨	٢٢,٣	٥٩,٧
	Adult	Early July	Mid. February	Early October	٨	١٠٩,١			

Table (٢): Number and duration of annual field generations of *Kilifia acuminata* (Sign.)on mango trees at El-Saff, Giza Governorate in the ٢nd year (٢٠١٢/٢٠١٣).

Generation	Insect stage	Generation period				Generation size		Mean Temp. °C	Mean R.H %
		From	To	Peak	Duration (month)	Population / leaf	Total population		
١st Generation	Nymph	Early March	Late July	Early May	٥	٩٢,٠	١٦١,٦	٢٥,٠	٥٦,٢
	Adult	Early March	Late July	Early May	٥	٦٩,٦			
٢nd Generation	Nymph	Early July	Mid. February	Early October	٨	١٢١,٤	٢٢٠,٥	٢٢,٦	٦٠,١
	Adult	Early July	Mid. February	Mid. October	٨	٩٩,١			

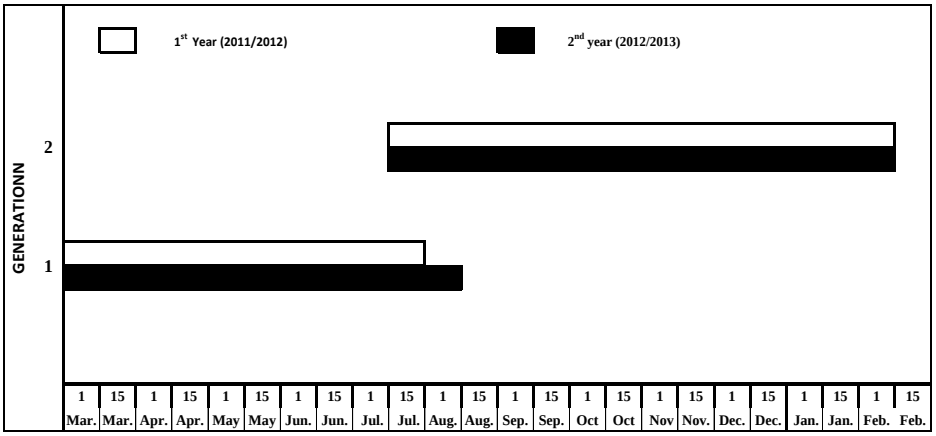

Fig. (٣): Phenology of *Kilifia acuminata* (Sign.)on mango trees at El-Saff, Giza Governorate in both studied years (٢٠١١/٢٠١٢ & ٢٠١٢/٢٠١٣).

The obtained results in agreement with Salama and Saleh (١٩٧١) they recorded ٢ annual generations for *Lecanium acuminatum* Sign. = *Kilifia acuminata* (Sign.) on mango trees in Qalubiya Governorate, the ١st generation extended from April to May and the ٢nd one peaked in October - November. Shahein (١٩٧٤) showed that, *K. acuminata* had two periods of activity on *Jasminum grandiflorum*, the ١st period occurred from October to March, while the ٢nd period lasted from June to September. Also, the population dynamics of *K. acuminata* on *Myrtus communis* showed two activity periods at Giza, the ١st period from October to February and the ٢nd one from March to September. However, the same authors revealed that *K. acuminata* has three periods of activity on *Jasminum azoricum* at Giza and Zagazig regions, the ١st period occupied at October and lasted for February, the ٢nd period occurred from April to May and the last period founded from July to September. Kwaiz (١٩٩٩) reported that, *K.* acuminata has two annual generations a year, the ١st generation started from early September until mid-April/early May whereas the ٢nd one occurred from early March/mid March to early September/ late August.

Elwan (٢٠٠٦) revealed that, *K. acuminata* has two overlapping generations per year under field conditions at Qalubiya Governorate, the ١st generation occurred in spring, peaked in April, whereas the ٢nd generation occurred in autumn, peaked in October/ November. On the other hand, the present results disagreement with Hassan *et al*. (٢٠١٢) they recorded three annual generations a year for *K. acuminata* on mango trees in Sharkia Governorate, occurred from March to June; July to October and November to February, respectively.

IV- Effect of tested weather factors on the insect activity

Correlation and regression analysis were done to determine the effect of each weather factor (daily mean temperature and RH %) and the combined effect on the activity of nymph and adult populations of *K.*

acuminata in each generation. Results of statistical analyses were shown in Tables (٣&٤) and discussed as follows:

١- The ١st generation

A: Nymphal population

١-Effect of daily mean temperature

As shown in table (٣ & ٤) *K. acuminate* nymphal population exhibited positive response to the increase of mean temperature (r = ٠,٨٣٤ & ٠,٨٩٧) during the ١st generation in the both studied years, respectively. However, the partial regression coefficient values (P.reg. = ١٤,٠ & ١٦,٧) which was highly significant in the ١st year (t = ٣,٥) and insignificant in the ٢nd one (t values = ١.٧١) when the daily mean relative humidity become around its mean. The obtained results revealed that, daily mean temperature under the optimum range of the nymphal activity in the ١st year and within the optimum ranger in the ٢nd year, respectively.

٢- Effect of daily mean relative humidity

Correlation and regression analysis indicated that *K. acuminate* nymphal population exhibited negative response to the increase of relative humidity (Table ٣&٤). These response was insignificant (r = -٠,٣٠٠) in the ١st year and significant in the ٢nd one (r = -٠.٨١٠). The partial regression coefficient values were (٢٨,٧& ٩,٧) insignificant (t = ١,٤٥& ٠,٥٨) in the first and second years, respectively. The obtained results revealed that, daily mean relative humidity within the optimum range of the nymphal activity in the two years.

٣- The combined effect of the daily mean temperature and %R.H.

Results in Tables (٣&٤) showed insignificant effect for both tested weather factors on the nymphal activity in the ١st generation (F values = ٦,٩ & ٧,١) in the both years. The obtained results revealed that, the changes in the half monthly counts of the nymphal population referred single effect of each weather factor especially daily mean temperature. The amount of variability in the nymphal population ranged ٨٢,١% - ٨٢,٥% in the both years, respectively.

B: Adult population

١-Effect of daily mean temperature

Daily mean temperature (Tables, ٣&٤) showed significantly positive effect (r = ٠.٨٧٩ & ٠.٨٥٢) on the adult activity in the ١st generation in the both years. As shown in table (٣&٤) the effect of this factor on the adult activity was significant in the ١st year (t value = ٣,٣٢) and insignificant (t value = ١,٢٠) in the ٢nd one when the daily mean relative humidity become around its mean. The obtained results revealed that, daily mean temperature under the optimum range of the adult activity in the ١st year and within the optimum range of activity in the ٢nd year, respectively.

٢- Effect of daily mean relative humidity

Data in Tables (٣&٤) showed that, daily mean relative humidity had insignificantly negative relation (r = -٠.٤٢٤ & -٠,٧٨٠) on the adult population in the both years. The single effect of daily mean relative humidity was insignificantly positive (t values = ٠.٩٣ & ٠.٣٣) on the adult activity in the two years when the daily mean temperature become around its mean.

The obtained results revealed that, daily mean relative humidity within the optimum range of adult activity in the ١st generation in both studied years, respectively.

٣-The combined effect of the daily mean temperature and relative humidity

The combined effect of both factors (Tables, ٣&٤) on the adult activity was insignificant (F values = ٧,٠ & ٤,٢) in the ١st generation in the two years. The obtained results revealed that, the changes in the half monthly counts of the adult population referred to the combined effect of the tested weather factors which ranged ٧٣,٥ - ٨٢,٤% in the ١st generation in the two years, respectively.

II- The ٢nd generation

A: Nymphal population

١- Effect of daily mean temperature

Results in the Tables (٣&٤) showed that, *K. acuminate* nymphal population exhibited highly significantly positive response to the increase of daily mean temperature (r = ٠,٨٧٢ & ٠,٩٣١) during the ٢nd generation in both years. Regression analysis showed positive relation between the nymphal activity and daily mean temperature in the ٢nd generation (P. reg. = ٦,٥ & ١٧,٧). These relation was insignificant in the ١st year (t = ١,٦٢) and highly significant (t = ٥,٤) in the ٢nd one when the daily mean relative humidity become around its mean. The obtained results revealed that, daily mean temperature within the optimum range of nymphal activity in the ١st year and under the optimum range of the nymphal activity in the ٢nd year, respectively.

٢- Effect of daily mean relative humidity

The nymphal population (Tables, ٣&٤) showed negative relation with the nymphal population in the both years, significant in the ١st year (r = - ٠,٨٦٨) and insignificant in the ٢nd one (r = - ٠.٤٨٧). The single effect of this factor on the nymphal activity was insignificant (t values = -١,٥٦ & -١.٣٦ in the two years when the daily mean temperature become around its mean. The obtained results revealed that, daily mean relative humidity was around the optimum range of the nymphal activity in the both studied years, respectively.

٣- The combined effect of the daily mean temperature and %R.H.

The combined effect (Tables, ٣&٤) of both daily mean temperature and relative humidity was highly significant on the nymphal population in the both years (F values = ١١,٥ & ١٩.٩), respectively. The changes in the half monthly counts of the nymphal population referred to the combined effect of the two tested weather factors which ranged ٨٥,١ - ٩٠,٩% in both years, respectively.

B: Adult population

١-Effect of daily mean temperature

Adult population of *K. acuminate* (Tables, ٣&٤) showed significantly positive relation (r = ٠,٨٨٨ & ٠,٧٨٠), with the daily mean temperature ٢nd generation in the two years, respectively. The single effect of this factor on the adult activity was significant in the ٢nd generation in the two studied years (t values = ٢,٧٤ & ٢.٤٩) when the daily mean relative humidity become around its mean. The obtained results revealed that, daily mean temperature

was under the optimum range of the adult activity in the ٢nd generation in the both years, respectively.

٢- Effect of daily mean relative humidity

Data in Tables (٣&٤) showed that, the adult population had insignificantly negative relation, with daily mean relative humidity in the both years (r values = -٠,٦٤١ & -٠.٦٠٢). The single effect of this factor on the adult activity was insignificant, positive in the ١st year and negative in the ٢nd one (t values = ٠.٣٦ & -١,٥١) when the daily mean temperature become around its mean. The obtained results revealed that, daily mean relative humidity within the optimum range of adult activity in the ١st year and around the optimum range of adult activity in the ٢nd one, respectively.

٣-The combined effect of the daily mean temperature and %R.H.

The combined effect (Tables, ٣&٤) of both tested weather factors was significant (F value = ٧) on the adult activity in the ١st year and insignificant in the ٢nd one (F value = ٦) The changes in the half monthly counts of the adult population referred to the combined effect of the tested weather factors ranged ٧٥ - ٧٩,٥% in the both years, respectively.

The present results proved that, daily mean temperature considered an effective factor for insect activity on both annual field generations, the insect population correlated significantly with daily mean temperature. The optimum range for insect activity ranged ٢٤,٦ - ٢٥,٠ºC for spring generation and ٢٢,٣ - ٢٢,٦ºC for autumn generation.

The changes in the half monthly counts of nymphs and adult females population referred to the combined effect of daily mean temperature and %R.H. on the spring generation (١st generation) were ٨٢,١- ٨٢,٥٪ & ٧٣,٥ - ٨٢,٤% for ١st and ٢nd year, respectively. The effect of both tested weather on the nymph and adults in the autumn generation (٢nd generation) were ٨٥,١ - ٩٠,٩٪ & ٧٥ - ٧٩,٥٪ for the ١st and ٢nd year, respectively.

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النشاط الموسمى لحشرة المانجو القشرية الرخوة على اشجار المانجو بمحافظة الجيزة

مها إبراهيم السيد عبد الرازق
معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الدقى - الجيزة

اجريت الدراسة الحالية بناحية مركز الصف - محافظة الجيزة لمدة عامين متتاليين (٢٠١٢/٢٠١١ & ٢٠١٣/ ٢٠١٢) لتقدير النشاط الموسمى لحشرة المانجو القشرية الرخوة ، عدد اجيالها فى كل عام ومدة كل جيل تحت الظروف البيئية السائدة فى منطقة الصف مع دراسة تأثر عوامل الطقس على نشاطها.

اتضح من نتائج الدراسة وجود جيلين متداخلين للحشرة على مدار العام ، ظهرالجيل الاول فى الربيع (جيل الربيع) والجيل الثانى فى الخريف (جيل الخريف) من كل عام . بدأ جيل الربيع نشاطة من بداية مارس فى العامين وامتد نشاطة الى منتصف اغسطس فى العام الاول ونهاية يوليو من العام الثانى ، وكانت ذروة نشاطة فى مايو فى العامين ، وبلغت فترة نشاطة ٥ - ٥,٥ شهر وكان متوسط درجة حرارة ٢٤,٤ - ٢٥,٠ م° فى العامين على التوالى ، تراوح متوسط تعداد جيل الربيع ٩٢,٠ - ٩٩,٦ حورية/ورقة و ٦٩,٦ - ٧٩,٣ حشرة كاملة/ورقة فى العامين وكان متوسط تعداد الحشرة ١٦١,٦- ١٧٨,٩ حشرة/ورقة فى العامين على التوالى.

بدأ جيل الخريف (الجيل الثانى) نشاطة مع بداية مارس فى العامين وامتد نشاطه الى منتصف فبراير فى العامين على التوالى ، وكانت مدة جيل الخريف ٨ شهور فى كل عام ، ووصل تعداده ١٢١,٤ - ١٢٩,٧ حورية/ورقة ، و٩٩,١ - ١٠٩,١ حشرة كاملة/ورقة وكان متوسط تعداد الحشرة فى جيل الخريف ٢٢٠,٥ - ٢٣٨,٨ حشرة/ورقة فى العامين على التوالى. كما تبين من الدراسة ان جيل الخريف كان اكثر تعدادا (٢٢٠,٥ - ٢٣٨,٥ حشرة/ورقة) من جيل الربيع (١٦١,٦ - ١٧٨,٩ حشرة/ورقة) فى كلا العامين .

واتضح من الدراسة انخفاض نشاط حشرة المانجو القشرية الرخوة فى يونيو ، يوليو وبداية اغسطس على مدار العامين على التوالى وهذا راجع الى ارتفاع درجة الحرارة فى فصل الصيف (٢٩,٤ - ٣٠,٥ م°) حيث وصل متوسط تعداد طور الحورية ٤٥,١ - ٧١,٣/ ورقة

ومتوسط تعداد طور الحشرة الكاملة ١٠٩ - ٥٠,٤/ورقة فى العامين على التوالى . وكانت درجة الحرارة المثلى لنشاط الحشرة ٢٤,٦ - ٢٥,٠ م° فى جيل الربيع و ٢٢,٣ - ٢٢,٦ م° فى جيل الخريف فى العامين على التوالى. كما تبين من نتائج التحليل الاحصائى وجود ارتباط قوى ومعنوى لدرجة الحرارة على نشاط الحشرة فى جيلى الربيع والخريف من كل عام .

اتضح من دراسة تأثير عوامل الطقس السائدة فى منطقة الدراسة (متوسط درجة الحرارة ومتوسط الرطوبة النسبية) على نشاط الحشرة فى جيل الربيع ان كمية الاختلاف فى تعدادها والتى يمكن اعزاءها احصائيا الى التغير فى عوامل الطقس المختبرة كانت ٨٢,١ - ٨٢,٥ % لطور الحورية و ٧٣,٥ - ٨٢,٤% لطورالحشرة الكاملة فى العام الاول والثانى على التوالى. وكانت فى جيل الخريف ٨٥,١ - ٩٠,٩% لطور الحورية و ٧٥ - ٧٩,٥% لطورالحشرة الكاملة فى العام الاول والثانى على التوالى.

قام بتحكيم البحث

أ.د / عبد الستار ابراهيم عبد الكريم — **كلية الزراعة – جامعة المنصورة**

أ.د / السيد علوان — **مركز البحوث الزراعية**

Table (٣): Effect of daily mean temperature and %R.H. on the seasonal activity of *Kilifia acuminata* (Sign.)on mango trees at El-Saff, Giza Governorate in the ١st year (٢٠١١/٢٠٠١٢).

Generation	Insect Stage	Generation duration		Generation Duration (month)	Weather Factor	Simple correlation	Multi-regression		ANOVA TABLE	
		From	To			r value	P. reg. ± s.e	t value	F value	E.V. %
١st Generation	Nymph	Early March	Mid Aug.	٥,٥	Mean Temp.	٠,٨٣٤*	١٤,٠±٤,٠	٣,٥٠**	٦,٩	٨٢,١
					Mean %R.H.	-٠,٣٠٠	٢٨,٧±١٩,٨	١,٤٥		
	Adult	Early March	Mid Aug.	٥,٥	Mean Temp.	٠,٨٧٩*	١٠,١±٣,٠	٣,٣٢**	٧,٠	٨٢,٤
					Mean %R.H.	-٠,٤٢٤	١٤,٠±٥,١	٠,٩٣		
٢nd Generation	Nymph	Early July	Mid Feb.	٨	Mean Temp.	٠,٨٧٢**	٦,٥±٣,٩	١,٦٢	١١,٥**	٨٥,١
					Mean %R.H.	-٠,٨٦٨*	-١٦,٧±١٠,٧	-١,٥٦		
	Adult	Early July	Mid- Feb.	٨	Mean Temp.	٠,٨٨٨**	١٠,٨±٣,٩	٢,٧٤*	٧,٨*	٧٩,٥
					Mean %R.H.	-٠,٦٤١	٣,٨±٢,٢	٠,٣٦		

Table (٤): Effect of daily mean temperature and %R.H. on the seasonal activity of *Kilifia acuminata* (Sign.)on mango trees at El-Saff, Giza Governorate in the ١st year (٢٠١٢/٢٠٠١٣).

Generation	Insect stage	Generation duration		Generation Duration / month	Weather factor	Simple correlation	Multi-regression		ANOVA TABLE	
		From	To			r Value	P. reg. ± s.e.	t value	F Value	E.V. %
١st Generation	Nymph	Early March	Late July	٥	Mean Temp.	٠,٨٩٧*	١٦,٧± ٩,٨	١,٧١	٧,١	٨٢,٥
					Mean %R.H.	-٠,٨١٠*	٩,٧±٤,٩	٠,٥٨		
	Adult	Early March	Late July	٥	Mean Temp.	٠,٨٥٢*	١١,٤±٩,٥	١,٢٠	٤,٢	٧٣,٥
					Mean %R.H.	-٠,٧٨٠	٥,٣±٢,٤	٠,٣٣		
٢nd Generation	Nymph	Early July	Mid Feb.	٨	Mean Temp.	٠,٩٣١**	١٧,٧± ٣,٣	٥,٤**	١٩,٩**	٩٠,٩
					Mean %R.H.	-٠,٤٨٧	-١٢,٤±٩,٢	-١,٣٦		
	Adult	Early July	Mid Feb.	٨	Mean Temp.	٠,٧٨٠*	٧,٣± ٢,٩	٢,٤٩*	٦,٠	٧٥
					Mean %R.H.	-٠,٦٠٢	-١٢,٥± ٨,٣	-١,٥١		