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Environmental Effect on The Biological Behavior of the Cucurbit Beetle *Epilachna chrysomelina* In Al- Qunfudah Province- Saudi Arabia

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ABSTRACT

Epilachna chrysomelina (Coleoptera: Coccinellidae) is a phytophagous insect with an economic importance of damaging the agricultural crops. The Melon Ladybird Beetle, *E. Chrysomelina*is is one of the major phytophagous insects that feed on cucurbit plants. It is considered an economic pest in agriculture and multi-habitat insect widely distributed throughout the world. The insect is abundant in the southern region of Saudi Arabia and choose the most favourable conditions for its life cycle completion. It prefers humid habitats with optimum temperature degrees. The generations of the insect are affected by changes in environmental conditions and its numbers increase or decline according to variation in temperature and relative humidity (RH). These factors play an important role in changing its biological behaviour particularly feeding, breeding, reproduction and development of its generations. There were significant differences between the different developmental stages in the periods of time of their development**.**

Key words: Saudi Arabia, *Epilachna chrysomelina*, Environmental, Behavior and Al- Qunfudah.

INTRODUCTION

The spotted oriental cucumber beetle *E.chrysomelina* (F.) is an important pest which feeds on many vegetable crops. It attacks plants specially members of the family Cucurbitaceae like pumpkin, sweet gourd, bittergourd, cucumber, Cucumis mello, Cucurbita pepoand Citrullus lanatus (Talhoq, 1982).

According to the Maps of Plant Pests of 1980 and 1990 the spread of *E. chrysomelina* was the scope of many of the cities of the world.

The temperature is the main factor in the activity and behavior of many insects. It helps in distribution and development of the spread of insects as well as there is a clear impact in the growth and the impact of different heat-swing . The various temperatures have significant impact on the growth and reproductive capacity of producing generations of beetles (Abdel-Rahman 2005)

Effect of temperature on the properties of reproduction in beetle Mexican beetle (*Zygogramma bicolorato*) .The highest fertility rate of 928 eggs and the highest proportion of vital whites are 75.6% at temperature 27 C° with a decrease in the periods before and after laying eggs whereas high temperatures up to 27 C° then height again as temperatures rise more than 27 C° .The spawning period decreased with heat rising from 92.9 days to 27.5 days. The degree of age-specific fertility also affected by temperature (Omkar*et al*. ,2009).

The change in humidity and temperature have an effect on the evolution of insect Larva Pupal *Diapreper abbreviatus*, through egg response to different temperatures in the possibility of hatching

(Lapointe and Shapiro, 1999 and Lapointe ,2000). There is relationship between the death of the offspring and the position of eggslayed, because the movement of larvae is very limited, and that the choice of insects to find suitable place to oviposit their eggs is influenced by a large number of different factors, including the quantity and quality of food sources Singly(Myers , 1985 and Thompson and Pellmyr , 1991).

Choose the Mexican bean beetle *Epilachna varivestis* to where to put their eggs significantly affects the lives of breeds and thus the strength(Ballhorn and Lieberei, 2006) .

The present work was planned to evaluate the effect of temperature and humidity on the population abundance, behavior and life cycle of spotted orientalCucumber beetle *E. chrysomelina* in Al- Qunfudahprovince Kingdom of Saudi Arabia.

MATERIAL AND METHODS

Study area

Al- Qunfudah province located on the west coast of the Kingdom of Saudi Arabia is one of the largest cities of Makka Al Mukarrama Region in Saudi Arabia, overlooking the Red Sea on the west, and away from the holy city of Mecca 350 km to the south, and away from Jeddah, 360 km (Fig. 1). Its geographic coordinates are 19 07 42. 18" N and 41 05 11. 75" E .

Methods of studying the stages of cucurbits beetle

Larva

Larvae were transferred from cage to cage Education hatching plastic, and fed by agricultural Cucumis melo, and record the date of the first day when placed with the observation of biological behavior in the feeding process until the day that become into the next stage and the dates will be recorded in the log transformation for that with record temperatures and humidity daily by a special digital device.

Pupa

The pupae (first day age) were transferred to the breeding cage and left with plastic study variables atmosphere of temperature and humidity, and are recording the history of evolution from the first day until the adult.

RESULTS

Characterized by an insect beetle cucurbits *E. chrysomelina* phytophagous of plants which favors plant cucurbits From this came the label. Adapt this insect is fast and observant with the plant that exist, but when the temperature and relative humidity, as observed through field and laboratory study they adapt and reproduce in certain times of the months of the year and under variable environmental conditions .

Cucurbits beetle *E.chrysomelina* is considered one of the most serious pests of economic destructive to agricultural crops are characterized lend the leaves of the plant updated damage to an adult, the advantage of this insect small size and the average length of a female (8,75 ± 0,082 mm) and the average length of the male (8,1 ± 0,123 mm) and of Blessed red color There twelve black dot so that it is six points on each sheath Fig. (2, 4)

Eggs

Found that for different temperatures and relative humidity significant impact on the growth

Table 1: Mean temp. and Humidity during themonths of (Jan. - Dec. 2009)

Month	Mean	
	Temperature(C°)	Humidity(%)
January	23.17	62.5
February	21.95	66
March	22.72	64
April	25.21	64.5
May	28.06	65.5
June	31.23	58
July	31.23	54.5
August	31.39	49
September	29.02	57
October	27.28	57.5
November	27.51	61
December	24.10	62

and reproductive capacity to produce generations *E. chrysomelina*, where the female lays her eggs on the body mass of an average of 27.8 ± 2.3 eggs on the bottom surface of the paper, where production times vary and reproduction between the months of the year.

Increasing reproduction and laying eggs in the periods of the month of February, March and April, while at least gradually in the months of April, May and June and disappear egg masses in the month of July and August because of the high temperature and low humidity from the normal rate.

The female lays her eggs on the leaves or large peripheral protected by mucous secretions

Fig. 1: Al- Qunfudah province

Fig. 2: Male and female of *Epilachna chrysomelina*

Eggs Larvae Pupa

Fig. 3: Eggs , larvae and pupa of *Epilachna chrysomelina*

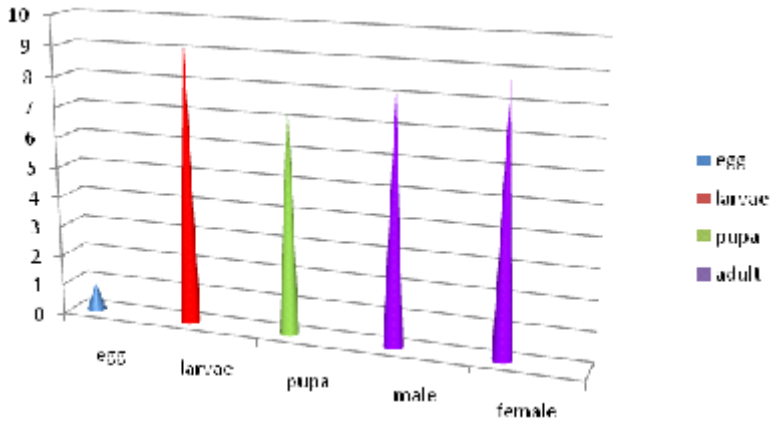

Fig. 4: Average length of stages beetle cucurbits (*E. Chrysomelina*)

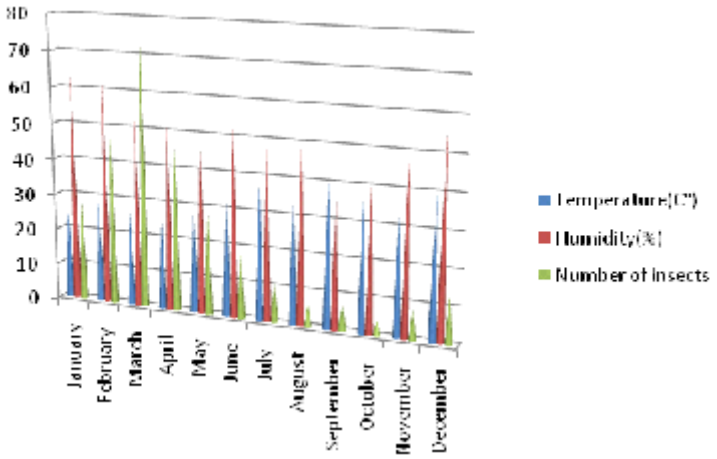

Fig. 5: Effect of temperature and air humidity on the numerical abundance of beetle cucurbits

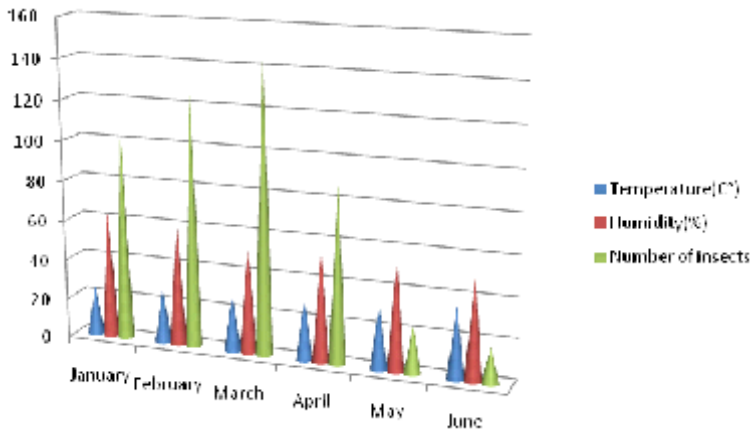

Fig. 6: The period of time for the stages of the evolution of beetle cucurbits

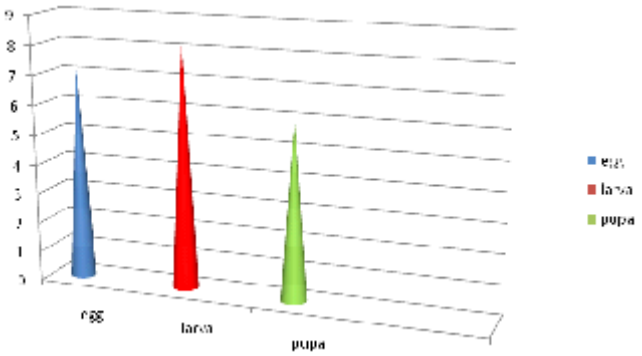

Fig. 7: Average age of the stages the growth of cucurbits beetle : (Eggs, larva, pupa and Adult)

in the absence of older leaves, they put it on solid objects, the egg spindle with an average length of (0.89 ± 0.025 mm) and the average age of the egg (7.14± 0,547) a day Fig. (3 and 4).

Larvae

E. chrysomelina be voracious feeding on the leaves of the plant-year-old firstTo a length of about 1 mm and then soon grow rapidly. Larvae feed on the leaves of the plant in the early stages of its growth, especially the lower surfaces of the paper, where she works on crop damage and destruction .

Body larva contains a large number of thorns black complex in part, dorsal and without the abdominal area of thorns (form 213) (Fig. 3 and 4) and the body of the larva amount of average length (9,2 ± 0,226 mm), and takes the larva grow to turn into a phase that followed average (8,2 ± 0,836) days .

Pupa

Larva turning to a pupa is a stage that comes before the advent the adult, where the larva turn into a pupa Average (6 ± 0,707) days and be deliberately inert on adhesion papers or on plant stems and branches through the abdomen Fig. (4).

The effect of temperature and air humidity on the numerical abundance of beetle cucurbits

The results of statistical analysis Simple Correlation Coefficient Table (1) showed that there is relationship and highly significant (P = 0.01) between the air temperature and the number of eggs, and the presence of a significant relationship at the level (P = 0.05) between the humidity Fig.(5)

The effect of temperature and humidity on the female oviposit egg masses

The number of egg masses that have been collected during the months of January to June and the amount of eggs that hatch with an indication of the average temperature and humidity during thesemonths.It is noticeable that the greater the average temperature and the average moisture content, the lower the number of eggs produced.

There is a correlation moral strong between the quantity of eggs produced and average temperatures, as the value of simple correlation coefficient (r) calculated at the level (P = 0.01) (0.92668) which is greater than the value scheduled (0.9170) at the same level and degree of freedom (4) .

The results of this study showed that the length of *E. chrysomelina* steady with an average length of the adult(8,75 ± 0,082)mm

This number indicative of the length fairly recently from insects lengths Coleoptera where recorded lengths up to 10 mm(Perry and Roitberg , 2005)

Cucurbits beetle as in full development insects going through four stages (egg, larva pupa the adult) such as coccinellidae(Dixon , 2000)

The results of the current study, it was

observed that female beetle cucurbits laid egg masses, which range between 25-30 eggs in environmental conditions suitable, and stated that insects coccinellidae put eggs in her lifetime approximately 500 eggs, (Talor , 2000). found in this study that the egg beetle cucurbits tend to yellow and ranges average length of (0,89 ± 0,025) and spindle-shaped, and pointed out that the length of the egg up to 1 mm in most of coccinellidae and is considered the Mexican bean beetle is the closest are the current insect in terms of morphological characteristics (Dixon , 2000).

The average age of the egg in cucurbits beetle (7,14 ± 0,547) day and the average age of the larva (8,2 ± 0,836) day and average age of pupa (6 ± 0,707) days and beetles coccinellidae up the age to 14 eggs a day appear to live larvae of 2, 5 weeks (Hoffman and Fredsham , 1993).

And pupa in coccinellidae beetles average age of 7 , 10 days (Mahr,1996) *E.chrysomelina* have the ability to choose the right place to lay eggs, where if you can not find terminal leaves or large size, they put it on the hard places, and a female coccinellidae choose the right place to lay eggs(Thompson and Pellmyr , 1991) (Ballhorn *et al* ., 2010).

There is obvious effect of the factors of the environment through the daily average temperature and humidity on the appearance of insects cucurbits of food daily in the field and its diversity, the results showed the extent to which these insects environmental variables where the highest density of numerical in the months of February and March, April and an average temperature equivalent to 23 C° and humidity upto 75% and recorded the lowest density in the months of August and September and October, where high temperatures average 36 C° and 35% humidity.

Reproduction properties in the Mexican bean beetle affected by variables of temperature and humidity, the higher the temperature less than the production of egg masses and thus less density numbers of insects (Omkar *et al* ., 2009) .

Observed a significant correlation between the number of eggs produced by female beetle cucurbits and humidity, and there is a strong significant correlation between the quantity of eggs produced and high temperatures, and these results agreed with many of the researchers , That the fixed temperature affect growth and reproductive capacity of the CoccinelleMndecimpunctata beetle where he pointed out that the temperature of 25 – 30°C is the best and most suitable for the development of these predatory beetles (Abdel-Rahman , 2005).

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