

LIFE CYCLE OF GOLDEN BUPRESTID BEETLE, *ANATHAXIA ANGUSTIPENNIS* KLUG., AND RELATIVE SUSCEPTIBILITY OF CERTAIN MANGO TREE VARIETIES TO INFESTATION WITH SOME INSECT BORERS

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Abstract

The golden buprestid beetle *Anathaxia angustipennis* Klug , infests many fruit and wood trees namely : mango, peach, pear, apricot, fig, apple, citrus, acacia, willow and casuarina . The life cycle of this pest on mango cuttings revealed that the recorded incubation period was 6-18 days. The immature larva lasted 230-305 days to reach the full-grown larva which elapsed 22-48 days to enter prepupa that passes to pupa after 7-49 days. The pupal duration lasted 4-22 days. The beetle stayed 4-15 days inside pupal chamber, the male beetle lived 4-19 days after emergence, while the female survived 5-26 days. The pre-oviposition, oviposition and post-oviposition periods were 2-5, 4-14 and 3-6 days, respectively. The female laid 6-21 eggs . Total life cycle indicated that *Anathaxia angustipennis* beetle had one generation yearly, ranged 352-393 days with an average of 367.8 ± 13.3 days.

Relative susceptibility of eight mango varieties namely: Timour, Company, Ewase, Mabrouka, Balady, Mesk, Hindy and Zebdia to the infestation with some borers showed that type of variety play a role in susceptibility rate. The different mango varieties were descendingly arranged according to their susceptibility to borers infestation as follows: Ewase > Mabrouka > Hindy > Balady > Zebdia > Mesk > Company > Timour. On the other hand, total relative infestation of different borers demonstrated that the borers were descendigly arranged according to their infestation of different mango varieties as follows: *Enneadesmus obtusedentatus* > *Hypothenemus eruditus* > *Sinoxylon sudanicum* > *Chrysobothris dorsata* > *Belionota scutellaris* > *Phonate frontalis* > *Chlorophorus varius* > *Xyleborus similis*.

INTRODUCTION

The golden buprestid beetle *Anathaxia angustipennis* Klug., is one of flat-headed borer which work in cambium tissue and sapwood region . This beetle attacks each of fruit and wood trees. No available studies on the biology and ecology of this insect was recorded. In Egypt, Willcocks (1924) found that *A. angustipennis* infested *Zyziphus spinacristi*, while Alfieri (1976) listed that this beetle infested *Acacia arabica* and *Acacia tortilis*. However, Batt (1999) recorded that *Anathaxia angustipennis* Klug. infested mango trees. Some investigators remember that *Anathaxia congregata* Klug. attacked sponge tree (Willcocks, 1924 ; Nour , 1963 ; Alfie-

ri, 1976; Batt, 1989), *Acacia tortilis* (Alfieri, 1976) Egyptian acacia and nabk trees (Nour, 1963; Helal, 1986; Batt, 1989), prickly broom (Nour, 1963), peach, common fig, citrus, white poplar, christmas berry and apricot trees (Batt, 1989), citrus (Batt *et al.*, 1993), pear, mango and willow trees (Batt, 1998).

The objective of this work is to gain some knowledge about the biology of *A. angustipennis* beetle on mango trees. Besides, behavior of different developmental stages, host plants and susceptibility of certain mango varieties to infestation with some borers were conducted.

MATERIALS AND METHODS

Life cycle of *A. angustipennis* : Infested branches with *A. angustipennis* were collected during January and February 1998 from Almansourya, Embaba district, Giza Governorate. The branches were divided to cuttings (each of 50 cm. long) and put in plastic containers (70 cm. height and 40 cm. diameter) then covered with muslin cloth. The containers were examined daily until emergence occurred. The emerged beetles were collected and sexed, each five couples (males and females) were released on two mango cuttings (25 cm. long and 2 cm. diameter) placed in glass jar (35 cm. height and 18 cm. diameter) and covered with muslin cloth and replicated 5 times. The cuttings were wounded at their terminals by sharp blade (as sites of oviposition). Daily examination was carried out until oviposition took place, the ovipositional periods were recorded, the deposited eggs were remarked until hatching and incubation period was estimated. Thirty hatching larvae were planted under the bark of intact mango cuttings (one larva per cutting), while the later left to develop in the same oviposition cuttings. Reared larvae were observed continuously until they reached to the full-grown and constructed the pupal chambers. Various transformations to pre-pupa, pupa and adult were studied. Generation period was estimated just after beetles emergence from oviposition cuttings.

Host range of *A. angustipennis* : Infested cuttings with buprestid beetles that were collected from some fruit orchards and wood trees during 1998 and 1999 were grouped and put separately in plastic containers until beetles emergence and the host plant of *A. angustipennis* was recorded.

Susceptibility of certain mango varieties to infestation with some borers : Five infested orchards of mango varieties were chosen at Al-mansourya, Embaba district, Giza Governorate. Each orchard contained eight mango varieties namely:

Timour , Company , Ewase , Mabrouka , Balady , Mesk , Hindy and Zebdia . Five infested trees / variety / orchard were randomizedly taken for inspection to record the number of infested trees / variety with each borer species under study (*Enneadesmus obtusidentatus* , *Phonapate frontalis* , *Sinoxylon sudanicum* , *Bellionota scutellaris* , *Crysobothris dorsata* , *Chlorophorus varies* , *Hypothenemus eruditus* and *xyleborus similis*).

Relative infestation (R I) of each mango variety with different borers was estimated as follows :

$$\text{R.I./ variety} = \frac{\text{No. of infested trees with borer to single variety}}{\text{Total no. of infested trees with same borer to all varieties}} \times 100$$

Where , relative infestation of each borer species on different varieties was estimated as follows :

$$\text{R.I./ species} = \frac{\text{No. of infested trees of variety with single species}}{\text{Total no. of infested trees of same variety with all species}} \times 100$$

RESULTS AND DISCUSSION

Life cycle of *A. angustipennis*

The egg stage : The laboratory observations showed that eggs of *A.angustipennis* were laid singly or in groups (2-8 eggs) inside the crevices and cracks of small and large branches bark .

Under mean laboratory conditions of 30.8 C° and 65 % RH . The incubation period ranged from 6 – 18 days , with an average of 12 ± 4.3 days , Table 1 .

The larval stage : The larva of *A. angustippennis* is a typical flat – headed borer. The newly hatched larva bores under the bark to cambial region making narrow tunnels at the beginning and increase gradually in width with increasing the larval growth . The larval tunnels are irregular , longitudinal and flattened and remain packed with frasses and borings .

The immature larva lasted from 230 to 305 days with an average of 264.5 ± 32.9 days, Table 1, to reach the full-grown larva which constructs a pupal chamber (ranged 8–16 mm., length and 1.8–3.8 mm., width) in the outer xylem and prepares an exit hole of adult under the bark. The full-grown larva elapsed 22–48 days with an average of 35.8 ± 8.0 days under mean laboratory conditions of 26.2°C and 62.1 % RH., Table 1.

By the end of larval stage, the mature larva stops feeding, body segments become semi-cylindrical in shape and passes a pre-pupal period. The pre-pupal duration varied from 7 to 49 days with an average of 26.1 ± 13.9 days, Table 1.

The pupal stage : Pupa is exarate type, under laboratory conditions of 28.6°C and 63.3 % RH., the pupal duration lasted 4–22 days with an average of 14.9 ± 5.2 days, Table 1.

The adult stage : Pupa transforms into adult inside the pupal chamber. The beetle stays in the pupal chamber about 4–15 days, with an average of 9.1 ± 3.4 days until the body cuticle becomes hard, Table 1. The beetle emerges through oval exit hole, ranged 1.5–3.5 mm. with an average of 2.5 ± 0.2 mm. in length and 1.3–2.4 mm. with an average of 1.7 ± 0.4 mm. in width.

Egg laying activities of *A. angustipennis* beetle under laboratory conditions of 30.8°C and 65.2 % RH., Table 2, revealed that pre-oviposition period lasted from 2–5 days with an average of 3.7 ± 1.1 days. The female laid about 6–21 eggs, with an average of 13.5 ± 5.5 eggs, through a period between 4 to 14 days with an average of 9.2 ± 2.9 days. The post-oviposition period lasted 3–6 days, with an average of 4.3 ± 1.0 days. The female beetle lived 5 to 26 days, with an average of 13.6 ± 7.1 days, while the male lived 4–19 days, with an average of 11.7 ± 4.6 days.

Number of generation : Table 1, indicated that the total of life cycle of *A. angustipennis* was 367.8 ± 13.3 days, ranging between 352–393 days, when it reared on mango cuttings and showed that this borer had one generation yearly.

Host range : Infested branches with buprestid beetles which were collected from some various fruit orchard and wood trees detected that *A. angustipennis* infests mango, peach, pear, fig, apple, citrus, acacia, willow and casuarina trees. The results of this work are coincident to those obtained by Batt 1998 for *Anthaxia congregata* Klug. on sunt trees.

Relative susceptibility of certain mango varieties to infestation with some borers : Data in Table 3 show relative infestation of each mango variety with different borers. Results revealed that all borers infested the whole varieties except *Xyleborus similis*, which infested Ewase, Mabrouka, Balady and Hindy varieties only. Relative susceptibility with *Enneadesmus obtusedentatus* indicated that highly infestation (23 %) was recorded to Hindy variety, while least infestation (8 %) obtained with Ewase variety ; highly infestation (22 %) with *Phonapate frontalis* was to Ewase variety , while the least one (6 %) recorded to Timour variety ; *Sinoxylon sudanicum* appeared highly infestation (22 %) to Hindy variety , while the least infestation (6 %) found with Mabrouka variety ; Buprestid beetles , *Belionota scutellaris* and *Chrysobothris dorsata* , showed highly infestation to Balady variety (36 % and 24 % , respectively) , while the susceptible to the same borers recorded to Timour variety (3 % and 6 % , respectively); Cerambycid beetle , *Chlorophorus varius* detected highest infestation (25 %) to Balady variety , while the least one (3 %) recorded to Company variety ; Scolytid beetle , *Hypothenemus eruditus* , had the highest infestation (22 %) with Zebdia variety, while it showed the least susceptible (7 %) to Ewase variety , *Xyleborus similis* appeared highest relative infestation (80 %) to Ewase variety , while did not show any infestation (0 %) to Timour , Company , Mesk and Zebdia varieties .

On the other hand, total relative infestation exhibited that different mango varieties were descendingly arranged according to their susceptibility to borer infestation as follows :

Ewase > Mabrouka > Hindy > Balady > Zebdia > Mesk > Company > Timour .

In this respect, relative infestation of borers on different varieties is shown in Table 4.

Timour variety was a more susceptible to *S. sudanicum* (25 % infestation), where it did not show any infestation (0 %) by *X. similis* ; Company variety showed highest infestation (21 %) by *E. obtusedentatus*, while relative infestation was (0 %) by *X. similis* ; Ewase variety exhibited the highest susceptibility (46.5 %) by *X. similis* , while least infestation recorded to *H. eruditus* (4.1 %) ; Mabrouka variety was more favorable to *B. scutellaris* (26.5 %), while was less infestation (4.4 %) by *S. sudanicum* ; balady variety appeared the highest infestation (21.9 %) by *Ch. varius* , while the least one (5.3 %) found with *X. similis* ; Mesk variety exhibited more susceptible (21.5 %) by *E. obtusedentatus* , while this variety did not show any infestation

by *X. similis* ; Hindy variety was more favorable to *E. obtusedentatus* (19 %) and it was less susceptible (3.3 %) *X. similis* ; Zebdia variety had the highest relative infestation (25.9 %) by *H. eruditus* ,while this variety did not show any infestation (0 %) by *X. similis* .

On the other hand , total relative infestation of different borers demonstrated that the borers were descendingly arranged according to their infestation of different mango varieties as follows :

***E. obtusedentatus* > *H. eruditus* > *S. sudanicum* > *C. dorsata* > *B. scutellaris* > *Ph. frontalis* > *Ch. varius* > *X. similis* .**

Table 1. Duration of the different developmental stages of *A. angustipennis* beetle rearing on mango cuttings under laboratory conditions.

Stage	Duration (in days)		Lab. Cond.	
	Range	Av. \pm S.e.	Mean Temp. °C	Mean RH. %
Egg	6 - 18	12.0 \pm 4.3	30.8	65.2
Immature larva	230 - 305	264.5 \pm 32.9	26.2	62.1
Full-grown larva	22 - 48	35.8 \pm 8.0	26.2	62.1
Pre-pupa	7 - 49	26.1 \pm 13.9	30.1	63.8
Pupa	4 - 22	14.9 \pm 5.2	28.6	63.3
Adult hardness	4 - 15	9.1 \pm 3.4	28.3	64.1
Female longevity	5 - 26	13.6 \pm 7.1	29.8	66.2
Male longevity	4 - 19	11.7 \pm 4.6	29.8	66.2
Generation period	352 - 393	367.8 \pm 13.3	-----	-----

Table 2. Ovipositional periods and number of eggs laid / female of *A. angustipennis* under laboratory conditions of 30.8 °C and 65.2 % RH.

Stage		Duration (in days)	
		Range	Av. \pm S.e.
Ovipositional periods	Pre-oviposition	2 - 5	3.7 \pm 1.1
	Oviposition	4 - 14	9.2 \pm 2.9
	Post-oviposition	3 - 6	4.3 \pm 1.0
Number of eggs / female		6 - 21	13.3 \pm 5.5

Table 3 . Relative infestation of mango varieties with different borers.

Species	Relative infestation/ variety (%)							
	Tim.	Cam.	Ewa.	Mab	Bal.	Mes.	Hin.	Zeb.
<i>Enneadesmus Obtusedentatus</i>	11	12	8	13	10	14	23	9
<i>Phonapate frontalis</i>	6	7	22	17	8	9	18	13
<i>Sinoxylon sudanicum</i>	13	10	11	6	9	12	22	17
<i>Belionota scutellaris</i>	3	4	14	36	23	5	8	7
<i>Chrysobothris dorsata</i>	6	8	12	24	18	9	12	11
<i>Chlorophorus varius</i>	4	3	18	22	25	7	15	6
<i>Hypothenemus eruditus</i>	9	11	7	8	15	9	19	22
<i>Xyleborus similis</i>	---	---	80	10	6	---	4	---
Total infestation %	6.5	6.9	21.5	17	14.3	8.1	15.1	10.6

Tim = Timour, Cam. = Campany, Ewa. = Ewase, Mab. = Mabrouka, Bal. = Balady, Mes. = Mesk, Hin. = Hindy, Zeb. = Zebdia.

Table 4 . Relative infestation of borers on different varieties Of mango trees.

Variety	Relative infestation / species (%)							
	E.ob.	Ph. Fr.	S.su.	B.sc.	C.do.	Ch.va.	H.er.	X.si.
Timour	21.2	11.5	25	5.8	11.5	7.7	17.3	0
Campany	21.8	12.7	7.3	18.2	14.5	5.5	20	0
Ewase	4.7	12.8	6.4	8	7	10.5	4.1	46.5
Mabrouka	9.6	12.5	4.4	26.5	17.6	16.1	5.9	7.4
Balady	8.8	7	7.9	20	15.9	21.9	13.2	5.3
Mesk	21.5	13.9	18.5	7.7	13.8	10.8	13.8	0
Hindy	19	14.9	18.2	6.6	9.9	12.4	15.7	3.3
Zebdia	10.6	15.3	20	8.2	12.9	7.1	25.9	0
Total infestation	14.7	12.5	13.5	12.6	12.9	11.5	14.5	7.8

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دورة حياة الخنفساء الذهبية (انزاكسيا انجيوستينس) والحساسية النسبية لبعض أصناف المانجو للأصابة ببعض الناخرات

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معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الدقى - جيزة

أظهرت التربية العملية للخنفساء الذهبية (انزاكسيا انجيوستينس) على عقل المانجو أن متوسط فترة حضانة البيض كانت ١٢ يوما وأن اليرقة غير تامة النمو تقضى حوالى ٢٦٤,٥ يوما لتصل الى اليرقة التامة النمو والتي تقضى حوالى ٢٥,٨ يوما لتدخل طور ما قبل العذراء التي تمر الى طور العذراء بعد ٢٦,١ يوما حيث تتحول الى طور الحشرة الكاملة بعد حوالى ١٤,٩ يوما وتظل الحشرة لفترة ٩,١ يوما داخل غرفة التعذير قبل الخروج ، يعيش الذكر حوالى ١١,٧ يوما بينما تعيش الأنثى لفترة ١٣,٦ يوما فى المتوسط وقد سجلت فترات ما قبل وضع البيض ووضع البيض وما بعد وضع البيض حوالى ٣,٧ و ٩,٢ و ٤,٣ يوما فى المتوسط على الترتيب ، أظهرت النتائج أيضا عن هذه الحشرة جيل واحد سنويا تصل متوسط فترته ٣٦٧,٨ يوما.

هذا وقد أظهر الحصر أن هذه الخنفساء تصيب كلا من أشجار المانجو ، الخوخ ، الكمثرى ، المشمش ، التين ، التفاح ، الموالح ، الأكاسيا ، الصفصاف ، الجازورينا.

وقد أظهرت المقارنة بين الاصابات النسبية لأصناف المانجو ببعض الناخرات أن الأصناف المختلفة تترتب تنازليا تبعا لأصابتها بالناخرات كالاتى:

عويس < ميروكة < هندی < بلدى < زبدية < مسك < كومبانية < تيمور فى حين تترتب الأنواع المختلفة من الناخرات تنازليا بالنسبة لأصابتها لأصناف المانجو كالاتى :

E. Obtusedentatus > *H. eruditus* > *S. sudanicum* > *C. dorsata* > *B. scutellaris* >
Ph. frontalis > *Ch. varius* > *X. similis*.