SOME BIOLOGICAL ASPECTS OF *SITOPHILUS ORYZAE* (L.) AND *TROGODERMA GRANARIUM* EVERTS ON DIFFERENT GRAIN VARIETIES OF WHEAT AND MAIZE

AWADALLA, S. S. [1], N. F. ABDEL-BAKY[1], H. A. EL-SYRAFI [1], M. S. GHARIB[2] AND A. Y. EL-SAID [1]

1. Department of Economic Entomology, Faculty of Agriculture, Mansoura University, Egypt.
2. Plant Protection Research Institute, Dokki, Giza, Egypt.

(Manuscript received 28 September 2005)

Abstract

Sitophilus oryzae (L.) and *Trogoderma granarium* Everts are serious primary insect pests of the stored wheat and maize grains. Both insects were reared on five varieties of wheat and maize to clarify their effects on certain biological aspects as pre-oviposition, incubation period, larval-pupal stage, oviposition period, post oviposition period, and female longevity of both insects. Wheat varieties were Sakha 8, Sakha 61, Sakha 69, and Sakha 93 in addition to Giza 168. Maize varieties were three white Tri- Hybrids (Tri-H) 322, 323 and 324 in addition to Argantina and Okrani. The varieties, in general, affected significantly the larval- pupal stage, oviposition period and female longevity as well as number of eggs/ female. *S. oryzae* (L.) preferred wheat grains as food than maize grains; 131- 134 and 55- 81 eggs/female in case of rearing on wheat and maize grains respectively. In the same time, Sakha 61 was the best wheat variety followed by Sakha 69. As for maize varieties, the most preferable were Tri-H 323 and 324 followed with Argentina and Okrani than Tri-H 322. On the other hand, means of the incubation period and pre-oviposition period as well as number of eggs/female were insignificantly differed either in tested wheat or maize varieties. *T.granarium* nearly preferred wheat and maize at the same rate. The best preferable wheat variety was Sakha 69 followed with Sakha 8 and Sakha 93 and Giza 168 than Sakha 61. Also, Tri-H 324 was the best maize variety for rearing this insect, followed with Tri-H 322 and 323 and at least Okrani and Argentina varieties.

INTRODUCTION

Insect infestation of stored grains and their products by a group of coleopterous insect pests is a serious problem all over the world. Since it reduces crop yields, contaminates and pollutes stored products, damages seed germs as well as reduces quality of the stored products and causes serious losses (Hassan, 1978 and El- Sabaay, 1998). Several workers in different foreign countries studied the biological aspects of *S. oryzae* and *T. granarium* on different stored grains, to identify effects of

grain characters on inset infestation (Ryoo and Cho (1986) in Korea; Ismail *et al.*, (1988) in Iraq; Taheri (1988) in Iran; Fava and Springhetti (1991) in Italy; Armitage and Cook (1997) in UK; Barbhuiya and Devashish (2002) in India and Campbell (2002) in USA. Other similar studies concerning the biological aspects on different wheat or maize varieties have been done in Egypt by El- Halfawy *et al.*, (1982); Gharib (2004), Youssef (2004), Youssef and Salama (2004). Therefore, the present works study some biological aspects of *S. oryzae* and *T. granarium* when reared on different varieties of Egyptian wheat and maize under constant laboratory conditions.

MATERIALS AND METHODS

Cultures of the test insects were prepared by introducing batches of about 200 adults of each species to 150 g of grains in one liter glass jar (20 x 10 cm) then covered with muslin and permitted to lay eggs for two weeks and removed. The new emerged adults were removed every two days, to obtain new cultures under the same conditions to be used in the following tests. The two insects were reared on wheat (Giza 168) in an incubator at 27±2 °C and 35± 2 °C and 70± 5% R.H., for *S. oryzae* and *T. granarium*, respectively

Wheat varieties were Sakha 8, Sakha 61, Sakha 93, Sakha 69, and Giza 168. Maize varieties were: three varieties of white grains (Tri-H 322, Tri-H 323, Tri-H 324), Argentina and Okrani (as yellow grains). The grains were then sterilized by sub-freezing (-18 °C to - 22 °C) for 2 days to kill any hidden insect stages (El- Sabaay, 1998). All grains were maintained in an incubator at 29± 1 °C and 65± 5% R.H. for two weeks to obtain equilibration moisture content with this R.H. (Ezz, 1976). Small plastic jars (5 x 2 inches) were used in this study; each contained 10 grams of a grain variety. The jar was closed with a cork, through which a 0.5 inch hole was bored and closed from inside with a piece of muslin (Richards, 1947).

One pair (male and female) of one-day old emerged adults of both insects previously reared on the same tested grain varieties in large plastic jars, was introduced on both wheat and maize varieties separately, and replicated 10 times. The grains were changed every 48 hours with fresh ones, until the females died. The old infested grains were examined to count number of eggs (as mentioned below) Daily investigation of 20 grains was carried out following the staining method with acidic fuchsin (Frankenfeld, 1948) to determine eggs count as well as periods of pre-oviposition, oviposition and post-oviposition.

To study duration of immature stages, batches of 1oo adults (two weeks old), of both insects were introduced separately into two pound glass jar, each contained 100 g of each variety and kept at a constant rearing temperature of 27± 2°C for *S. oryzae* and 35± 2 °C for *T. granarium* and 70± 5 % R.H. Twenty four hours later, the adults of both insects were removed and the grains remained under the same experimental conditions. Daily investigation of 20 grains was carried out according to the staining method with acidic fuchsin to determine egg plugs count. Incubation and Laval-pupal durations for *S. oryzae* larvae were recognized from the larval head capsule appearance until adult emergence and this replicated 10 times. Daily inspection to determine the larval-pupal stage period was done by using the methods described by Hassan (1978). Two replicates with 100 g each, were soaked for two hours in solution composed of two parts of distilled water, two parts of lactic acid, two parts of phenol and one part of glycine at the rate of 2 ml of the mixture per 100 grain. This method was satisfactory for detecting and observing larvae, pupae and adults inside the grains. No difficulties were encountered with *T. granarium*; all its different stages were living and feeding outside the grains. Data were statistically analyzed by ANOVA and differences between means of the different treatments were statistically analyzed by Duncan multiple range test (Duncan, 1956).

RESULTS AND DISCUSSION

Data in Table 1 represented some biological aspects of *S. oryzae* reared on five different wheat grain varieties under constant laboratory conditions. As for the larval-pupal stage, it differed significantly with the variety, while the longest duration (28.5 days) was recorded with Sakha 69; the shortest duration (25.5 days) was on Giza 168. The pre-oviposition period was insignificantly affected, ranged between 3.5 and 4.0 days, while thee longest oviposition period was 75.0 days with Sakha 8, the shortest period was 56.5 days on Sakha 61 variety with significant differences between mean durations recorded with the different varieties. In spite of this significant and wide range (56.5- 75.0 days), the number of eggs/ female was nearly similar (131- 134) and unaffected with the variety. In addition, the female longevity significantly varied with the variety, about 85.5 days with Sakha 8, while was 75.0 days with Sakha 69.

The shortest longevity (about 67.5 days) was recorded with Sakha 61 variety. This wide variation had no effect on the number of eggs. Total life span was nearly similar,

about 114.2, 115.0 and 116.0 days with Giza 168, Sakha 8 and Sakha 61 respectively. It decreased to 107.0 days with Sakha 69 and 98.5 days with Sakha 93.

A general glance to the data in Table 1, revealed that, Sakha 93 was the most favorable and susceptible food to *S.oryzae*, had the shortest life span(98.5 days) and the female laid reasonable number of eggs (about 132.5) in the shortest oviposition period(about56.5.0 days). Sakha 69 occupied the second rank, total life span lasted 107.0 days, and the female laid about 133.0 eggs in about 63.0 days. The least favorable varieties were Giza 168, Sakha 8 and Sakha 61 gave the longest durations (114.2- 115.0 days) as total life span and with nearly a similar number of eggs /female.

Data in Table (2) showed some biological aspects of *S. oryzae* reared on five maize grain varieties under laboratory conditions. The data showed that, the incubation and pre- oviposition periods were not affected with the varieties. On the other side, the larval- pupal duration (26.0- 32.5 days), oviposition period (41.5- 57.5 days), and female longevity (59.0- 76.0 days) was significantly affected. The total life cycle ranged from 92.0 in Tri-H 323 to 112.5 days in Okrani. Trihybrids of 323 and 324 represented the most favorable and susceptible hosts for *S.oryzae*, 27.5- 29.0 days as larval- pupal stage, 41.5- 42.5 days as oviposition period, 59.0- 60.0 days as female longevity and about 92.0- 92.5 days as total life cycle. Moreover, rearing the insect on any of the two varieties enhanced the female to lay the highest number of eggs (75.0-81.0). Argentina occupied a moderate rank, the larval- pupal stage lasted 32.5 days and the female lived about 60.0 days and laid 65.0 eggs during 42.0 days. Okrani variety elongated each of the larval- pupal duration (32.0 days), oviposition period (57.5 days), post- oviposition period (14.0 days) and female longevity (76.0 days), so the total life cycle was relatively the longest (112.5 days) in this case. Trihybrid322 represented the least favorable variety as a food for *S.oryzae*, in spite of the larval-pupal stage was the shortest (26.0 days), the female laid the least number of eggs (55.0) in a long period (52.2 days).

These results agree with those of EL-Halfawy et al.(1982), Ryoo and Cho, (1986), Fava and Springheth(1991) and Barhuiya and Devashish (2002). With regard to these data in the two previous tables, it is clearly noticed that *S.oryzae* preferred the wheat varieties than maize varieties. The female laid about 131.0-134.0 eggs through 56.5-75.0 days in case of wheat, while laid 55.0- 81.0 eggs only through 41.5- 57.5 days with maize.

Results of *T. granarium* on the wheat varieties are shown in Table 3. These results revealed that, the duration of the larval stage ranged from 18.0 in Sakha 69 (as the shortest) to 21.5 days in Sakha 61 (as the longest). Pre-oviposition period was nearly similar (3.0- 4.0 days) in all varieties. In addition, the oviposition period lasted about 11.5- 12.5 days, except that of Sakha 61 was the longest (14.0 days). In the same time, females on this variety lived longer (28.0 days) than those of other varieties (18.0- 21.5 days). With regard to the number of eggs, it cleared that rearing the insect on Sakha 69 produced females laid more eggs (65.0 egg/ female) compared with 52.5-57.5 eggs/Female in the other varieties.

It cleared from the previous results that, Sakha 69 is considered the most favorable food for *T. granarium*, short larval– pupal stage (18.0 days), moderate oviposition period (12.5 days) and adult longevity (21.5 days) with the highest number of eggs (65.0/female). Sakha 8, Sakha 93 and Giza 168 represented the second rank in this respect since gave similar durations and about 53.0-58.0 eggs/female. The least favorable variety was Sakha 61, longest oviposition period (14.0 days) and with a longer female longevity (28.0 days) but with 42.0 days as the total life span (Table 3).

Data of Table (4) resulted from rearing *T. granarium* on the tested maize varieties. It could be noticed that, this insect needed a similar period (18.5- 21.0 days, as previous on wheat, to complete its larval- Pupal stage. Also, the oviposition periods in both crops were nearly similar (11.5- 12.5 days). The female lived for about 19.5- 22.0 days and laid about 45.0- 62.0 eggs. Tri-H 324 was considered the best diet for this insect, short- larval- pupal stage (18.5 days) and the female laid the highest egg number (61.5/ female). Tri-H 322 and 323 occupied the second rank, the larval- pupal stage ranged 18.0- 21.0 days with about 57.5 eggs/female. Varieties of Argentina and Okrani maize were so the least favorable diet, a long larval-pupal durations (20.0- 21.0 days), the female laid the least eggs (48.0 and 45.0 respect.) and had 19.5- 21.0 days as female longevity. Data in this table showed also that, the different durations (except that of incubation period) as well as number of eggs/ female were significantly different with maize varieties.

As a conclusion, data presented in Table (4) showed that the larval-pupal stage, oviposition period, post oviposition period and the female longevity of *T. granarium* as well as the number of eggs/ female varied significantly according to the tested maize varieties. On the other hand, the incubation period, and the pre-oviposition period were slightly affected with no significant differences among the maize varieties.

These results are in the agreement with those of Lin and Li (1983), Mahmood and AL-Azawi (1987), Aldryhim and Adam (1992) and Armitage and Cook (1992). A glance to the data in Tables (3&4), reveals that the tested wheat and maize varieties were nearly similar as valid diets for *T. granarium* insects.

REFERENCES

1. Aldryhim, Y.N. and E.E.Adam, 1992. The biology of *Trogoderma granarium* Everts (Coleoptera: Dermestidae) in the Central Province of Saudi Arabia. J. of King Saud Univ. Agric.Sci.4(1):79- 85.
2. Armitage, D. M. and D. A. Cook, 1997. Laboratory experiments to compare the development of populations of five species of insects during dormancy break and subsequent cool storage of malting barley. J. Institute of Brewing, 103(4): 245-249.
3. Barbhuiya, M. H. and Kar. Devashish, 2002. Biology of rice weevil, *Sitophilus oryzae* Lin. (Coleoptera: Curculionidae) in stored wheat *Triticum vulgare* and its control. Environment and Ecology, 20 (3): 700- 702.
4. Campbell, J., 2002. Influence of seed size on exploitation by the rice weevil, *Sitophilus oryzae.* J. Insect Behavior, 15(3): 429- 445.
5. Duncan, D., 1956. Multiple range and F-tests. Biometrics, 11: 1- 42.
6. El-Halfawy, M. A.; A. K. M. El-Nahal.; N. A. A. Zeid. and H. I. Hassan, 1982. The biology of *Sitophilus weevils* on the highest and lowest susceptible varieties of grains to infestation. Agric. Res. Review, 60(1): 29- 39.
7. El-Sabaay, T., 1998. The effectiveness of certain vegetable oils as wheat grain protectants against the granary weevil, *Sitophilus granarius* (L.) and the lesser grain borer, *Rhyzopertha dominica* (F.). Ph.D. Thesis, Cairo Univ., 103.
8. Ezz, E., 1976. Studies of damage in some stored grains due to infestation with certain insects. Ph.D. Thesis, Fac. Agric., Cairo Univ.
9. Fava, A. and A. Springhetti, 1991. Egg distribution of *Sitophilus granarius* L. (Col., Curculionidae) in *Triticum aestivum* caryopses. J. Appl. Entomol, 111(4): 406-411.
10. Frankenfeld, J.C., 1948. Staining method for detecting weevil infestation in grain. U.S.D.A. Bull. Ent. ET- 256, 4P.

11. Gharib, M.S.A., 2004. Screening susceptibility/ resistance of some wheat grain varieties to *Rhyizopertha dominica* (f.) and *Trogoderma granarium* everts infestation. *Egypt. J. Agric. Res., 82 (1): 139- 148*

12. Hassan, I. H., 1978. Studies on the relative susceptibility of certain Egyptian varieties of grains to infestation with some stored grain insect. M.Sc. Thesis, Fac. Agric. Cairo Univ.

13. Ismail, A. Y.; K. Abdul-Zahra. and M. Ali, 1988b. Survey of insect pests in cereal stores in Erbil. Iraqi J. Agric. Sci., `ZANCO', 6(1):108-117.

14. Lin, T.; C. H. Li., 1983. Studies on the ecology of the khapra beetle, Trogoderma granarium E. J. Agric. Res. China, 32(4): 383- 389

15. Mahmood, E.A. and A. F. Al-Azawi, 1987. Effect of wheat and air moisture contents on *Trogoderma granarium* Everts (Dermestidae, Coleoptera). Mesopotamia J. Agric., 19(2): 71- 81.

16. Richards, O. W., 1947. Observations on grain weevil, Calandra: I. General biology and oviposition. Proc. Zool. Soc. Lond., CXVII, 203-206.

17. Ryoo, M. I., and K. J. Cho., 1986. Life history and intrinsic rate of natural increase of the rice weevil, *Sitophilus oryzae* (L.) (Coleoptera: Curculionidae) in rice. Korean J. Entomol., 16(1):1-5.

18. Taheri, M. S., 1988. Effect of various temperatures on different stages of *Trogoderma granarium*. Entomol. et Phytopath. Appli., 55(1-2): 25- 26.

19. Youssef, L. A., 2004. Relative resistance of some maize cultivars to *Sitophilus zeamais* (Motsch.) and *Sitotroga cerealella* (Oliv.) in storage. J. Agric. Sci. Mansoura Univ., 29 (4): 2117- 2125.

20. Youssef, L., and S. Salama, 2004. Laboratory assessment of the inherent susceptibility of some maize varieties to post- harvest insect infestation. J. Agric. Sci. Mansoura Univ., 29 (4):2087-2094.

Table1. Certain biological aspects of *S. oryzae* on five wheat grain varieties at 27± 2 °C and 70± 5%R.H.

Biological aspects	Varieties				
	Sakha 8	Sakha 61	Sakha 69	Sakha 93	Giza 168
Incubation	3.5±0.2a	3.5±0.2a	3.5±0.2a	3.5±0.2a	3.5±0.2a
Larval- Pupal	26.0±0.5	27.5±0.6	28.5±0.8a	27.5±0.5a	25.5±0.3b
Pre-oviposition period	3.5±0.2 a	4.0±0.4 a	3.5±0.2 a	4.0±0.4 a	3.7±0.2 a
oviposition	75.0±3.1	56.5±0.7	62.5±2.1b	72.5±3.2a	72.5±0.7ab
post-oviposition period	7.0±0.7 b	7.0±0.7 b	9.0±0.6 a	8.5±0.4 ab	9.0±0.6 a
Female longevity	85.5±3.9 a	67.5±1.8 b	75.0±2.9a b	85.0±3.9 a	85.2±1.5 a
Total life cycle	115.0a	116.0a	107.0b	98.5c	114.2a
Eggs no./	131.0±0.	132.0±0.	132.5±0.6	132.5±0.7	134.0±0.5a

Means with the same letter(s) within a row were not significantly different, H=hybrid and F=female.

Table (2). Certain biological aspects of *S. oryzae* on five maize grain varieties at 27±2 °C and 70± 5%R.H.

Biological aspects	Varieties				
	Tri-H 322	Tri- H 323	Tri- H 324	Argentina	Okrani
Incubation	4.5±0.2a	4.5±0.2a	4.5±0.2a	4.5±0.2a	4.5±0.2a
Larval- Pupal	26.0±0.7c	27.5±0.7b	29.0±0.8b	32.5±0.95a	32.0±0.95
Pre-oviposition period	4.0±0.4a	4.5±0.4a	4.5±0.4a	4.5±0.4a	4.5±0.4a
oviposition	52.5±0.7b	42.5±0.5c	41.5±0.6c	42.0±0.6c	57.5±0.6a
post-oviposition period	12.0±0.3b	13.0±0.3a b	13.0±0.3a b	13.5±0.2a	14.0±0.3a
Female longevity	69.9±1.4b	60.0±1.2c	59.0±1.3c	60.0±1.2c	76.0±1.3a
Total life cycle	99.0b	92.0c	92.5c	97.0c	112.5a
Eggs no./	55.0±1.5d	75.0±1.4b	81.0±0.3a	65.0±0.4c	68.0±0.2b

Means with the same letter(s) within a row were not significantly different, H=hybrid and F=female.

Table 3 Certain biological aspects of *T. granarium* on five wheat grain varieties at 35±2 °C and 75± 5% R.H.

Biological aspects	Varieties				
	Sakha 8	Sakha 61	Sakha 69	Sakha 93	Giza 168
Incubation Period	2.5±0.2a	2.5±0.2a	2.3±0.2a	2.5±0.1a	2.5±0.2a
Larval – pupal stage	18.5±0.6b	21.5±0.3a	18.0±0.5b	19.0±0.4a b	20.9±0.7a
Pre-Oviposition period	3.0±0.6a	4.0±0.1a	3.0±0.2a	4.0±0.1a	3.0±0.2a
Oviposition period	12.5±0.2b	14.0±0.3a	12.5±0.2b	11.5±0.2c	11.5±0.2c
Post-Oviposition period	4.0±0.1d	7.0±0.1a	6.0±0.1b	5.0±0.2c	4.0±0.1d
F. longevity	19.5±0.5 bc	28.0±0.5 a	21.5±0.5 b	20.5±0.5 b	18.5±0.7 c
Total life cycle	40.5bc	42.0b	41.8b	49.0a	41.9c
Eggs No. / Female	52.5±1.3 d	57.5±0.8 b	65.0±0.7 a	55.0±1.2 c	57.5±0.8 b

Means with the same letter(s) within a row were not significantly different, H=hybrid and F=female.

Table 4. Some biological aspects of *T. granarium* reared on five maize varieties at 35± 2 °C and 75± 5% R.H.

Biological aspects	Varieties				
	Tri-H 322	Tri-H 323	Tri-H 324	Argentina	Okrani
Incubation period	3.5±0.2a	3.5±0.2a	3.5±0.2a	3.5±0.2a	3.50±0.2a
Larval –pupal stage	18.5±0.3 b	21.0±0.8 a	18.5±0.8 b	20.0±0.7a b	21.0±0.7 a
Pre-Oviposition period	4.0±0.1 a	4.0±0.1 a	3.5±0.2 a	3.5±0.2 a	3.5±0.2 a
Oviposition period	12.0±0.6 ab	11.5±0.7 b	12.5±0.7 a	12.0±0.6 ab	12.5±0.7 a
Post-Oviposition period	6.0±0.1a	5.0±0.1ab	6.0±0.1a	4.0±0.1b	5.0±0.1ab
F. longevity	22.0±0.9 a	20.5±0.9a b	22.0±0.9 a	19.5±0.9 b	21.0±0.9 b
Total life cycle	44.0a	45.0ab	44.0a	43.0b	45.6b
Eggs No./ female	57.5±0.7a	57.5±0.7a	61.5±0.6a	47.5±0.3b	45.0±0.2b

Means with the same letter(s) within a row were not significantly different, H=hybrid and F=female.

بعض النواحي البيولوجية لسوسة الأرز وخنفساء الصعيد على أصناف حبوب مختلفة من القمح والذرة

سمير صالح عوض الله- نجدي فاروق عبد القوي- هالة الصيرفي- محروس سليمان غريب*- أحمد يحي السيد

قسم الحشرات الاقتصادية- كلية الزراعة- جامعة المنصورة

**معهد بحوث وقاية النباتات- الدقي- جيزة.*

سوسة الأرز وخنفساء الصعيد من الآفات الحشرية الأولية الخطيرة التي تصيب حبوب القمح والذرة. وفي هذا البحث تم دراسة تأثير خمسة أصناف حبوب مختلفة من كل من القمح والذرة كغذاء علي بعض النواحي البيولوجية للحشرتين. ونفذت التجربة علي درجة حرارة ٢٧± ١ درجة مئوية و ٣٥± ٢ درجة مئوية لهما علي التوالي، وعند رطوبة نسبية ٧٠±٥%. أصناف القمح المستخدمة هي سخا ٨ وسخا ٦١ وسخا ٦٩ وسخا ٩٣ وجيزة ١٦٨ وأصناف الذرة الخمسة هي ثلاثة هجن ثلاثية بيضاء (٣٢٢ و٣٢٣ و ٣٢٤) بالإضافة إلي الصنفين أرجنتينا و أوكرانيا وهما ذات حبوب صفراء.

أظهرت الدراسة أن للأصناف المختبرة بصفة عامة تأثيرا معنويا علي كل من مدة و فترة كل من وضع البيض، طور اليرقة- العذراء، وكذلك حياة الحشرة الكاملة بالإضافة إلي متوسط عدد البيض لكل أنثي. أظهرت النتائج أيضا أن سوسة الأرز تفضل حبوب القمح كغذاء عن حبوب الذرة الشامية ، حيث وضعت الأنثى حوالي١٣١- ١٣٤ بيضة في فترة ٥٦,٥- ٧٥ يوم بينما في الذرة فكانت حوالي ٥٥- ٨١ بيضة فقط،، و أشارت الدراسة إلي أن الصنف سخا ٦١ كان أفضل أصناف القمح للحشرة حيث وضعت الأنثى حوالي ١٣٣ بيضة/ أنثي وفي أقصر فترة(٥٧ يوم) ويليه الصنف سخا٦٩ في المرتبة الثانية بينما كانت الأصناف سخا ٨ وسخا ٩٣ وجيزة ١٦٨في المرتبة الثالثة. وبالنسبة لأصناف الذرة فوجد أن أفضلها الهجن الثلاثية ٣٢٣ و٣٢٤ ثم يليها أصناف الأرجنتينا وأوكرانيا وأخيرا الهجين الثلاثي ٣٢٢.

وبالنسبة لخنفساء الصعيد فقد أتضح أن درجة تفضيلها للتغذية علي أي من القمح أو الذرة كانت بصفة عامة متقاربة ، وأن أفضل أصناف القمح للحشرة كان سخا٦٩ حيث كانت فترات النمو قصيرة للأطوار المختلفة ، كما وضعت الإناث أكبر عدد من البيض (٦٥بيضة /أنثي) وأحتلت الأصناف سخا ٨ وسخا ٩٣ وجيزة ١٦٨ المرتبة الثانية ثم أخيرا الصنف سخا ٦١. أما بالنسبة لأفضل أصناف الذرة في تربية خنفساء الصعيد فكان الصنف الهجين ٣٢٤ بينما أحتل الصنفين هجين ثلاثي ٣٢٢ و٣٢٣ المرتبة الثانية ثم أخيرا الصنفين أوكرانيا و أرجنتينا في المرتبة الثالثة، كما أظهرت الدراسة عدم وجود أصناف من القمح أو الذرة منيعة تماما للإصابة بالحشرتين.