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Evaluating the Susceptibility of Some Wheat Varieties to Infestation of Khapra beetle (*Trogoderma granarium* Everts) Under Storage Conditions

Batol A. Karso

Department of Plant Protection, College of Agricultural Engineering Science, University of Duhok, Kurdistan Regain, Iraq

Corresponding author email: batool.karso@uod.ac

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Abstract: This study was conducted to evaluate the susceptibility of eighteen Iraqi wheat varieties against the infestation of Khapra beetle *Trogoderma granaruimnine* Everts; nine varieties of durum wheat *Triticum turgidum* Desf. (Um Rabei, Aksad65, Cham3. Bakrajo-1, Semeto, Creso, Baghdad2, Zain Turk, Sardar), and nine varieties of bread wheat *T. aestivum* L. (Jihan99, Azza, Cham6, Tamuz2, Adnaniya, Adana, Ibaa99, Azadi, and Abu-Ghraib) were selected. Results showed that the Abu-Ghraib and Azza varieties were the most resistant to infested by the beetles; the total of insect's population reached 4.8, and 5 insects.100 g^{-1} of wheat, respectively. Growth rate of 0 and 0.1 insect/$month^{-1}$, loss of weight grains of 1.6 and 1.9 %, and the decreasing germination of grains (4.81, and 0.6)% were recorded for both varieties, respectively. While var. Semeto was susceptible to the infestation; the insect population attained 1238.8 insects.100 g^{-1} of wheat with a growth rate of 82.3 insect/$month^{-1}$; also the loss of weight grains was 58.5 % and the loss of germination of grains increased to 84.3%. To conclude, this study demonstrated that the durum wheat showed higher susceptibility than bread varieties.

Keywords: Bread wheat, Durum wheat, Khapra beetle, Sensitivity.

Introduction

Wheat *Triticum* spp. (family Poaceae) is main cereal crop in Iraq; it is an important source of carbohydrates (Shewry & Hey, 2015). Globally, in 100 grams, wheat contains 13% water, 71% carbohydrates, 1.5% fat, 13% protein, minerals and vitamins, wheat crop is attacked by many types of insect pests under storage conditions; Khapra beetle (*Trogoderma granarium* Everts.) is one of the world's most destructive pests of stored grain products, particularly wheat (Kteo & Mohammed, 2019; Lampiri *et al.,* 2022). This beetle is polyphagous, caused quantitative loss, produces an unpleasant odor, dirty abhorrent taste due to contamination with insect molts (Lampiri *et al*., 2021); it destroys the grain completely because they prefer feeding on grain's embryo; in addition, Khapra beetle infestation can damage valuable trade goods causing significant economic losses (Kteo & Mohammed, 2019). Handling or consuming contaminated grain and seed products can lead to health issues such as

skin irritation and gastrointestinal distress (Christos, *et al*., 2019); moreover, the infestation makes grain unsuitable for cultivation (Eliopoulos, 2013). Using resistant cultivars can help to protect grains from infestation (Sayed *et al*., 2006). In Iraq, several new varieties of wheat, which have high productivity, were developed by plant breeders; however, as no extensive studies on the susceptibility of these new varieties during storage against infesting by store insects.

During the field trips to grain warehouses in province of Duhok, it was observed that the wheat varieties differed in infestation and resistance to attacking insects; the objectives of the study to evaluate the susceptibility of eighteen Iraqi wheat varieties to the infestation with the Khapra beetle under normal storage conditions.

Materials & Methods

Insect's colony

The grain beetle (Khapra) (*T. granarium* E.) was obtained from infected wheat grains in the entomology lab of Plant Protection Department/College of Agriculture Engineering Sciences. It was placed inside 1 kg plastic containers, placed in the incubator at 30 ± 1 °C, and with a relative humidity of 65 - 70± 5%.

Wheat varieties

Eighteen wheat varieties including durum wheat *Triticum turgidum* Desf., (Um Rabei, Aksad, Cham3. Bakrajo-1, Semeto, Creso, Baghdad2, Zain Turk, Sardar, and bread wheat (*T. aestivum* L.) of (Jihan99, Azza, Cham6, Tamuz2, Adnanyah, Adana, Ibaa99, Azadi, and Abo-Graib), were obtained from the Directorate of Agricultural Research Center, Duhok. The wheat grains were clean, untreated, uninfested, and were evaluated to determine their susceptibility to the khapra beetle.

Bioassays

100 g. grains of each variety were kept in a 500 ml plastic jar, as the experimental unit, and placed in a freezer for 24 hours to kill all insect stages that may be found (McGaughey *et al*., 1990). The plastic containers were infested with five larvae of the third instar, and covered with a muslin cloth to provide sufficient ventilation; the plastic containers were kept at laboratory (room) temperature for different storage periods 3, 6, 9, and 12 months. Each treatment was replicated three times in complete randomized design.

Insect population, growth rate, loss of grains weight were determined; seed germination were counted at the end of each storage period. The growth rate of insects is estimated using the following equation.

$$R = \frac{(dN/dt)}{\mathbb{N}}$$

Where, R = growth rate, dN = change in the number of individuals in the population, dt= change in time, and N= number of individuals in the population at the beginning of the experiment.

Statistical analysis

The experiments will be designed as a completely randomized design (CRD). The comparison between means will be carried out according to Duncan's multiple range test ($P < 0.05$) using a computerized program of SAS (Esaki *et al.*, 2012).

Results

The results in table (1) indicated that there is a difference between among the population

densities of the Khapra beetle, infesting different wheat varieties. The statistical analysis of population of the beetle on durum wheat varieties showed that the highest population density of insects was found on variety Semeto, which amounted to 1238.8 insects.100 g^{-1} of wheat, followed by the Baghdad2 variety reached 1138.3 insects.100 g^{-1} of wheat; while, the number of khapra beetle population was decreased in the Aksad 65 compared to the rest of the varieties reached 21.3 insects.100 g^{-1} of wheat.

The population of the beetle varied on the bread wheat varieties. The Adnaniya variety was most susceptible and distinguished significantly from other varieties; the highest population density of khapra beetles was 411 insects.100 $g^{-1}$of wheat; Tamuz2 was the next, reaching 407 insects.100 g^{-1} of wheat. While the number of insects was the lowest on the most resistant var. Abu-Ghraib, reaching 4.8 insects.100 g^{-1} of wheat, compared to the other bread varieties.

Also, the results indicated that the insect population density was significantly affected by the storage period, the lowest population of the infested varieties was found during the first storage period; the insect's number increased after 3 months reaching 150.1 insects.100 g^{-1} of wheat; the population increased with the progression of the storage period until it reached 265.7 insects.100 g^{-1} of wheat after 6 months of storage and its number continued to increase until it reached 764.7 insects.100 g^{-1} of wheat after 12 months.

Generally, the results of the same table indicated that the durum wheat variety was more susceptible than the bread wheat varieties to khapra beetle infestation; the insect population densities reached 7.1, and 134 insects.100 g^{-1} of wheat, respectively.

Table (2) showed that the growth rate of the Khapra beetle, increased due to the availability of food and the lack of crowding out between individuals after three months reaching 18.2 insect.$month^{-1}$, and it continued to increase during the twelve months of storage up to 50.7 insect.$month^{-1}$; also it found that the durum wheat varieties more susceptible than bread wheat varieties, where the growth rate of insects reached 47.9 and 8.5 insect.$month^{-1}$ respectively.

Table (2) indicated that the durum wheat cultivar Semeto was the most susceptible variety to Khapra beetle infestation; the reproduction rate (growth rate) was 82.3 insect.$month^{-1}$; however, the most bead wheat varieties were resistant to the infestation were Abu-Ghraib and Azadi, with growth rates of 0 and 0.1 insect.$month^{-1}$ respectively; the insect failed to grow and reproduce on the resistant varieties during the 12 month of the study period under stored conditions. The results of the table (3) indicated that the average percentage of weight losses of grain was related to the population density of the insect and the storage period, which reached 22.6% after 9 storage months and increased to 44.7% after 12 months.

The average percentage of grain loss increased with increasing of the severity of the infestation of durum wheat varieties; the results indicated that the losses rate after twelve months reached 93.5% in the semeto variety. However, the weight losses varied on grain of varieties of bread wheat; the cultivar Tamuz2 was the most susceptible, and it was affected by the insect

during the storage period and population density of insects. The rate of weight loss decreased to 53% after 12 storage months, while the varieties Azadi, Abu-Ghraib, and Azza were most resistant; the rate of weight losses were 1.4, 1.6%., and 1.9 % respectively. Generally, it was found that durum wheat varieties were more susceptible than bread wheat with weight losses of 34.5% and 13% respectively. Also, the results of table (4) indicated that the percentage of germination is related to the population density of the insect and the storage period; the percentage of germination decreased with the increase in the severity of the infestation. For the varieties of durum wheat, the results revealed that the rate of decrease after nine months reached 95% in the variety Zain Turki, followed by variety Semeto reached 92% and reached 100% after 12 months of storage in the varieties Zain Turki, Semeto, and Creso. Among the varieties of bread wheat, the variety Adnaniya was the most affected by the insect storage period; the percentage of germination reached 71.1%, while the cultivar Azza was the least affected, and the most resistant to the infestation; the germination percentage was 0.6%. Generally, it was found that the germination of durum wheat varieties were more effected than bread wheat; the germination percentage were 63.8% and 23.7% respectively.

Table (1): Effect of Storage period on the population density of khapra beetle infesting some varieties of Durum and bread wheat

		Insects population (insects.100 g-1 of wheat)					
		Storage period (month)					
Wheat	Variety	3	6	9	12	Variety effect	Mean
	UmRabei	208.0±7.6 q	311.4±7 p	652.0±23 kl	1383.0±44 f	638.6±24 f	
	Aksad65	4.0±0 s	3.0±0 s	12.0±1r s	66.0±4 rs	21.3 ±1.2 j	
	Cham3	4.0±0 s	4.0±0 s	7.0±0 s	302.0±6.3 p	79.3±5 i	
	Bakrajo-1	234.0±6 q	460.0±10 n	533.0±13 m	1633.0±52 d	715.0±25 e	
Durum	Semeto	320.0±8.2 p	698.0±24.6 k	2078.0±68 a	1859.0±57 c	1238.8±50 a	711.1±30.2 a*
	Creso	707.0±22 k	314.0±7 p	1052.0±39 h	1608.0±52 d	920.3±29 d	
	Baghdad2	308.0±7.9 p	814.0±26 j	1462.0±46 e	1969.0±59 b	1138.3±43 b	
	Zain Turk	357.0±7 op	696.0±20 k	1090.0±40 h	1832.0±57 c	993.8±30 c	
	Sardar	164.0±5 q	612.0±19.2 l	604.0±5 l	1238.0±47 g	654.5±24 f	
	Jihan99	11.0±0 rs	37.0±1 rs	40.7±2 rs	26.0±1 rs	28.7±1 j	
	Azza	3.0±0 s	2.0±0 s	3.0±0 s	12.0±1 rs	5.0±0 j	
	Cham6	4.0±0 s	4.0±0 s	6.0±0 s	90.0±8.2 r	26.0± 1j	
	Tamuz2	228.0±6 q	400.0±11 no	410.0±5 no	590.0±14 lm	407.0±10 g	
Bread	Adnaniya	67.0±1 rs	202.0±5 q	455.0±7 n	920.0±27 i	411.0±10.2 g	134.0±10.3 b
	Adana	68.0±1 rs	204.0±5 q	430.0±7 n	458.0±8 n	290.0±8 h	
	Ibaa99	7.0±0 s	14.0±1 rs	41.0±1 rs	48.0±2 rs	27.5±1.1 j	
	Azadi	4.0±0 s	4.0±0 s	4.0±0 s	12.0±1 rs	6.0±0 j	
	Abo-ghraib	4.0±0 s	4.0±0 s	5.0±0 s	6.0±0 s	4.8±0 j	
Total mean period		150.1±12.1 d	265.7 ±19.4 c	509.6±21 b	764.7±25.1 a		

* Similar letters indicate non-significance of values at the 0.05 probability level

Table (2): Effect of Storage period on the growth rate of khapra beetle in some varieties of Durum and Bread wheat

Wheat	Variety	Insects growth rate (insect.month^{-1}) Storage period (month) 3	6	9	12	Variety effect	Mean
Durum	UmRabei	26.9±1.5 pq	34.0±2 o	43.1±2l m	92.0±3.2 f	49.0±2.1 e	47.9±1 a*
	Aksad65	0.0±0 z	0.0±0 z	0.5±0.01 yz	4.1±2 wxy	1.2±0.01 k	
	Cham3	0.0±0 z	0.0±0 z	0.1±0 z	19.9±0.6 t	5.0±0.03 j	
	Bakrajo-1	15.3±0.8 u	30.3±1 p	35.21± 2 o	108.5±3.7 d	47.3±2.4 f	
	Semeto	21.0±0.7 st	46.2±2 kl	123.6±4 c	138.2±4.2 a	82.3±3 a	
	Creso	46.8±1.7 k	20.6±0.5 st	69.8±2.3 h	106.9±4 d	61.0±2 d	
	Baghdad2	20.2±1 st	54.0±2 j	131.0±4.2 b	97.1±3.4 e	75.6±3 b	
	Zain Turk	23.5±1.3 rs	46.1±2 kl	72.3±3 h	122.3±8c	66.0±2 c	
	Sardar	11.0±1 v	40.5±2 mn	40.0±2 mn	82.0±2.7 g	43.4±1.3 g	
	Jihan99	0.4±0y z	2.1±0.02 xyz	2.4±0.02 xyz	1.4±0 yz	1.6±0 k	
	Azza	0.0±0 z	0.0±0 z	0.0±0 z	0.4±0.01 yz	0.1±0 k	
	Cham6	0.0±0 z	0.0±1 z	0.1±0 z	6.0±0.06 w	1.5±0.02 k	
	Tamuze2	15.0±1 u	26.0±1 qr	27.0±1 pq	39.0±1.4 n	26.8±1 h	
Bread	Adnaniya	4.1±0.02 wxy	13.11 uv	27.0±1 pq	61.0±2 i	26.3±1 h	8.5±0.2 b
	Adana	4.2±0.03 wx	13.3±1 uv	28.3±1.2 pq	30.2±1 p	19.0±0.5 i	
	Ibaa99	0.1±0 z	0.6±0 xyz	2.4±0.05 xyz	2.9±0.04 xy	1.5±0 k	
	Azadi	0.0±0 z	0.0±0 z	0.0±0 z	0.4±0.01 yz	0.1±0 k	
	Abu-Ghraib	0.0±0 z	0.0±0 z	0.0±9 z	0. ±01 z	0.0±0 k	
Periods Effect		10.5±0.2 d	18.2±o.5 c	33.5±1 b	50.7±1 a		

* Similar letters indicate non-significance of values at the 0.05 probability level.

Table (3): Effect of Storage period on the weight losses of grains of some varieties of Durum and Bread wheat infested by khapra beetle

Wheat	Variety	Average weight losses of wheat (%) Storage period (month) 3	6	9	12	Variety effect	Mean
Durum	UmRabei	14.3±0.3 tu	19.6±0.5 rs	29.0±0.5 mno	76.3±1.6 c	34.8±2 d	34.5±2.5 a*
	Aksad65	0.1±0 x	0.9±0 x	3.1±0.01 wx	15.7±0.5 st	5.0±0.5 h	
	Cham3	0.1±0±0 x	0.1±0 x	2.0±0 wx	25.0±0.5 opq	6.8±o.5 gh	
	Bakrajo-1	27.8±0.5 no	33.3±1 lm	48.3±0.1 g	82.5±2 b	48.0±2 b	
	Semeto	26.3±0.5 nop	40.9±1 ij	73.4±1.5 cd	93.5±2 a	58.5±2 a	
	Creso	29.1±0.6 mno	42.3±1 hi	46.0±1 gh	69.7±1.5 de	46.8±2 b	
	Baghdad2	15.9±0.2 st	22.6±0.4 pqr	30.0±1 lm	89.5±2 a	39.5±1.8 c	
	Zain Turk	19.3±0.3 rs	21.3±0.3 qr	36.2±1 jkl	66.9±1.4 e	35.9±1.6 d	
	Sardar	19.8±0.3 rs	30.8±1 mn	34.0±1 klm	55.0±1.4 f	34.9±1.5 d	
	Jihan99	1.3±0 wx	3.9±0.02 wx	9.9±0.2 uv	10.0±0.2 uv	6.3±0.6 gh	
	Azza	0.0±0 x	0.1±0 x	1.3±0.01 wx	6.0±0.01 vw	1.9±0 i	
	Cham6	0.0±0 x	0.6±0 x	1.6±0.01 wx	30.0±1 mno	8.1±0.2 g	
	Tamuz2	10.5±0.2 uv	29.9±1.3 mno	37.0±1.4 jkl	53.0±1.2 f	32.6±1.5 e	
Bread	Adnaniya	10.8±0.1 uv	30.0±1.3 mno	38.3±1.4 k	46.0±1 gh	31.3±1.3 e	13.0±1.5 b
	Adana	11.9±0.3 tu	29.9±1.3 mno	11.6±0.0.2 tu	55.0±1.4 f	27.1±1.5 f	
	Ibaa99	1.2±0 wx	2.1±0.01 wx	4.6±0 wx	20.0±0.5 rs	7.0±0.4 gh	
	Azadi	0.1±0 x	0.1±0 x	0.3±0 x	5.0±0 wx	1.4±0.1 i	
	Abu-Ghraib	0.1±0 x	0.3±0 x	1.0±0 wx	5.0±0 wx	1.6±0.1 i	
Total mean period		10.5±1.1 d	17.1±1.5 c	22.6±2 b	44.7±3a		

* Similar letters indicate non-significance of values at the 0.05 probability level.

Table (4): Effect of storage period and khapra beetle infestation on the seed germination of some varieties of Durum and Bread wheat

Wheat	Variety	Germination rate of seeds %						
		Control	Storage period (month)				Variety effect	Mean
			3	6	9	12		
Durum	UmRabei	92	65.0±2 op	71.0±2 jkl	75.3±2 hg	85.0±2 d	74.1±2 f	63.8±2 a
	Aksad65	95.2	5.0±0 vx	5.0±0 vx	10.0±0.1 u	17.0±1 s	9.3±0.3 k	
	Cham3	89	1.0±0 y	1.3±0 y	2.0±0 y	67.9±1.5 mn	18.1±1 j	
	Bakrajo-1	93	64.5±2 p	73.0±2 hij	74.0±2 hgi	81.0±2 e	73.1±2 g	
	Semeto	94	71.0±1.9 jkl	74.0±1.9hgi	92.0±2.8 c	100.0±3 a	84.3±2.4 a	
	Creso	93	67.0±1.6mno	65.0±1.7 op	85.0±2.6 d	100.0±3 a	79.3±2.1 c	
	Baghdad2	95	53.0±1 r	60.0±1.5 q	95.0±3 b	95.0±2.6 b	75.8±2e	
	Zain Turk	97	66.0±1.6 nop	69.0±1.8lm	95.0±2.9 b	100.0±3 a	82.5±2b	
	Sardar	96	65.0±1 op	76.0±2 g	78.0±2 f	92.0±2.4 c	77.8±1.8d	
	Jihan99	95	7.0±0.3 v	10.0±0.06u	11.0±0.6 u	11.0±0.6u	9.8±0.04k	
	Azza	93	0.0±0 z	0.2±0 z	0.2±0 z	2.0±0 y	0.6±0o	
	Cham6	95	0.0±0 z	1.0±0 z	1.5±0 y	10.0±0 u	3.1±0 n	
	Tamuz2	97	67.0±2 mno	70.0±1.7jkl	72.0±1.8ijk	75.0±2 hg	71. ± 1.9 0h	
Bread	Adnaniya	93.5	58.5±1.6 q	67.0±1.7 op	73.5±2 kl	86.5±2.5 d	71.1±1.7h	23.7±1 b
	Adana	96	5.0±0.04 vx	52.0±1.3 r	53.0±1.3 r	66.0±1.5nop	44.0±1i	
	Ibaa99	96	1.3±0 y	2.0±0 y	10.0±0.7 u	14.7±1 t	7.0±0.04 k	
	Azadi	96	1.3±0 y	2.0±0 y	2.7±0.3 y	3.7±0 xy	2.4±0.02 n	
	AbuGhraib	96	3.7±0.04 xy	4.3±0 xy	5.3±0 wvx	6.0±0.1 vw	4.81±0.04xy	
	Periods affect		33.4±1 d	38.9±1 c	46.3±1 b	56.3±1.2 a		

* Similar letters indicate non-significance of values at the 0.05 probability level.

Discussion

The study indicated that there were differences among population density of the Khapra beetle infesting different wheat varieties; the durum wheat varieties were more susceptible than the bread wheat varieties to infestation. It is attributed to the differences of chemicals compounds for each kind of wheat variety. These results agreed with the findings of Al-Hussine & Alyousuf (2021), who evaluated the sensitivity of 12 varieties of local wheat varieties (IPA-95, IPA-99, Abu-Ghreib, Babel-113, Bhooth-10, Bhooth-22, and Bhooth-158, Baraka, Tammuz, Fatih, Latifia and Rasheed) against infestation by Greenbug *Shizaphis graminum* and Bird-Cherry Oat Aphid *Rhopalosihum padi* in the province of Basrah; they founded significant differences among the chemical of wheat varieties; phenols had an effective role by reducing the population density of aphids. The verities Rasheed and IPA-99 which recorded low population rates of the aphids have the highest rates of phenols at a rate of 7 and 6.78 mg.100g^{-1} dry weight. However, varieties Abu-Ghraib, IPA-99, and Rasheed varieties recorded the highest productivity rates (weight of thousand grains), with an average of 33.47, 43, and 67.42 g, respectively.

Also, the insect population density was significantly affected by the storage period, the numbers of insects were less during the first storage period; the insect's number increased with the progression of the storage period. The growth rate of the Khapra beetle increased due to the availability of food and the lack of crowding out between individuals after three months, and it continued to increase during the twelve months of

storage. This is due to the variation in its nutritional components and its degree of hardness; the results are consistent with what was referred to by Mohammad & Omar (2012). Also, components of the grains, especially the protein, had a positive significant effect; whereas, the hardness of the grain had a negative significant effect (Kteo & Mohammed, 2019).

The rate of grain weight losses was affected by the beetle infestation and storage periods; the weight of durum wheat decreased more than that of bread wheat, reaching 34.5% and 13% respectively. The results are in agreement with the results of Jood *et al*. (1996), who found that the infestation of wheat, maize, and sorghum grains with the Khapra beetle caused fundamental changes in the components of the grains; the growth rate of insects reflects the quality of food consumed by the insect. Kavallieratos *et al.* (2017) and Hendrival & Dewi (2019), also mentioned that the insect infestation causes a qualitative loss in the wheat grain as a result of feeding it on the components of the grain; the weight loss of the grain depends on the degree of infestation and the length of storage period. Finally, the infestation by the khapra beetle may play a great role in losing weight of grains.

These results agreed with the findings of Gourgouta *et al*. (2021), who evaluated the susceptibility of different sorghum and wheat varieties for the infestation with khapra beetle, *T. granarium*; significant differences were founded among sorghum and wheat varieties regarding the final weight losses. The current study proved differences in the susceptibility of the varieties to *T. granarium* infestation. These results show that khapra beetle can develop on different varieties of grains with different levels of infestation. The percentage of germination varied among the varieties and decreased with the increase in the severity of the infestation. This was confirmed by Misiak *et.al.* (2020) who mentioned that the severe infestation with the khapra beetle leads to the destruction of the grain completely; the beetles prefer feeding on the seed embryo, which makes the grain unsuitable for cultivation. Hadaway (1995) also indicated that the khapra larvae attack the grain first from the fetus area, then move to feed on the endosperm; therefore, the rate of germination is inversely affected by the insect population or infestation. Also, Mohammad & Omar (2012) found that Khapra beetle infestation under storage periods (2 and 4) months affected significantly the grain physical characteristics; including the percentage of germination which decreased to 12.96% compared to non-infestation treatment (83.3%).

Conclusions

The results of the studied parameters like insect population, grain weight loss, seed germination percentage, and growth rate of insects, in the eighteen varieties of Iraqi wheat varieties, demonstrated that the Semeto variety was the most susceptible variety to the infestation, while the varieties Abu-Ghraib and Azza were the least susceptible. The durum wheat varieties were generally more susceptible to infestation than the bread wheat varieties. The storage period had a significant effect on the insect population density, the rate of community reproduction, and the loss in germination rate. It also concludes from this study that the phenomenon of insect food preference was clear and influential through the insect population density and other characteristics under study.

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ORCID

https://orcid.org/0000-0003-0974-7488

Conflicts of Interest

The authors declare no conflict of interest.

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قابلية بعض أصناف الحنطة للإصابة بخنفساء الخابرا *Trogoderma granarium* Everts تحت ظروف المخزن

بتول عبد الله كرسو

قسم وقاية النبات، كلية علوم الهندسة الزراعية ، جامعة دهوك، أقليم كردستان، العراق

المستخلص: ثمانية عشر صنفًا من أصناف القمح العراقية، اختيرت تسعة أصناف من الحنطة الخشنة *Triticum turgidum* Desf. (أم ربيع ، أكساد ، شام 3. بكراجو $^{-1}$، سيميتو، كريسو ، بغداد2، زين تركي ، سردار)، وتسعة أصناف من الحنطة الناعمة *T. aestivum* L. (جيهان 99، عزة ، شام 6 ، تموز 2، عدنانية ، أدنا ، إباء 99، آزادي، أبو– غريب) لدراسة حساسيتها للاصابة بخنفساء الخابرا *Trogoderma granaruim* Everts. وتضمنت النتائج الكثافة العددية ومعدل النمو للحشرات ونسبة فقدان الوزن للحبوب وتاثيرها على نسبة إلانبات. وجدت اختلافات كبيرة بين الأصناف ؛حيث كان أبو غريب وعزة أكثر الأصناف مقاومة للأصابة . حيث بلغ إجمالي عدد الحشرات (4.8 ، 5) حشرة\100غم حنطة، ومعدل النمو (0 ، 0.1) فرد شهريًا، ونسبة الفقد بوزن الحبوب (1.6 ، 1.9)، ونسبة فقد الإنبات للحبوب (4.81، و 0.6)٪ لكلا الصنفين على التوالي.اما صنف الحنطة Semeto فكان الأكثر حساسية للاصابة فقد بلغ المعدل العام للكثافة العددية للحشرة 1238.8 فرد وبمعدل نمو 82.3 ، كذلك نسبة الفقد لوزن الحبوب 58.5٪ وزيادة نسبة فقدان إلانبات للحبوب إلى 84.3٪. عموما فقد أظهر القمح الخشن حساسية عالية للاصابة مقارنة بأصناف الحنطة الناعمة.

الكلمات الدالة: حساسية اصناف، الحنطة الخشنة ، الحنطة الناعمة، خنفساء الخابرا.