

**INFESTATION RATES AND SEED WEIGHT LOSSES IN  
CERTAIN FABA BEAN VARIETIES CAUSED BY *BRUCHUS  
RUFIMANUS* BOHMAN (COLEOPTERA: BRUCHIDAE)  
IN EGYPT**

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**INTRODUCTION**

Faba bean *Vicia faba* L. has gained a particular importance as available winter legume crop in Egypt. This is due to its high content of protein and it is considered one of the most public food in Egypt. Faba bean is a host of several insect pests, either at seedling or at late developmental stages until harvesting and storage. More than 20 insect species belonging to 8 orders were recorded on faba bean in the fields and during storage (Kamel, 1982).

Ozaer and Genc (1987) found that the infestation rate by *Bruchus rufimanus* Boheman in faba bean was 15.4% and a damage rate of 0.163 %. Epperlein (1992) reported that the germination rate of normal and infested seeds was the same. Seeds with bore-holes had higher germination rates, seedling weights, shoot and root lengths than those without ones, probably as a result of improved water uptake by damaged seeds. Field investigations showed that, the germination rate and length of the shoots after flowering were nearly equal, but that yield from damaged plants by the bruchid was lower. Also, Epperlein (1993) studied the germination rate of *vicia faba* seeds infested with *B. rufimanus* which was differed by only a few percent from that of uninfested ones. He found that, seedling weight and length were better from seeds with drill holes than other from unattached ones. He added that infestation greatly affected the seed quality.

Blaszczak *et al.*, (1995) in Poland found that, the lowest number of seeds damaged with *B. rufimanus* was recorded in 1989 (3.5%) while the highest was in 1992 (40.4%).

Boughdad and Lauge (1997) revealed that, the actual average losses were closed to 5% of the dry weight seed. These losses were correlated with infestation severity. The average weight loss caused by one larva was 46.91 mg, producing 31.17 mg of frass. Reductions in seed germination depended on the infestation severity; with one bruchid adult per seed, the germination rate was 90.5%; with 5 adults per seed, only 55% of the seed germinated. The present study aimed to determine the relation between faba beans infestation rates and weight losses caused by *B. rufimanus* during storage.

## MATERIAL AND METHOD

The experiment was conducted in the Experimental Farm of the Faculty of Agriculture field, Cairo University, at Giza region during 2000 – 2001 season. The five selected faba bean varieties were imposed on the recommended commercial varieties as Giza 716, Giza 2429, Giza 40, Cairo 375 and Cairo 241. The experiment included four replicates. The area of each replicate was 12 rows, 4m long (30 m<sup>2</sup> for each replicate). Sowing date was 15<sup>th</sup> of November and the normal agriculture practices with no insecticide treatments were applied.

After harvesting, seeds of each variety were stored in a plastic container from the 2<sup>nd</sup> week of May to the 3<sup>rd</sup> week of July under open laboratory conditions. The container was covered tightly with a plastic cover to prevent any external infestation by other insects and to ensure that the infestation and losses are based on the field infestation by *B. rufimanus*, and nothing else.

To determine the percentages of *B. rufimanus* infestation, three samples each of 200 gm. Seeds (as replicates) were weekly taken randomly from each stored variety. By establishing the number and weight of damaged and undamaged seeds of each sample, changes in the weight could be determined over the period of storage.

The percentage of infestation was calculated using the following formula:

$$\% \text{ Infestation} = \frac{Nd}{Nd + Nu} \times 100$$

The percentage of weight loss was calculated using the following formula of Harris and Lindblad (1978):

$$\% \text{ Weight loss} = \frac{(Wu \times Nd) - (Wd \times Nu)}{Wu \times (Nd + Nu)} \times 100$$

**Where:-**

Wu = weight of undamaged seeds.

Nu= number of undamaged seeds.

Wd= weight of damaged seeds.

Nd= number of damaged seeds.

## RESULTS AND DISCUSSION

Data presented in Table (1) presented percentages of the infestation and losses (%) caused by *B. rufimanus* in the different faba bean varieties throughout the storage period. The results obtained showed that infestation rates ranged between 4.20 and 6.08 % in Giza 716, 2.63 and 3.84% in Giza 429, 3.30 and 4.91 % in Giza 40, 4.50 and 5.71 % in Cairo 375 and 2.73 and 6.13 % in Cairo 241.

The percentages of weight losses ranged in these respective varieties by 0.16- 1.37 %, 0.02-0.81 %, 0.21-0.98 %, 0.09-1.38 % and 0.10 -0.93%.

**TABLE (I)**

Infestation rates and losses in five faba bean variety caused by *B. rufimanus*.

variety Sampling Dates	Giza 716		Giza 429		Giza 40		Cairo 375		Cairo 241	
	% Infest.	% loss	% Infest.	% loss	% Infest.	% loss	% Infest.	% loss	% Infest.	% loss
02-05-2002	6.08	1.37	2.63	0.40	4.80	0.44	5.28	0.65	3.80	0.20
09-05-2002	6.02	1.00	2.70	0.03	3.94	0.36	5.20	0.88	3.63	0.18
16-05-2002	5.61	0.59	2.70	0.63	4.91	0.98	5.40	1.19	3.22	0.37
23-05-2002	5.48	0.42	2.84	0.53	4.90	0.88	4.50	0.35	6.13	0.93
30-05-2002	5.19	0.36	3.08	0.42	3.30	0.21	4.93	0.09	4.30	0.85
06-06-2002	5.35	0.48	3.54	0.21	4.40	0.58	5.47	1.12	4.05	0.48
13-06-2002	4.35	0.42	3.60	0.31	3.47	0.38	5.28	0.25	3.70	0.14
20-06-2002	4.94	0.85	3.84	0.81	3.58	0.34	5.33	0.73	3.82	0.36
27-06-2002	5.85	0.32	3.72	0.64	4.60	0.89	5.71	1.38	2.73	0.11
04-07-2002	5.48	0.50	3.18	0.60	3.90	0.54	4.85	0.38	3.02	0.29
11-07-2002	5.13	0.59	3.08	0.33	4.44	0.42	5.20	0.98	2.89	0.15
18-07-2002	4.20	0.16	3.16	0.02	4.49	0.64	4.96	0.45	2.73	0.10
Mean	5.30	0.59	3.17	0.41	4.23	0.56	5.18	0.70	3.67	0.35

Table (2) demonstrated the infestation and yield losses caused by *B. rufimanus* in the different faba bean varieties. Maximum infestation rates of 5.30 and 5.18 % were recorded on Giza 716 and Cairo 375 varieties, while the minimum rates of 3.17% and 3.67% were found Giza 429 and Cairo 241, respectively. Statistical analysis showed highly significant differences between the infestation levels of the examined varieties.

Concerning weight loss in the stored seed varieties, it ranged between 0.35 % (Cairo 241) and 0.70% (Cairo 375) with highly significant differences between the tested varieties.

**TABLE (II)**

Infestation rates and seed losses in different faba bean varieties by *B. rufimanus* during the period of storage.

Variety	No. of seeds/sample	Undamaged seeds		Damaged seeds		% Infest.	% Losses
		Weight (g)	No.	Weight (g)	No.		
Giza 716	251.68	188.22	238.21	11.78	13.47	5.30 a	0.59 b
Giza 429	323.33	192.86	313.08	7.16	10.25	3.17 e	0.41 d
Giza 40	320.19	190.48	306.69	9.52	13.50	4.23 c	0.56 c
Giza 375	313.13	188.45	296.94	11.55	16.19	5.18 b	0.70 a
Giza 241	270.74	192.00	260.74	8.00	10.00	3.67 d	0.35 e
F						1105 **	5989**
L.S.D. 05						0.009	0.005

These results are in agreement with those obtained by Boughdad and Lauge (1997) in Morocco who found that, real average losses were close to 5% of the seed dry weight, and correlated with the infestation severity. The average loss caused by one larva was 64.91 mg. Sharaf El- Din *et al.*, (1999) found also that, all samples of faba bean varieties contained *B. rufimanus*, with a maximum infestation of 2.9% and the loss correlated with infestation was 0.12%. El- Shazly (1992) found a positive relationship between weight loss and the number of emergence holes with bruchids in the seeds. The presence of 5 holes/seed caused a loss of 31.05% in seed weight.

Hashem *et al.* (2005) found that, the infestation with *B. rufimanus* was higher in Giza 716 and Cairo 375 than in other varieties.

Giza 716 and Cairo 375 seeds appeared to be more susceptible to the infestation by this insect than the other tested varieties is susceptibility may be due to physical or chemical seed characters as mentioned by El-Shazly (1998).

## SUMMARY

This study was carried out at Experimental Farm at Faculty of Agriculture throughout 2000-2001 season to determine the percentages of infestation on faba bean varieties and the percentages of weight loss on the infested seed with *B. rufimanus*.

Maximum infestation rates were recorded on Giza 716 (5.30%) and Cairo 375 (5.18%), respectively. while minimum rates of 3.17 and 3.67 % were recorded on Giza 429 and 241, respectively. Statistical analysis revealed highly significant differences between the infestation levels of the tested varieties.

Weight loss percentage of stored faba bean seed varieties ranged between 0.35 and 0.70 % for Cairo 241 and Cairo 375, respectively; with highly significant differences between all the tested varieties.

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