EFFECT OF SOME AGRONOMIC TREATMENTS ON YIELD AND SEED QUALITY OF FABA BEAN (*VICIA FABA* L.)

Asmaa A. M. El-Sayed*, M.E. Saleh, I.E. Ramadan and R.M. Aly

Agron. Dept., Fac. Agric., Zagazig University, Egypt.

ABSTRACT

Six filed experiments were carried out in the Experimental Farm, Faculty of Agriculture, Zagazig University, at Ghazala village, Zagazig city, Sharkia Governorate, during 2004-2005 and 2005-2006 seasons to find out the effect of planting dates(1st of Nov, Mid of Nov. and 1st of Dec.) and planting populations (140,000,93,333 and 70,000 plants/fad.) on yield of two faba bean cultivars (Giza2 and Sakha1), as well as , the effect of harvesting date (At full maturity and after 15 days from maturity) and storage methods (cans, synthetic fiber and jute packs) on seed quality. Concerning planting dates effect, it could be concluded that early planting achieved the highest value in most characters, yield and yield component as well as reducing seed infestation percentage in the store while the late planting at 1st of Dec. gave the highest seed infestation percentage, seed protein content and the lowest percentage of seed germination. Planting dates at mid of Nov., and 1st of Dec., gave the highest percentage of seed coat. The results cleared that Sakha1 cv. had the superiority over Giza2 in 100 – seeds weight, seed weight/plant, seed yield/fad., germination percentage and seed protein content, while Giza2 cv. was the superior in number of pods/ plant, number of seeds/ pod, straw yield/fad. and seed coat percentage. Low planting population of 70,000 plants/fad. surmounted both 93,333 and 140,000 plants /fad. in No of pods/plant, number of seeds/pod, seed weight/plant and 100-seeds weight. Furthermore, the dense planting of 140,000 plants/fad was extreme in the final seed and straw yields/fad.

Respecting to harvesting dates and methods of storage effect, the results showed that, seeds harvested at full maturity and stored in cans were the best in the most quality characters.

Keywords: Faba bean, yield, seed quality, planting dates, plant population, harvesting dates.

***Corresponding author:** Asmaa A. M. El-Sayed, Tel.: +20164874070

E-mail address: asmaaabdulsallam@yahoo.com

INTRODUCTION

Faba bean is the most important food legumes crop for human nutrition in Egypt, it has a special appreciation in human feeding since it was created the daily basic source of nutrients for millions of people. Rather than being used in human and animal feeding. Also, due to its role in crop rotation. However, total production of faba bean is still below the national consumption. Therefore, increasing faba bean production at national level is one of the major targets of the agricultural policy. This could be achieved by improve faba bean production per unit area, through several agricultural practices, such as planting date suitable tested cvs. and planting population.

Planting date is one of the most important agronomic factors relating to crop growth, yield and seed quality. The temperature and day length are the most important environmental conditions that effect the plant development of faba bean Hadley *et al*., (1983) faba bean requires a cool season for best development. Zayenhom, (2004) showed a significant increases in number of seeds/pod and seed weight/plant with planting faba bean on 15 Oct. and El- Galaly *et al* (2008), found that planting at mid Oct., gave the highest seed yield and yield components.

Also, planting population plays an important role on faba bean growth and yield due to its effect on the degree of weed infestation and diseases infection, in addition to the competition between plants. Because of the important of determination optimum planting population there were some studies carried out in Egypt by some researchers such as Hussein *et al* (1995), who found an increase in seed and straw yields/fad. due to increasing faba bean planting population up to 25 plants/ m^2.Furthermore,Ali and Abd El-Mottaleb (1997), found a significant decrease in number of pods and seeds/plant and seed weight/plant due to increasing faba bean planting population from 40,000 to 120,000 plants / fad. However, seed and straw yields / fad. were increased. Khameis, wafaa (2000), El-Murshedy *et al* (2002) and Nawar and Said (2002) showed that increasing planting population up to 186,500 plants/fad., significantly increased seed yield/fad. However, Attallah

and Mohamed (2004) showed a significant increase in seed yield/fad. with increasing faba bean planting population up to 140,000 plants/fad. Moreover, Sharara and El-Kramany (2006) demonstrated the superiority of low faba bean planting population of 20 plants/m^2 over the higher one of 40 plants/m^2 in number of pods/plant, number of seeds/pod and seed weight/plant.

Regarding seed quality of faba bean which is the second objective of this study, the most important factors affecting the quality of seeds are harvesting date and methods of storage. It has been stated by many workers such as Amer *et al.*, (1997) that, faba bean harvested at full maturity produced high seed protein content. El-Sayed, Soad (1997) observed that seeds of faba bean stored in impermeable packages had a higher germination percentage than those stored in permeable ones. This work aimed to find out the effect of planting dates and planting populations on yield and yield components of two faba bean (*Vicia faba* L.) cvs., Giza2 and Sakha1 as well as, to study the effect of harvesting dates and methods of storage on seed quality characters.

MATERIALS AND METHODS

Six filed experiments were carried out in the Experimental Farm, Faculty of Agriculture, Zagazig University, at Ghazala village, Zagazig city, Sharkia Governorate, during of winter growing seasons 2004-2005 and 2005-2006. The study included three planting dates, each carried out in separate experiment. In the 1st season, experiments were laid out in split plot design with three replicates. But, in the 2nd season, split- split plot design with three replicates was followed. In both seasons, the two faba bean cvs. were allocated in the main plots. Whereas, the three planting populations were distributed in the 1st order sub plots (8 ridges of 3m long and 0.6 width for each). In the 1st season, harvesting was made once, only at maturity, using the central two ridges. But, in the 2nd season, harvesting was made twice, at maturity and at 15 days latter, using two of the four central ridges at each harvesting date.i.e. the harvesting date allocated to the 2nd order sub plots in the 2nd season. Irrespective of planting populations, seeds produced from the 2nd order subplots in the 2nd season were divided into three

equal parts, each of them stored with three different methods cans, jute and synthetic fiber packs. Consequently, the studied factors and their levels were as follows:

Planting Dates

a- planting at 1st of November
b- planting at mid of November
c- Planting at 1st of December

Cultivars

Two faba bean cultivars used were:

a- Giza 2
b- Sakha1

Planting Populations

a- 70,000 plants/ fad., i.e., 20cm between hills with two plants / hill , on one side of the ridge.
b- 93,333 plants/ fad., i.e., 15cm between hills with two plants / hill , on one side of the ridge.
c- 140,000 plants/ fad., i.e., 10cm between hills with two plants / hill , on one side of the ridge.

Harvesting Dates

Two harvesting dates were made as follows:

a- At full maturity (maximum dry matter). When the hillum of the seed in the upper fifth of fruiting zone turns to black, the seed is at full maturity.
b- After 15 days from maturity.

The preceding crop was corn in both seasons. Each experimental unit area was 14.4m^2 (3x4.8m) in both seasons. Nitrogen Fertilizer in form of ammonium sulphate (20%N) and phosphorus fertilizer in form of calcium super phosphate (15.5% P_2O_5) were added just before planting at rate of 50 and 200 kg / fad., respectively. The soil of the experiments was clay in texture, with an average PH value of 7.4 and organic matter content of 1.32%.The available N,P and K contents were 22,20.5 and 165 ppm, respectively (averaged over the two seasons for the upper 30 cm of soil depth)

In both seasons all plants in the 3rd and 4th ridges were harvested at maturity to determine yield and yield components. Components were measured using five guarded plants. This was repeated after 15 days from maturity, only in the 2nd season, using plants in the 5th and 6th ridges. The recorded measurements were as follows:

1- Number of pods / plant
2- Number of seeds / pod
3- Seed weight / plant (g)
4- Seed index (100- seeds weight) (g)

5- Seed yield (ardab/fad.)
6- Straw yield (ton/fad.)

In the 2nd season, storage was made in seed laboratory, Faculty of Agriculture, Zagazig University for six months from harvest. Seeds were stored in cans, jute and plastic fiber bags.

After the storage period, three samples were taken from each pack to determine seed quality characters as follows:

1- Percentage of infested seeds
2- Seed coat percentage
3- Germination percentage
4- Seed protein content

Data of each experiment were analyzed according to Snedecor and Cochran (1967). Then, a combined analysis was made for data of the three experiments of planting dates in each season, as well as, for the data of both seasons. Duncan's multiple range test (Duncan, 1955) was used to compare among means. In interaction tables, capital and small letters were used to compare row and column means, respectively.

RESULTS AND DISCUSSION

Data in Tables 1, 2 and 3 show the effects of planting dates and planting populations on yield and yield components of two faba bean cultivars.

Number of Pods / Plant

Concerning the effect of planting dates Table 1, the results indicate the significant superiority of early planting in this respect with highly in the two seasons and their combined analysis. Abd El-Hakim (2003) found that faba bean planted on 15th Oct. gave higher number of pods/plant compared with the late planting. Also, Ahmed, Eman (2004) showed that number of pods/plant decreased with delay in planting.

Likely, there are significant variations between the two faba been cvs., whereas Giza2 cv.. produced higher number of pods during both seasons, as well as, their combined than Sakha1. Abd El-Fattah, El-Set and Shalaby (1999), recorded the superiorty of Giza 2 in number of pos/plant as compared with the other investigated cvs.

Respecting, planting populations effect, results revealed significant differences in both seasons, as well as, their combined when number of pods/plant tended to be gradually decreased as planting population increased from 70,000 to 93,333 then 140,000 plants/fad. Sharara

and El-Kramany (2006) cleared that the wider planting distance encouraged the vegetative growth of plants which it turn in much more of setting pods. In addition, other investigators included Zayenhom (2004) and Attallah and Mohamed (2004) reported similar findings.

The interaction between planting dates and faba bean cultivars as well as the interaction between cultivars and planting population, significantly affected the number of pods/plant in same way of the main effects.

Number of Seeds / Pod

Regarding the influence of planting dates on number of seeds/pod, Table 1 results reveal highly significant differences in the two seasons, as well as their combined analysis. In the 1st season early planting at 1st of November produced more Seeds/pod, while in the second season mid of Nov. gave the highest number of seeds/pod. The combined analysis show that both first and mid of Nov., surpassed the late planting date in number of seeds/pod. Nigem and Mohamed (1987) showed that delaying planting date over 5th Nov. decreased number of seeds/pod while Zayenhom (2004) reported that planting on 25 November gave the highest number of seeds/pod.

Data in both seasons, and their combined, exhibited significant varietal differences in number of seeds/ pod, in vafour of Giza2 cv. The excess of Giza2 over Sakha1 valued 5.718% in the combined analysis. Insignificant differences between faba bean varieties were reported by Khameis, Wafaa(2000) while, Bakheit *et al* (2001) and Mokhtar (2003) reported significant differences in this respect.

Number of seeds/pod appeared to be significantly decreased with each increase in the tried planting population. This was typically in 2nd season and the combined analysis. The decrease in number of seeds/pod could be attributed to the severe intra specific competition with the increase in planting population. Abd El-Hakim (2003) and Sharara *and El-Kramany* (2006) indicated that, number of seeds/pod decreased with increasing planting population. Interaction between planting dates and faba bean cvs. Significantly affected on number of seeds/pod (Table 1-a). Number of seeds/pod of Giza2 faba bean

cultivar was the highest when planted on 1st of Nov., while that number for Sakha1 cv. was the highest when planted on mid of Nov. In the other direction, faba bean cv. Giza2 outnumber Sakha1 in seeds/pod under the early planting date, but under the late planting date, the opposite was find out. The significant interaction between cultivars and planting populations Table1-b showed that the highest number of seeds/pod for the two cvs. obtained under planting population 70 thousand plants/fad. However, in the other direction, Giza2 cv. had higher number of seeds/pod than Sakha1 under the three tried planting populations.

Seed Weight/Plant (g)

Data presented in Table 2 reveal significant differences among seed weight/plant of three planting dates, where early planting of 1st Nov. produced higher seed weight/plant during both seasons, as well as their combined compared with late planting of 1st Dec. In other words faba bean plants showed a considerable decrease in seed weight/plant with delaying planting date. These results might be the result of favorable temperature prevailed at blooming period of the crop planted on these dates. The obtained results are in accordance with those reported by Abd El-Hakim (2003), Mekky *et al* (2003) and Zayenhom (2004).

The varietal differences in seed yield/plant, were significant in the two seasons, as well as their combined. Sakha1 cv. out yielded Giza2 in seed weight/plant by about 16.60% in the combined analysis. Superiority of Sakha1 in seed yield/plant could be attributed to it's seed size, which were larger and heavier as confirmed from the data of seed index shown in Table(2) Similar cultivar differences in seed weight /plant were given by, Abd El –Hakim (2003) and Mokhtar (2003).

The analysis of variance of seed weight/plant, showed significant differences among the three tried planting populations, where as the greatest mean value was in the lowest planting population (70,000 plants/ fad.) followed by 93,333 and 140,000 plants/fad. in the two seasons, as well as, their combined analysis. The lowest weight of seeds/plant was obtained from the highest planting population (140,000 plant/fad). This may be due to the decrease in number of pods and seeds/plant in dense planting, as shown in Table- 1.

Table 1. Number of pods/plant and number of seeds/pod of two faba bean cultivars as affected by planting dates and planting populations in the two seasons and the combined analysis

Main effects and interactions	Number of pods/plant	Number of seeds/pod

	2004-2005	2005-2006	Combined	2004-2005	2005-2006	Combined
planting dates(P):						
1st of Nov.	**16.04 a**	**13.75 a**	**14.90 a**	**3.73 a**	**3.18 b**	**3.45 a**
Mid of Nov.	**13.20 b**	**10.22b**	**11.71 b**	**3.48 b**	**3.41 a**	**3.44 a**
1st of Dec.	**8.91 c**	**7.84 c**	**8.37 c**	**3.44 b**	**2.62 c**	**3.03 b**
F.test	**	**	**	**	**	**
Cultivars (C)						
Giza-2	**14.43**	**11.98**	**13.21**	**3.68**	**3.14**	**3.41**
Sakha-1	**11.00**	**9.23**	**10.11**	**3.42**	**3.00**	**3.21**
F.test	**	**	**	**	**	**
Planting populations (D)						
70,000 plants/fad	**14.64a**	**12.34 a**	**13.49a**	**3.74a**	**3.26 a**	**3.50 a**
93,333 plants/fad	**12.60 b**	**10.51 b**	**11.55 b**	**3.48 b**	**3.05 b**	**3.27 b**
140,000 plants/fad	**10.91c**	**8.96 c**	**9.93 c**	**3.43 b**	**2.89 c**	**3.16 c**
F.test	**	**	**	**	**	**
Interaction effects						
P × C	**	**	**	**	**	**
P × D	**	N.S	N.S	N.S	N.S	N.S
C × D	**	**	**	N.S	N.S	*

Table 1-a. Number of seeds/pod as influenced by the interaction between planting dates and faba bean cultivars in the combined analysis

planting dates	Cultivars	
	Number of seeds/pod	
	Giza2	Sakha1
1st of Nov.	A 3.83 a	B 3.07 b
Mid of Nov.	A 3.42 b	A 3.46 a

	B	A
1st of Dec.	2.96 c	3.10 b

Table 1-b. Number of seeds/pod of faba bean as influenced by the interaction between cultivars and planting populations in the combined analysis

Cultivars	**Planting populations**		
	Number of seeds/pod		
	70,000 plant/ fad	**93,333 plant/ fad**	**140,000 plant/ fad**
	A	B	C
Giza-2	3.64 a	3.37 a	3.21a
	A	B	B
Sakha-1	3.36 b	3.16 b	3.11 b

Similar results were obtained by**,** Attallah and Mohamed (2004) and Sharara *and El-Kramany* (2006).

Regarding the interaction effects between the studied factors on seed weight/plant, the results on both directions almost followed the same trends of the main effects whereas, early planting date (1st of Nov.), Sakha1 cv. and lower Planting population (70,000 plants/fad) produced the highest seed weight/plant each with any of other factors.

Hundred Seeds Weight (g)

Data given in Table 2 show the influence of planting dates and planting populations on seed index of two faba bean cultivars in the two seasons and their combined.

Meanwhile, planting dates reveales significant differences in the two seasons, as well as, their

combined whereas the early planting (1st of Nov.) produced heavier seeds than mid and late plantings. Bakheit *et al* (2001) showed that early planting of faba bean produced the highest seed index.

Statistical analysis revealed significant differences between faba bean cvs. in both seasons, as well as, their combined analysis where, Sakha1 cv. produced heavier 100–seeds weight. The difference in 100-seed weight may be due to the differences genetic background of the two tested cultivars.

Planting populations had significant differences in seed index during the two seasons, as well as, their combined analysis, whereas the lowest planting population (70,000 plants/fad.) had the capuluty to produce the heaviest seeds compared with either 93,333 and 140,000 plants/fad.. Abuldahab *et al* (2002) and El-Murshedy *et al* (2002) found significant increase in100-seeds weight due to decreasing planting population.

Regarding to the interaction effect of planting dates and the two faba bean cultivars on seed index, results of the interaction in both directions were in accordance with those of main effects.

Seed Yield (Ardab / Fad.)

Data relating to the effect of planting dates and planting populations on seed yield (ardab/fad.) of two faba bean cvs. in the two seasons and their combined analysis are presented in Table 3.

The results reveales significant differences, where early planting

Table 2. Seed weight/plant (g) and 100-seeds weight (g) of two faba bean cultivars as affected by planting dates and plant populations in the two seasons and the combined analysis

Main effects and interactions	Seed weight/plant (g)			100-seeds weight (g)		
	2004-2005	2005-2006	Combined	2004-2005	2005-2006	Combined
planting dates(P):						
1st of Nov.	**24.822 a**	**22.546 a**	**23.684 a**	**76.807 a**	**79.895 a**	**78.351 a**
Mid of Nov.	**19.090 b**	**19.993 b**	**19.542 b**	**74.707 b**	**75.911b**	**75.309 b**
1st of Dec.	**9.899 c**	**9.191 c**	**9.545 c**	**65.751 c**	**66.127 c**	**65.939 c**
F.test	**	**	**	**	**	**
Cultivars (C)						
Giza-2	**16.317**	**15.677**	**15.997**	**64.092**	**66.750**	**65.421**
Sakha-1	**19.556**	**18.810**	**19.183**	**80.752**	**81.206**	**80.979**
F.test	**	**	**	**	**	**
Planting populations (D)						
70,000 plants/fad	**20.428 a**	**19.008 a**	**19.718 a**	**75.311 a**	**76.660 a**	**75.985 a**
93,333 plants/fad	**17.571 b**	**17.221 b**	**17.396 b**	**72.407 b**	**74.046 b**	**73.226 b**
140,000 plants/fad	**15.812 c**	**15.501 c**	**15.657 c**	**69.548 c**	**71.227 c**	**70.387 c**
F.test	**	**	**	**	**	**
Interaction effects						
P × C	**N.S**	**	**	**	**N.S**	**
P × D	**	**	**	**	**N.S**	**N.S**
C × D	**	**	**N.S**	**N.S**	**N.S**	**N.S**

of 1st Nov. produced the highest seed yield/fad during both growing seasons, as well as, their combined.

In other words, faba bean plants showed a considerable decrease in seed yield (ardab/ fad.) with delay planting from 1st of Nov. to 1st of December. Seed yield reduction

could be attributed mainly to reduce the number of pods/plant Table- 1, seed yield/plant and 100-seeds weight Table 2. Also, the reduction in seed yield (ardab/fad.) due to delay in planting can also be attributed to shorter growth period at disposal of the late planted crop as the time taken by the crop to mature decreased with delaying in planting. Similar findings were obtained by Abd El-Hakim (2003), Mekky *et al* (2003) and Zayenhom (2004).

Regarding cultivar differences, the results indicate significant differences between the two tested faba bean cvs. in the two seasons, as well as their combined analysis, whereas the faba bean cultivar Sakha1 outyielded Giza2 cv. by 13.71%in the combined analysis. This indication was also seen in most of yield attributes such as seed weight/plant and seed index Table-2. Amer *et al* (2003) and Mokhtar (2003) came to similar findings.

Concerning, the influence of planting populations on seed yield / fad., it was clear that the dense planting 140,000 plant/fad. exerted the highest mean values of seed yield/fad followed by the 93,333 and 70,000 plants / fad., respectively. It means that the dense planting affected negatively the growth and yield of individual plants but the increase in number of plants per unit area compensated that negative effect and produced higher seed yield / fad. Also, plants in dense planting were more efficient in utilizing light, water and minerals per unit area and consequently, the dry matter content of the fruiting organs of faba bean plant per unit area become greater for dense planting and consequently, increasing seed yield than for thin one. Similar results were obtained by Sharara *and El-karmany* (2006), Abd El- Aziz (2007) and Matthews *et al* (2008).With respect to the interactions between planting dates and faba bean cultivars, as well as between planting dates and planting populations, they affected significantly on seed yield (ardab/fad.) by the same way as of the main effects, wherease the highest seed yield/fad could be obtained from Sakha1 cv. under both early planting at 1st of Nov. and under the highest population (140,000 plants /fad.).

Straw Yield (Ton/Fad.)

The straw yield results in Table 3 indicated significant differences in the two seasons and the combined, whereas early planting of 1st Nov. produced higher straw yield. Such results could be attributed to vigor of faba bean plants planted early under suitable environmental conditions which in turn scored higher growth and yield attributes compared with the other planting dates. The obtained results are in accordance with those reported by Abd El-Hakim (2003) and Ahmed, Eman (2004).

The two faba bean cvs., are differ significantly in straw yield/fad., Where Giza2 cv. possessed greater values than Sakha1 in both seasons, as well as, their combined analysis. Significant cultivar differences in straw yield/fad were mentioned by Abdel-Fattah,El-Set and Shalaby (1999) and Khameis, Wafaa (2000).

The straw yield/fad., was markedly affected by planting populations, whereas the dense planting (140,000 plants/fad.) produced the greatest straw yield in both seasons, as well as, their combined analysis. Such observation may be due to the extra number of plants/unit area. It is clear that the dense planting exceeded both 93,333 and 70,000 ones in straw yield/fad by nearly 11.34 and 18.55% in the combined analysis. In this regard, Abd El-Hakim (2003) and Ahmed,Eman (2004) recorded significant excess in straw yield/unit area in case of increasing planting population.

The significant interaction effect between planting dates and the two faba bean cultivars on straw yield/fad. in the combined analysis Table 3-a. indicating the superiority of Giza2 cultivar over Sakha1 under the different planting dates. But, at the planting on 1st Dec., the two cultivars recorded equal straw yield/ fad. On the other hand, the early planting date gave the highest straw yield/fad. under the two cvs. Thus, the highest straw yield/fad.(2.770 ton/fad) was achieved by planting faba bean Giza2 cv. on 1st of Nov. in the combined analysis.

Table 3. Seed yield (ardab/fad.) and Straw yield (ton/fad.) of two faba bean cultivars as affected by planting dates and plant populations in the two seasons and the combined analysis

*** ardab= 155 kg**
Fad. = 4200m^2

Main effects and interactions	Seed yield (*ardab/fad.)			Straw yield (ton/fad.)		
	2004-2005	2005-2006	Combined	2004-2005	2005-2006	Combined
planting dates(P)						
1st of Nov.	**10.520 a**	**13.415 a**	**11.967 a**	**2.036 a**	**3.208 a**	**2.622 a**
Mid of Nov.	**9.204 b**	**9.063 b**	**9.134 b**	**1.104 b**	**1.204 b**	**1.154 b**
1st of Dec.	**5.353 c**	**5.059 c**	**5.206 c**	**0.925 c**	**0.809 c**	**0.867 c**
F.test	**	**	**	**	**	**
Cultivars (C)						
Giza2	**7.657**	**8.590**	**8.124**	**1.403**	**1.817**	**1.610**
Sakha1	**9.061**	**9.769**	**9.415**	**1.308**	**1.663**	**1.486**
F.test	**	**	**	**	**	**
Planting populations (D)						
70,000 plants/fad	**7.354 c**	**8.250 c**	**7.802 c**	**1.221 c**	**1.579 c**	**1.400 c**
93,333 plants/fad	**8.241 b**	**9.084 b**	**8.663 b**	**1.347 b**	**1.701 b**	**1.524 b**
140,000 plants/fad	**9.483 a**	**10.203 a**	**9.843 a**	**1.498 a**	**1.941a**	**1.719 a**
F.test	**	**	**	**	**	**
Interaction effects						
P × C	**N.S**	*	**	**	**	**
P × D	**	**N.S**	**	**	**	**
C × D	**	**N.S**	**N.S**	**	**	**

Table 3-a. Straw yield (ton/fad.) of faba bean as influenced by the interaction between planting dates and faba bean cultivars in the combined analysis

Planting dates	Cultivars

	Straw yield (ton/fad.)	
	Giza2	**Sakha1**
1st of Nov.	**A** **2.770 a**	**B** **2.474 a**
Mid of Nov.	**A** **1.184 b**	**B** **1.124 b**
1st of Dec.	**A** **0.876 c**	**A** **0.858 c**

Straw yield/fad. of faba bean was significantly affected by the interaction between planting dates and planting populations ,as well as, between cultivars and planting populations, data of these interactions did not add valuable information to those of the main effects .Therefore, data of these interactions were excluded.

Seed Quality Characters

Percentage of infested seeds

Seeds infestation% are given in Table-4.The obtained results indicates that planting dates highly significantly affected infestation %, where the late planting at Dec., 1st had the highest infestation % while, the early planting of Nov., 1st gave the lowest infestation % .Such results might be attributed to the influence of weather conditions prevailing during development and harvesting period for the different planting dates which may be affect the physical properties of seeds and in turn tended to increase the initial infestation of later plantings.

Faba bean cultivars differed significantly in the infestation %, where Sakha1 cv. recorded lower infestation 59.926% than Giza2 65.222%. these results could be attributed to the genetic influence and the physical properties of the seeds specially seed coat thickness and hardness of cotyledons. Then, it could be concluded that some faba bean cvs might be more susceptible than the others and such trait should be respecting taken in breeding programs. In this connection, Hashem and Risha (2000) should that Giza461 was the most susceptible cultivar as compared with Giza716 and Giza3 cultivars. Also, El-Sayed, Ferial *et al*., (2004) reported that faba bean cultivars were differ significantly in the infestation percentage.

Regarding the influence of harvesting dates, the results

revealed significant differences, where later harvest after 15 days from full maturity caused higher infestation 65.40% as compared with harvesting at full maturity 59.74%. Such results were expected, delaying harvesting date of seeds usually tended to increase failed deterioration and exposure the seeds to the reverse climatic conditions and subsequently increasing infestation%.

Likely, methods of storage had significant effect on infestation%, where canning of faba bean seeds lowered insect infestation 43.19%. Storage in synthetic fiber packs ranked the second 69.75%, however storage in jute packs been the highest infestation of 74.798%. Similar results were reported by Shehate *et al.,* (1985) and Amer *et al*., (2002).

Interactions between planting dates and faba bean cultivars, cultivars and methods of storage as well as harvesting dates and methods of storage, significantly affected infestation % likely to the affects of the main factors.

Seed coat percentage

Data pertaining to seed coat percentage of faba bean as influenced by planting dates, cultivars, harvesting dates and storage methods are presented in Table 4.

Concerning the influence of planting dates on seed coat percentage, the statistical analysis revealed highly significant differences where early planting at Nov., 1st gave the lowest seed coat% as compared with either mid or late planting dates. These results indicate that early planting which gave lower seed coat % tended to produce faba bean seeds that have more nutrition value and better cooking quality than later plantings. Likely, faba bean cultivars showed highly significant differences where, Sakha1 cv. achieved lower seed coat % as compared with Giza2 cv., indicated that Sakha1 cv. produced more reach nutrition seeds than Giza2 one.

Regarding the influence of harvesting dates, the results revealed highly significant differences, where late harvesting after 15 days from full maturity tended to increase seed coat percentage. Then, harvesting faba bean at full maturity appeared to produce seeds with lower seed coat percentages than later harvesting which might be attributed to weather conditions and seed moisture contents.

Likely, methods of storage results showed highly significant

differences, where canning faba bean seeds tended to protect beans with lower seed coat percentages which followed by plastic bags, then jute packs gave the highest seed coat percentage 18.37%. Thus, it could be concluded that storage faba bean seeds in cans gave good quality of seeds with low seed coat percentage and high nutrition value.

With respecting to the significant interactions between the studied factors, the interaction between planting dates and cultivars Table 4-a indicate that the lowest seed coat percentage 14.35% was achieved by Sakha1 cv. when planted at 1st and mid Nov., Otherwise, the highest seed coat percentage 17.75% was obtained by Giza2 cv. when planted at mid of Nov. Furthermore, the interaction between planting dates and storage methods Table 4-d, showed that early and mid plantings tended to produce seeds with lower seed coat percentage when stored in cans. However, the highest seed coat % 19.88% was achieved by late planting when the seed was stored in plastic fiber bags.

Concerning the significant interaction between cultivars and methods of storage Table 4- b, results showed that Sakha1 cv. gave seeds with the lowest seed coat % 11.76% when was stored in cans, however the highest seed coat % 20.17% was achieved by Giza2 cv. when the seeds were stored in synthetic packs. Moreover, the interaction between harvesting dates and methods of storage Table 4-c indicate that late harvesting date achieved the lowest seed coat percentage 11.36 when the seeds were stored in cans. In addition, the late harvesting date also obtained the highest seed coat percentage 20.51 %.But when the seeds were stored in plastic fiber bags.

Seed protein percentage

Protein percentage of faba bean seeds as the most nutritive value component in such legume crops are presented in Table 4 with regard to the influence of the studied factors.

Concerning the influence of planting dates on seed protein %, the results reveal significant differences, where seed protein %

Table 4. Infested seeds (%), Seed coat %, Seed protein content % and Germination% of two faba bean cultivars as affected by planting dates, harvesting dates and methods of storage

Main effects and interactions	Infested seeds (%)	Seed coat (%)	Seed Protein (%)	Germination (%)
	After six months from harvest			
Planting dates(P):				
1st of Nov.	**55.250 c**	**15.419 b**	**27.057 c**	**91.611 a**
Mid of Nov.	**61.917 b**	**16.276 a**	**27.475 b**	**90.972 a**
1st of Dec.	**70.556 a**	**16.300 a**	**28.404 a**	**87.694 b**
F.test	**	**	**	**
Cultaivars (C)				
Giza2	**65.222**	**17.004**	**27.311**	**87.741**
Sakha1	**59.926**	**14.993**	**27.980**	**92.444**
F.test	**	**	**	**
Harvesting dates (H)				
At full maturity	**59.741**	**15.294**	**27.152**	**91.556**
After 15 days from maturity	**65.407**	**16.702**	**28.139**	**88.630**
F. test	**	**	**	**
Methods of storage (M)				
Cans	**43.194 c**	**11.985 c**	**27.506 b**	**96.778 a**
Synthetic fiber	**69.750 b**	**17.635 b**	**27.019 c**	**92.389 b**
Jute	**74.778 a**	**18.375 a**	**28.412a**	**81.111 c**
F. test	**	**	**	**
Interaction effects				
PxC	*	**	**	*
PxH	**N.S**	**N.S**	**	**N.S**
CxH	**N.S**	**N.S**	**N.S**	**N.S.**
PxM	**N.S**	**	**N.S**	**N.S**
CxM	**	**	**	**N.S**
HxM	**	**	**	**N.S**

Table 4-a. Seed coat% and seed protein content as affected by the interaction between planting dates and cultivars

Planting dates	Cultivars			
	Seed coat%		Seed protein content	
	Giza 2	Sakha1	Giza2	Sakha1
1st of Nov.	A 16.486 b	B 14.352 b	A 27.124b	B 26.990c
Mid of Nov.	A 17.753 a	B 14.799b	B 26.677c	A 28.273b
1st of Dec.	A 16.772b	B 15.827a	B 28.133a	A 28.676a

Table 4-b. Seed coat % as affected by the interaction between cultivars and methods of storage

Cultivars	Methods of storage		
	Seed coat %		
	Cans	Synthetic fiber	Jute
Giza2	C 12.202a	A 20.173a	B 18.636a
Sakha1	C 11.768a	B 15.098 b	A 18.113b

Table 4-c Seed coat % as affected by the interaction between harvesting dates and methods of storage

Harvesting dates	Methods of storage		
	Seed coat %		
	Cans	Synthetic fiber	Jute
At full maturity	C 12.607a	B 14.751b	A 18.524a
After 15 days from maturity	C 11.362b	A 20.519a	B 18.226a

Table 4-d. Seed coat % and seed protein content as affect by the studied factors

Planting dates	Methods of storage			Harvesting dates	
	Seed coat%			Seed protein content	
	Cans	Synthetic fiber	Jute	At full maturity	After 15 days from maturity
1st of Nov	C 12.753a	B 15.173c	A 18.330a	B 26.727b	A 27.387c
Mid of Nov.	C 12.091a	B 17.847b	A 18.891a	B 26.710b	A 28.241b
1st of Dec.	C 11.110b	A 19.886a	B 17.903b	B 28.021a	A 28.788a

tended to be gradually increased as planting date was delayed from Nov., 1st to Nov. mid and Dec.,1st.Then, the highest seed protein content of 28.40 % was achieved by the late planting.

While the lowest protein % 27.05 was obtained by early planting. These results might be attributed to the dilotion effects since early planting was produced the highest seed yield/fad. Which almost duplicated that produced by late planting.

Likely, the two faba bean cultivars differed significantly in their seed protein %, where Sakha1 cv. appeared to gave higher seed protein % 27.98 than Giza2 cv. 27.31 %. Such differences in seed protein % among cultivars mainly due to genetic structure and its interaction with environmental conditions and function of DNA, RNAs and protein synthesis.

Likely, harvesting dates revealed highly significant differences where harvesting early at full mature stage achieved the lower seed protein content of 27.152 %as compared with late harvesting after 15 days which recorded higher seed protein % of 28.139 %. Again, these differences between harvest dates in seed protein content % might be attributed to either dilution effects or decreasing seed moisture content through the period of late harvesting after 15 days from full maturity stage. In this connection Ghanbari and Lee (2003) reported that delaying harvesting date of faba bean raised seed crude protein content as compared with earlier harvest. Also, Abd El- Razik and Mohamed (2004) recorded significant increasing in protein content of faba bean with the delay in harvesting date from 120 to 140 days from planting.

Respecting the influence of storage methods on seed protein content, the results reveal highly significant differences, where canning faba bean seeds gave the lowest seed protein content as compared with the storage in jute packs which achieved the highest seed protein content 28.41%. However, the lowest seed protein content of 27.01% was obtained by the storage in synthetic packs. In this manner, El Bedawey (1991) and Omar *et al*., (1994) indicated that methods of storage did not effect the seed protein content of faba bean.

The significant interactions between the studied factors showed that the interaction between planting dates and cultivars Table 4-a indicate that Sakha1 cv. recorded the highest seed protein (28.67%) when planted at later date of Dec.,1st . Otherwise, the lowest protein content (26.67%) was achieved by

Giza2 cv. when planted at mid of Nov. Also, the significant interaction between planting dates and harvesting dates Table 4-d showed that late planting at Dec., 1st obtained the highest seed protein content (%) when harvested later after 15 days from full maturity. However, lower seed protein content were recorded by both early and mid planting dates when harvested at full mature stage.

Regarding the significant interaction between cultivars and methods of storage (Table 4-e), the results indicated that Sakha1 cv. achieved the highest seed protein content 28.98 % when the seeds were stored in jute packs. However, Giza2 cv. gave the lowest seed protein content 26.87% when the seeds were stored in synthetic packs.

Finally, the significant interaction between harvesting dates and methods of storage Table 4-f indicated that harvesting date after 15 days from full maturity achieved the highest seed protein content 29.00 % when the seeds were stored in jute packs. On the contrary, the lowest seed protein content (26.78 %) was recorded with early harvesting at full maturity and stored in cans.

Germination percentage

Germination % as a measurement of seed viability of faba bean seeds as influenced by planting dates, harvesting dates and methods of storage is presented in Table 4.

Planting dates results revealed highly significant differences in germination percentage where as early and mid- planting dates achieved higher seed viability potential and it recorded higher germination % of 91.61 and 90.97 %, respectively as compared with the late planting at Dec., 1st which recorded germination percentage (%) 87.69 %. Such results were expected, since late planting was recorded the highest infestation % which resulted in lowering seed viability of faba bean. These data were reconfirmed by Attia and Badawi (1996) who mention that increasing storage period led to a significant decrease in seed viability and seedling vigour of faba bean seed.

Likely, faba bean cultivars indicated highly significant differences, in this respect Sakha1 cv. achieved higher germination % of 92.44 % than Giza2 cv. with lower germination of 87.74%. Also, these results followed the reverse directions of infestation %

and number of holes/seed. The obtained results are in accordance with those reported by El Sayed, Ferial *et al*., (2004) who reported that seed viability of faba bean cultivars showed that viability of seeds were significantly decreased with length of storage period and the highest viability was recorded in Giza843 cv. followed by Giza674 cv. whilst the lowest seed germination % was in Giza429 cv.

Concerning the influence of harvest date on germination percentage, the results revealed highly significant differences, where delaying harvesting date 15 days after full maturity tended to reduce seed viability of faba bean seed which recorded lower germination % of 88.63 as compared with harvesting at full maturity which achieved higher germination percentage of 91.55. Likely, the results followed the reverse directions of infestation % which indicated that delaying harvesting of faba bean resulted in reducing seed viability because of exposure the seed to the field conditions and then attacked by insects. In this manner, Abd El-Razik and Mohamed (2004) recorded a significant increasing in germination % with the delay in harvesting date from 120 to 140 days from planting.

In addition, methods of storage results indicated highly significant differences where canned faba bean seeds appeared to be the highest viability with germination of 96.77 % which followed by synthetic fiber packs 92.39 %, whilst the lowest germination % (81.11 %) was recorded when the seeds were stored in jute packs. Again, these results almost followed the reverse directions of infestation %. In this respect, Shehata *et al.,* (1985) indicated that canning lowered insect infestation of faba bean seeds as compared with synthetic fiber and jute packages. In addition, Omar *et al.,* (1994) cleared that the storage of faba bean seed underground pits attested the initial infestation and prevented further development of insects and did not affect seed viability. El-Sayed, Soad (1997) reported that seeds of faba bean stored in impermeable packages had a higher germination % than those stored in permeable.

With respecting to the significant interaction between planting date and cultivars Table 4-e, the results

Table 4-e. Seed protein content and germination % as affected by the studied factors

Cultivars	Methods of storage	Planting dates
	Seed protein content	Germination %

	Cans	Synthetic fiber	Jute	1st of Nov.	Mid Nov.	.1st of Dec.
Giza2	B 27.221b	C 26.872a	A 27.841b	A 89.333 b	A 89.222 b	B 84.667 b
Sakha1	B 27.791a	C 27.167a	A 28.982a	A 93.889 a	A 92.722 a	B 90.772 a

Table 4-f. Seed protein content as affected by the interaction between harvesting dates and methods of storage

Harvesting dates	Methods of storage		
	Seed protein content		
	Cans	Synthetic fiber	Jute
At full maturity	B 26.783b	B 26.859a	A 27.815b
After 15 days from maturity	B 28.228a	C 27.180a	A 29.008a

showed that Sakha1 cv. achieved the higher germination % with both early and mid- planting dates.

On the other direction, the lowest germination % of 84.667 was recorded by Giza2 cv. when the planting date was delayed at 1st of Dec.,

REFERENCES

Abd El Razik, M. A. and E.I. Mohammed . 2004 . Effect of harvesting date and storage periods on seed quality of faba bean (*Vicia faba* L.). Zagazig J.Agric. Res., 31(5): 2039-2051.

Abd El-Aziz, M.A. . 2007. Effect of plant density and phosphorus fertilizer on growth and yield variety Domani of faba bean (*Vicia faba* L.). Minia J. Agric .Res., 27 (1):135-155

Abd El-Hakim, K.M. . 2003 . Effect of planting date and plant density on growth and yield of some faba bean varieties. M. Sc. Thesis, Fac. of Agric.,Cairo Univ.

Abdel- Fattah El-Set and F.H. Shalaby . 1999 . physiological studies on response of new released faba bean varieties to

different plant populations. Zagazig J. Agric . Res., 26(5): 1229-1244

Abuldahab, A.A., W.A.El-Murshedy and G.O. Mahmoud . 2002. phonological response of faba bean to climatological effects under different sowing dates and plant distribution. J. Agric. Sci., Mansoura Univ., 27(4): 1982-2003.

Ahmed Eman M. . 2004 . Yield and seed quality of faba bean as affected by some environmental factors. Prof. Thesis .Fac. of Agric. Cairo Univ., Egypt.

Ali, E.A. and H. M. Abd El-Mottaleb . 1997 . Yield and its components of faba bean as affected by irrigation intervals, nitrogen fertilization and plant density. Egypt J. Appl. Sci., 12(4):148-161.

Amer, M.I., M.Z. Hassan, A.H.A. Hussein , M.M. Radi, O. A.M. El-Galaly, M.M. El-Hady and N.M. Abou-Zeid . 2003 . Sakha 2, a new released foliar disease resistant faba bean (*Vicia faba* L.) cultivar., J. Agric. Sci., Mansoura Univ., 28 (2): 785-790.

Amer, M.I., A.K.El-Assily, M.M. Radi and N. El-Aidy . 1997 . Effect of sowing and harvesting dates on faba bean (*Vicia faba* L.) productivity and seed technological traits. Fayoum J. Agric. Res. Dev., II (1): 23-31.

Amer,M.I., A. H.Hussien ,M.A. El-Borai, O. A.M. El-Galaly, K.A. El-Assiely and N. M.A. Mohmoud . 2002 . A new released early mature faba bean (*Vicia faba* L.) cultivar Sakha1. J. Aric. Sci., Mansoura Univ., 27(5):3109-3115.

Attallah, S.A. and G.A. Mohamed . 2004 . yield and yield components of faba bean (*Vicia faba* L.) as affected by nitrogen fertilization levels and plant population. Minia J. Of Agric. Res., 24 (2) :297-308.

Attia,A. N. and M.A. Badawy . 1996 . Effect of fumigation under different storage conditions on seed viability of faba bean. Mansoura J. of Agric. Sci., 21 (9) :3097-3108.

Bakheit, B.R., A.Y.Allam and H.G. Amam . 2001 . Response of some faba bean cultivars to planting dates and population densities. Assiut J. Agric. Res., (5) :232-245.

Duncan, D.B. . 1955 . Multiple Ranges and multiple F.test, Biometrics, II: 1-42.

El Bedawey, A. A. . 1991 . Effect of storage by stratification on the quality of faba bean. Minufiya J. Agric. Res.,16 (1) : 647-663.

El- Sayed Ferial, M. A., M.A. Ali and H.M. El- Beshlawy . 2004 . Effect of storage period and controlled temperature on infection potential, food consumption, damage and weight losses of cowpea and faba bean seeds infested with callosobruchus Maculatus(f). Egypt, J. Agric.Res., 83(2): 595-607

El.Galaly Ola A. M., R.A.I. Abou-Moustafa, A.M. Nassef and M.A. Mohammed . 2008 . Response of two faba bean promising lines and Sakha3 cultivar to different sowing dates and planting densities. J. Agric. Res., Kafr El-Sheikh Univ.,34 (3):647-661.

El-Mubarak, A.A., F. A. Salih, N. El-Huda and A. M. Ghorashi . 1988 . Effect of time of harvest on physical and chemical compositions, cookability and yield of faba bean. FABIS News letter 20 En 33.

El-Murshedy, W.A., M.A. El-Metwaly and G.O. Mahmoud . (2002) . performance of two faba bean varieties under different plant desities and nitrogen fertilization., Assuit J. of Agric. Sci., 30(4): 200-210.

El-Sayed Soad, A. . 1997 . Effect of storage conditions on seed quality of wheat and faba bean. Ph.D. Thesis., Food Tech. Dept., Faculty of Agric.,Kafr El-Sheikh, Tanta Univ., Egypt.

Ghanbari, A.B. and H. C. Lee . 2003 . Intercropped wheat (*Triticum aestivum* L.) and bean (*Vicia faba* L.) as a whole – crop forage: effect of harvest time on Forage yield and quality Grass and forage. Sci., 58:1, 28-36., 45 ref.

Hadley, P., R. J. Summerfield and E. H. Roberts . 1983 . The effect of temperature and photo period on reproductive development of selected grain legume crops, P: 19-1. In: L.T. Evans (ed). Temperature legumes. Pitman, London.

Hashem, M.Y. and E. S. Risha . 2000 . post harvest losses caused by southern cowpea beetle callosobruchus maculates in faba bean and its control using modified atmospheres. Zeitschrift fur

pflanzenkrankheiten and pflanzenschutz.,107 (2): 205-211.

Hussein, A.H.A., S.A. Saleh, K.H.A. El-Assily and M.M. El-Morsy . 1995 . Response of some released faba bean cultivars and promising lines to plant densities at newly reclaimed soil in middle Egypt., Annals Agric. Sci., Ain-Shams Univ., 40(2):539-545.

Khameis,Wafaa, M. 2000 . Response of two faba bean varieties to different plant densities and distributions. M.Sc. Thesis, Fac. of Agric. Cairo Univ., Egypt.

Matthews, P.W., C.J. Listel, I.D. Menz and B.C. Armstrong . 2008 . The effect of faba bean plant population on yield, seed quality and plant architecture under irrigation in southern NSW. Proceedings of 14th Australion Agronomy Conference, September 2008.

Mekky, M.S., Z. R. Yehia and A.N.M. Nassar .2003. Effect of sowing dates, varieties and glyphosate application on broom rape (*Orobanche crenta forsk*) and yield of faba bean (*Vicia faba* L.). Bull. Fac. Agric., Cairo Univ., 54(1): 55-76

Mokhtar, S.M. . 2003 . Effect of some Agronomic practices on faba bean under newly cultivated lands. M. Sci Thesis, Agron. Dept. Fac. of Agric. Zagazig Univ., Egypt.

Nawar, F.R.R. and M.S. Said . 2002 . Effect of plant spacing and potassium fertilization on faba bean productivity in reclaimed land., Egypt. J.Appl. Sci., 17(3):78-85.

Nigem, S.A. and M.A.Mohamed . 1987 . yielding ability of some broad bean genotypes under different sowing dates. Zagazig J. Agric. Res., 14 (2) 336-357.

Omar, E. E., E. Z. Fam and S. R. Kassis . 1994 . Storage of faba bean in underground pits. Egypt, J. Agric. Res., 72(4): 947-955.

Sharara,A.A. and M.F. El-Kramany . 2006 . Interacting effect of some selective herbicides natural products and plant density on controlling weed and increasing faba bean (*Vicia faba* L.) yield. J. of Appl. Sci., 21 (5):145-164.

Shehata, A.M. E., M. M. Youssef, N. M. El Shimi and A. A. El Bana . 1985 . Seed properities

of Egyptian faba bean (*Vicia faba* L.) cultivars. Alex. Sci., Exchange , Alexandria Univ., 6 (3):227-245.

Snedecor, G.W. and Cochran . 1967 . Statistical methods.6th ed. The lowa state Univ., Press, Ames, USA.

Zayenhom, A.M. . 2004 . Employment of some agricultural practices as tools for intecored management in broad bean with reference to chocolate spot disease. M.Sci. Thesis Faculty of Agric. El-Fayoum Univ.

تأثير بعض المعاملات الزراعية على المحصول وجودة البذور فى الفول البلدى

أسماء عبدالسلام محمد السيد - محمد البكرى صالح- إسماعيل الشربينى رمضان رجب محمد على

قسم المحاصيل- كلية الزراعة- جامعة الزقازيق

أجريت ست تجارب حقلية بالمزرعة التجريبية لكلية الزراعة – جامعة الزقازيق – بقرية غزالة – محافظة الشرقية خلال موسمى(٢٠٠٤/٢٠٠٥-٢٠٠٥/٢٠٠٦) وذلك بهدف دراسة تأثير مواعيد الزراعة (الاول من نوفمبر-منتصف نوفمبر- الاول من ديسمبر)والكثافة النباتية(٧٠٠٠٠- ٩٣٣٣٣ - ١٤٠٠٠٠ نبات/فدان) على المحصول ومكوناته لصنفى الفول البلدى(جيزة٢- سخا١) وكذلك معرفة تأثيرمواعيد الحصاد(عند النضج التام - بعد النضج ب١٥ يوم) وطرق تخزين البذور (فى صفائح-أكياس ألياف صناعية-أكياس جوت) على جودة بذور الصنفين تحت مواعيد الزراعة المختلفة.

وفيما يلى أهم النتائج المتحصل عليها:

١- تفوقت الزراعة فى الاول من نوفمبر معنوياً فى صفات عدد القرون/نبات ، وزن بذور/نبات، وزن١٠٠ بذرة، محصول البذور/فدان ومحصول القش/فدان مقارنة بالزراعة فى (منتصف نوفمبر وأول ديسمبر) فى حين تفوقت الزراعة فى أول و منتصف نوفمبرفى صفتى عدد بذور/قرن وكذلك النسبة المئوية للانبات.بينما أعطى الميعاد المتأخر(أول ديسمبر) أعلى نسبة اصابة بالخنافس،النسبة المئوية لوزن القشرة ومحتوى البذور من البروتين.

٢- أظهر الصنف سخا١ تفوق معنوى فى صفات وزن١٠٠ بذرة ،محصول البذور/نبات،محصول البذور/فدان والنسبة المئوية لكلا من البروتين والانبات. فى حين تفوق الصنف جيزة٢ فى صفات عدد القرون/نبات،عدد البذور/قرن،محصول القش/فدان ،أعلى نسبة اصابة بالخنافس وكذلك النسبة المئوية للقشرة البذرة.

٣- تفوقت الكثافة المنخفضة(٧٠٠٠٠نبات/فدان) فى صفات مكونات المحصول حيث أعطت أعلى عدد قرون/نبات،عدد بذور/قرن،وزن ١٠٠ بذرة ومحصول البذور/نبات وعلى العكس أعطت الكثافة العالية(١٤٠٠٠٠ نبات/فدان) اعلى محصول بذور وقش/فدان.

٤- أدى تخزين بذور الفول البلدى التى تم حصادها عند تمام النضج فى علب من الصفيح الى تحسين صفات جودة البذور أثناء التخزين حيث كانت هذه البذورأقل نسبة اصابة بالخنافس وأقل سمك فى القشرة وأعلى نسبةانبات فى حين تفوق ميعاد الحصاد المتأخر فى محتوى البذور من البروتين.

٥- أظهرت نتائج تداخل الفعل المعنوى بين مواعيد الزراعة والاصناف تفوق الصنف سخا١ تحت مواعيد الزراعة المختلفة فى انتاج أعلى محصول بذور/نبات والفدان ووزن ١٠٠ بذرة.

٦- كذلك أظهرت نتائج التداخل بين مواعيد الزراعة والكثافة النباتية تفوق مواعيد الزراعة الثلاثة مع الكثافة العالية(١٤٠٠٠٠ نبات/فدان) فى انتاج أعلى محصول بذور وقش للفدان .

وبذلك يمكن استخلاص أنه يمكن الحصول على محصول مرتفع من الفول البلدى تحت ظروف تلك المعاملات بزراعة الصنف سخا١ مبكراً فى أول نوفمبر بكثافة عالية (١٤٠٠٠٠ الف نبات) مع مراعاة أفضلية التخزين فى العلب الصفيح أو اكياس الالياف الصناعية للحفاظ على صفات جودة البذور.