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ONION SEED YIELD AND ITS QUALITY AS INFLUENCED BY STORAGE METHODS, MOTHER BULB SIZE AND HARVESTING TIME

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ABSTRACT

Two field experiments were carried out in Tag AL-Ezz, Agricultural Research Station, Dakahlia Governorate, Agricultural Research Center, Egypt, during 2007/2008 and 2008/2009 seasons to determine the effect of two storage methods (normal and cold), three mother bulb sizes (large, medium and small) and three harvesting times of seeds (early, intermediate and late) on onion growth, seed yield and its components as well as seed quality.

The main results of this investigation could be summarized as follows:

- Storage onion bulbs at 5 °C for 2 months produced the highest values of growth, seed yield and its components and also high seed quality in both seasons.
- Planting large size of mother bulb resulted in the highest values of growth, seed yield and its components and also high seed quality. However, medium size of bulb might be recommended due to economic consideration.
- Harvesting time had a significant effect on number of leaves/plant and root length (in the first season), number of scapes/plant, seed head weight, number of flowers/seed head, number of seeds/seed head, weight of seeds/seed head, seed yield/plant and seed yield/fed in both seasons. Harvesting onion seeds after 157 days from sowing (medium harvesting time) recorded the highest seed yield and also most its components.
- The results recommended storage medium size of mother bulbs at 5 °C for 2 months before sowing and harvesting after 157 days from sowing to raise onion seed productivity and its quality.

Keywords: Onion, *Allium cepa* L., storage methods, bulb size, harvesting dates, harvesting times, seed yield, quality.

INTRODUCTION

Seed production is a vital part in onion growing. It is a highly specialized business requiring particular knowledge and training. Steady supply of good quality seeds is a pre-requisite for the successful accomplishment of high production of acceptable onions as fresh bulbs or as dehydrated either for local consumption or for export. The production of onion seed with high quality is depend on a number of factors, the most important of which are storage methods and size of bulbs as well as harvesting times.

Bolting, or seedstalk development, of onion is important for seed production. Onion requires low temperatures or vernalisation for flower induction (Woodbury, 1950). Cold temperature storage is necessary in areas of the tropics such as in Egypt, where little cold weather exists for inflorescence induction. In this concern, Kampen (1970) found that inflorescence was initiated during storage of mother bulbs after sufficient accumulation of low temperatures between 5 and 15 °C. Hwang (1982) reported that increasing chilling durations increased bolting in onion and

consequently increasing seed yield. Khokhar *et al.* (2007 a and b) stated that number of florets and percentage of seed bearing florets per umbel increased with lengthening cold durations (10 °C for 90 days) and this resulted in higher seed yield per umbel. Khokhar (2009) showed that seed yield per umbel exhibited a curvi-linear response to storage temperature with the lowest seed yield occurring at 30 °C and the highest seed yield at 5 °C.

The mother bulb size has marked influence on seed production in onion. Considering that an increase in size of bulb results in higher seed yield, but large size bulbs if used will need a very high seed rate. Many investigators supported this conclusion, in this concern, Heath *et al.* (1947), Khokhar (2008) and Khokhar (2009) showed that large sets produce greater seed yield, especially when these are stored at temperatures which prevent floral initiation during storage. Whereas, large sets accelerate the onset of bulbing and consequently onset of maturity and increasing seed yield. Toman *et al.* (1989), Mostafa *et al.* (1996), Ali *et al.* (1998), Jilani (2004), Mirshekari *et al.* (2008) and Mosleh ud-Deen (2008) stated that the mother bulb size showed significant influence on growth, bulb and seed yield of onion. The large mother bulb was favourable for getting higher seed yield.

In onion seed crop, the timing of harvest is complicated by the asynchronous patter of seed growth and development within and between umbels. Furthermore, there is a tendency for seeds to shed soon after physiological maturity as a result of capsule dehiscence. Therefore, selection of optimum harvest time must balanced the increase in the number of physiologically mature seeds in umbels over time with the decrease in seed number caused by capsule dehiscence. There are many literature describing the effects of harvest time on seed yield and quality. In this respect, Ogawa (1961) stated that onion seed reached maturity at 40 days after the time of which the endosperm had become dry. Neal and Ellerbrock (1986) found that seed quality was not significantly affected by harvesting date. They concluded that harvesting should be conducted when 25 % of capsules have dehisced. Steiner and Akintobi (1986) recommended that harvesting when the umbels had a moisture content between 52 and 66 %. While, Vik (1992) recommended that harvesting when the seed moisture content was between 16 and 53 %. El-Emery (1993) suggested that harvesting onion seed when 1.5 % open capsules are noticed in the field. Since, at this stage the seed has reached maximum weight, full maturation, high viability and vigour. Spurr *et al.* (2002) concluded that the decision to harvest time of onion seed onset capsule dehiscence will result in increase of potential seed yield and quality.

The present investigation was, therefore, undertaken to find out the optimum storage method and size of mother bulb as well as harvesting time to achieve the best possible growth, seed yield and quality of onion under the existing agro-climatic conditions of Tag El-Ezz district, Dakahlia Governorate.

MATERIALS AND METHODS

Two field experiments were carried out in Tag AL-Ezz, Agricultural Research Station Farm, Dakahlia Governorate, Agricultural Research Center,

Egypt, during the two successive winter growing seasons of 2007/2008 and 2008/2009. The objective of these experiments were to determine the effect of storage methods, bulb size and harvesting times of seeds on onion growth, seed yield and its components as well as seed quality. Onion bulbs of the used variety Giza 20 were obtained from Onion Research Section, Agricultural Research Center, Giza.

Each storage method *i.e.* normal (under normal room conditions) and cold (at 5 °C for 2 months) was carried out in separate experiment. Every experiment of storage method was carried in split plot design with four replications. The main plots were occupied with mother bulb size *i.e.* large (> 7cm), medium (5-6 cm) and small (3-4 cm). The sub plots were assigned to harvesting times of onion seed heads *i.e.* early (150 days after sowing {DAS}, medium (157 DAS) and late (164 DAS).

Each experimental basic unit (sub – plot) included five ridges, each of 60 cm width and 3.5 m length, resulted an area of 10.5 m^2 (1/400 fed). The preceding summer crop was rice (*Oryza sativa* L.) in both seasons. The soil of the experimental site was characterized as clay loam in texture.

Onion bulbs stored in normal room conditions and at 5 °C for 2 months as previously mentioned sizes were sown at 10^{th} and 15^{th} December in the first and second seasons, respectively on both sides of ridges at 25 cm between bulbs. Phosphorus fertilizer in the form of calcium superphosphate (15.5 % P_2O_5) was applied before planting at the rate of 90.0 kg P_2O_5/fed. Nitrogen fertilizer in the form of ammonium nitrate (33.0 % N) at the rate of 120 kg N/fed was added in two equal doses. The first dose was added before the first irrigation, and the second dose after one month from the first one. Potassium fertilizer in the form of potassium sulphate (48 % K_2O) at the rate of 50 kg K_2O/fed was added with the first dose of nitrogen fertilizer.

However, the common agricultural practices for growing onion according to the recommendations of Ministry of Agriculture were followed, except the factors under study.

STUDIED CHARACTERISTICS:

1- Growth characters:

Ten onion plants were randomly chosen and labeled from each sub plot and were used to measure the following growth characters:

1- Plant height (cm).
2- Number of leaves/plant.
3- Number of scapes/plant.
4- Scape height (cm).

2- Yield and its components:

After harvesting, the seed heads were threshed and the following characteristics were calculated as follows:

1- Seed head weight (g).
2- Seed head diameter (cm).
3- Number of flowers/seed head.
4- Number of seeds/seed head.
5- Weight of seeds/seed head (g).
6- 1000 – seed weight (g).
7- Seed yield/plant (g).
8- Seed yield/fed (kg). Whole seed head of all plants in each sub plot were harvested and left to air – drying, then they were threshed and the seeds were weighted, then converted to kg/fed.

All obtained data of field experiments were statistically analyzed according to the technique of analysis of variance (ANOVA) for the split – plot design to each experiment (storage method), then combined analysis was done between two storage methods as published by Gomez and Gomez (1984) by using means of "MSTAT-C" computer software package. Least Significant Difference (LSD) method was used to test the differences between treatment means at 5 % level of probability as described by Snedecor and Cochran (1980).

3- Seed quality:

In order to assess seed quality resulted from the field experiments, a laboratory experiments were carried out to determine the following:

1- Germination percentage: It was expressed by the percentage of seed germinating normally after twelve days according to A.O.S.A. (1993).
2- Speed of germination: The four replications of germination test were used to evaluate speed of germination according to Agrawal (1986).
3- Root and shoot length (cm): it were determined from 10 normal seedlings taken at random per each replicate at the end of standard germination test.
4- Seedling dry weight: shoot and root portions of 10 normal seedlings at random per replicate, were dried in a forced air oven at 105 C° for 24 hours and weights thereafter. Dry weight of seedling recorded and expressed as milligrams.

Collected data of laboratory experiments were subjected to the statistical analysis according to the technique of analysis of variance (ANOVA) for the factorial completely randomized design as published by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

1- Growth, seed yield and its components:

1.1- Storage methods effect:

Storage methods of onion bulbs caused significant effects on growth attributes as well as seed yield and its components in both seasons (Tables 1 and 2). Cold storage method of onion bulbs (at 5 °C for 2 months) markedly resulted in the highest values of plant height, number of leaves/plant, number of scapes/plant, scape height, seed head weight, seed head diameter, number of flowers/seed head, number of seeds/seed head, weight of seeds/seed head, 1000 – seed weight, seed yield/plant and seed yield/fed as compared with normal storage method (under normal room conditions) in both seasons. The increases in onion growth, seed yield and its component characters due to cold storage (5 °C) for two months before sowing could be explained by the fact that under longer cold treatments at an inductive temperature (5 °C), the bulbs received colder stimulus which favoured flowering resulting in the highest number of florets and seed yield. Hwang (1982), Khokhar *et al.* (2007 a and b) and Khokhar (2009) obtained similar results.

1.2- Mother bulb size effect:

Data presented in Tables 1 and 2 show also significant effect of mother bulb size on plant height, number of leaves/plant, number of scapes/plant,

scape height, seed head weight, seed head diameter, number of flowers/seed head, number of seeds/seed head, weight of seeds/seed head, 1000 – seed weight, seed yield/plant and seed yield/fed in both seasons, except 1000 – seed weight in the first season only. Planting onion by using large size of mother bulb significantly surpassed other studied bulb sizes (small and medium) in all growth and yield component characters and also seed yield per plant and per feddan, with exception number of scapes/plant and 1000-seed weight in both seasons. Moreover, its recorded the highest values of all characters in the two growing seasons, except number of scapes/plant in both seasons. Whereas, the last rank values were obtained from small bulb size, except number of scapes/plant in both seasons, resppectively. These findings might be attributed to the relative large amount of food reserves stored in large bulbs which enhanced the production of healthy and vigorously growing plants with large number of seed head and consequently increasing seed yield. While, large size bulbs if used will need a very high seed rate and become uneconomic, therefore medium size of bulb might be recommended. Similar results were stated by Ali *et al.* (1998), Jilani (2004), Mirshekari *et al.* (2008) and Mosleh ud-Deen (2008).

Table 1: Plant height, number of leaves/plant, number of scapes/plant, scape height, seed head weight and seed head diameter of onion as affected by storage methods, bulb size and harvesting times as well as their interactions during 2007/2008 and 2008/20098 seasons.

Characters / Treatments	Plant height (cm)		Number of leaves/ plant		Number of scapes/ plant		Scape height (cm)		Seed head weight (g)		Seed head diameter (cm)	
	2007/ 2008	2008/ 2009	2007/ 2008	2008/ 2009	2007/ 2008	2008/ 2009	2007/ 2008	2008/ 2009	2007/ 2008	2008/ 2009	2007/ 2008	2008/ 2009
A-Storage methods:												
Normal	42.8	42.9	32.1	31.7	4.11	4.35	72.5	72.4	6.70	6.75	5.15	5.21
Cold	48.7	48.9	32.9	32.9	5.45	5.55	79.0	79.1	8.39	8.46	6.65	6.64
F. test	*	*	*	*	*	*	*	*	*	*	*	*
B- Bulb size:												
Large (> 7cm)	55.7	56.0	37.5	37.5	4.00	4.17	102.5	102.6	10.84	10.75	9.53	9.48
Medium (5-6 cm)	45.3	45.5	31.3	30.8	5.52	5.69	69.7	70.0	7.92	7.99	5.65	5.68
Small (3-4 cm)	36.2	36.2	28.7	28.5	4.82	4.98	54.9	54.8	3.89	4.08	2.53	2.62
F. test	*	*	*	*	*	*	*	*	*	*	*	*
LSD 5 %	0.3	0.4	0.7	0.6	0.20	0.15	0.6	0.4	0.28	0.22	0.11	0.13
C- Harvesting times:												
Early (150 DAS)	45.5	46.1	32.3	32.3	7.08	7.16	75.7	75.9	7.35	7.19	5.89	5.92
Medium (157 DAS)	45.8	45.8	31.9	32.6	5.26	5.64	75.5	75.5	7.72	7.95	5.87	5.99
Late (164 DAS)	45.9	45.8	33.3	32.0	2.01	2.05	76.0	76.0	7.58	7.68	5.95	5.87
F. test	NS	NS	*	NS	*	*	NS	NS	*	*	NS	NS
LSD 5 %	-	-	0.8	-	0.11	0.13	-	-	0.28	0.23	-	-
D- Interactions:												
A X B	*	*	NS	NS	*	*	NS	NS	*	*	*	*
A X C	NS	NS	NS	NS	*	*	NS	NS	NS	NS	NS	NS
B X C	NS	NS	NS	NS	*	*	NS	NS	NS	NS	NS	NS
A X B X C	NS	NS	NS	NS	*	*	NS	NS	NS	NS	NS	NS

Table 2: Number of flowers/seed head, number of seeds/seed head, weight of seeds/seed head, 1000 – seed weight, seed yield/plant and seed yield/fed of onion as affected by storage methods, bulb size and harvesting times as well as their interactions during 2007/2008 and 2008/20098 seasons.

Characters / Treatments	Number of flowers/ seed head		Number of seeds/ seed head		Weight of seeds/seed head (g)		1000–seed weight (g)		Seed yield/plant (g)		Seed yield/fed (kg)	
	2007/ 2008	2008/ 2009	2007/ 2008	2008/ 2009	2007/ 2008	2008/ 2009	2007/ 2008	2008/ 2009	2007/ 2008	2008/ 2009	2007/ 2008	2008/ 2009
A-Storage methods:												
Normal	238.8	240.8	916.5	916.5	2.84	2.88	4.03	3.92	6.80	6.41	165.8	167.4
Cold	273.5	276.6	1082.3	1088.6	3.97	4.03	4.90	4.86	10.28	10.37	181.8	181.4
F. test	*	*	*	*	*	*	*	*	*	*	*	*
B- Bulb size:												
Large (> 7cm)	352.4	355.8	1398.3	1397.2	5.27	5.37	4.59	4.51	12.11	11.63	186.8	188.8
Medium (5-6 cm)	249.9	251.9	1261.0	1268.7	3.36	3.37	4.44	4.41	9.56	9.51	178.3	178.5
Small (3-4 cm)	166.2	168.4	339.0	341.6	1.58	1.63	4.36	4.26	3.95	4.04	156.2	155.9
F. test	*	*	*	*	*	*	NS	*	*	*	*	*
LSD 5 %	8.0	9.1	43.2	36.7	0.19	0.18	-	0.19	0.30	0.34	1.4	1.2
C- Harvesting times:												
Early (150 DAS)	245.8	248.6	937.2	937.2	3.22	3.36	4.31	4.38	6.18	6.22	165.1	164.9
Medium (157 DAS)	271.9	274.6	1054.3	1056.2	3.60	3.61	4.53	4.41	12.00	11.81	187.6	188.3
Late (164 DAS)	250.8	253.0	1006.8	1014.1	3.39	3.40	4.55	4.38	7.45	7.15	168.8	170.0
F. test	*	*	*	*	*	*	NS	NS	*	*	*	*
LSD 5 %	8.3	8.8	31.5	33.0	0.20	0.18	-	-	0.40	0.43	1.7	1.6
D- Interactions:												
A X B	*	*	*	*	*	*	NS	NS	*	*	*	*
A X C	NS	NS	NS	NS	NS	NS	NS	NS	*	*	*	*
B X C	*	*	NS	NS	NS	NS	NS	NS	*	*	*	*
A X B X C	NS	NS	NS	NS	NS	NS	NS	NS	*	*	*	*

1.3- Harvesting time effect:

The results in Tables 1 and 2 clarified that harvesting time had significant effects on number of leaves/plant (in the first season), number of scapes/plant, seed head weight, number of flowers/seed head, number of seeds/seed head, weight of seeds/seed head, seed yield/plant and seed yield/fed in both seasons. Harvesting onion seeds after 157 days after sowing (medium harvesting time) markedly recorded the highest seed yield per plant and per feddan and also most its components *i.e.* seed head weight, number of flowers/seed head, number of seeds/seed head, weight of seeds/seed head in both seasons as well as seed head diameter and 1000-seed weight in the second season as compared with early and late harvesting time. Conversely, the lowest values of these characters were obtained from early harvesting time in both seasons. These results might be attributed to an increase in the net assimilates of onion plants owing to prolonged growth period until 157 days which increased dry matter accumulation in plant organs till it reached the full maturity stage. In addition, the balance between the increase in the number of physiologically mature seeds in seed head and the decrease in number of loss seed caused by capsule dehiscence. Steiner

and Akintobi (1986), Vik (1992), El-Emery (1993) and Spurr *et al.* (2002) reported similar conclusions.

1.4- Interactions effect:

There are many significant effects of the interactions among studied factors on all characters as shown in Tables 1, 2 and 3. But, the significant interaction on seed yield/fed only were reported. The significant effect of the interactions on seed yield/fed were the interaction between storage method X bulb size, storage method X harvesting time, bulb size X harvesting time and storage method X bulb size X harvesting time in both seasons as presented in Table 2. As shown from data graphically illustrated in Fig. 1, the highest seed yield/fed of onion was produced from storage large size of mother bulbs at 5 °C for 2 months before sowing in both seasons. Data graphically illustrated in Fig. 2, show that the highest seed yield/fed was resulted from cold storage method and harvesting after 157 days from sowing (medium harvesting time) in both seasons. Planting large size of onion bulbs and harvesting plants after 157 days from sowing (medium harvesting time) resulted in the maximum means of seed yield/fed as cleared from data graphically illustrated in Fig. 3. The highest values of onion seed yield/fed were obtained from storage large size of mother bulbs at 5 °C for 2 months before sowing and harvesting after 157 days from sowing (medium harvesting time) in both seasons, followed by the same storage method and harvesting time by using medium size of onion bulbs without remarkable differences (Fig. 4).

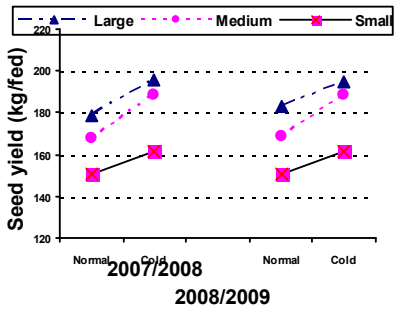

Fig. 1: Seed yield (kg/fed) as affected by the interaction between storage methods and bulb size (A X B) during 2007/2008 and 2008/2009 seasons.

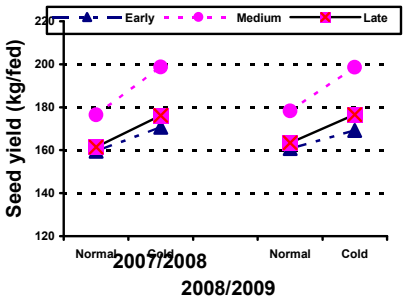

Fig. 2: Seed yield (kg/fed) as affected by the interaction between storage methods and harvesting times (A X C) during 2007/2008 and 2008/2009 seasons.

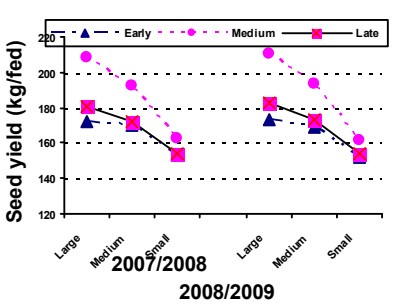

Fig. 3: Seed yield (kg/fed) as affected by the interaction between bulb size and harvesting times (B X C) during 2007/2008 and 2008/2009 seasons.

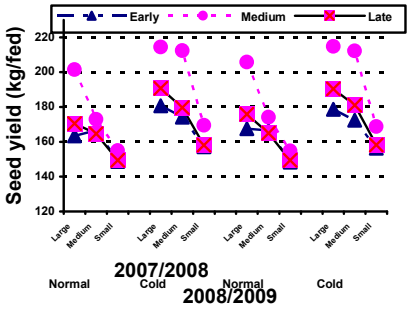

Fig. 4: Seed yield (kg/fed) as affected by the interaction between storage methods, bulb size and harvesting times (A X B X C) during 2007/2008 and 2008/2009 seasons.

2- Seed quality :

2.1- Storage methods effect:

Data in the Tables 3 reveal that there were significant differences between the two storage methods on onion seed quality in both seasons. The most marked and maximum values of seed quality characters such as shoot and root length were resulted from storage onion bulbs at 5 °C for 2 months before sowing in both seasons. The highest values of germination percentage, speed of germination and seedling dry weight were resulted from normal storage method in both seasons.

1.2- Mother bulb size effect:

The results in Tables 3 exhibit also significant differences among the three studied size of mother bulbs in seed quality characters *i.e.* germination percentage, speed of germination, shoot and root length and seedling dry weight in both seasons. From the data, using large size of mother bulbs produced the highest values of previously mentioned traits in both seasons, except speed of germination in the second season. On the other hand, the lowest values of seed quality characters were resulted from using small size of mother bulbs in both seasons, except speed of germination in both seasons.

1.3- Harvesting time effect:

The results in Table 3 show that the effect of harvesting time on seed quality characters was insignificant, except for root length in the first seasons only.

Table 3: Germination percentage, speed of germination, shoot and root length and dry weight of seedling of onion seeds as affected by storage methods, bulb size and harvesting times as well as their interactions during 2007/2008 and 2008/20098 seasons.

Characters / Treatments	Germination %		Speed of germination		Shoot length (cm)		Root length (cm)		Dry weight of seedling (mg)	
	2007/ 2008	2008/ 2009	2007 2008	2008/ 2009	2007/ 2008	2008/ 2009	2007/ 2008	2008/ 2009	2007/ 2008	2008/ 2009
A-Storage methods:										
Normal	87.0	87.5	2.90	2.94	5.84	5.81	4.75	4.78	2.90	2.90
Cold	84.3	84.5	2.68	2.69	7.67	7.66	6.14	6.12	2.60	2.60
F. test	*	*	*	*	*	*	*	*	*	*
B- Bulb size:										
Large (> 7cm)	86.5	87.0	2.86	2.90	8.61	8.59	6.83	6.87	3.00	3.10
Medium (5-6 cm)	86.0	86.1	2.75	2.77	6.66	6.60	5.40	5.41	2.70	2.70
Small (3-4 cm)	84.5	84.9	2.76	2.78	4.99	5.02	4.10	4.07	2.60	2.60
F. test	*	*	*	*	*	*	*	*	*	*
LSD 5 %	1.2	0.9	0.07	0.05	0.10	0.08	0.10	0.14	0.10	0.10
C- Harvesting times:										
Early (150 DAS)	86.1	85.5	2.83	2.83	6.75	6.79	5.49	5.43	2.70	2.80
Medium (157 DAS)	85.5	86.1	2.78	2.81	6.73	6.74	5.46	5.49	2.80	2.80
Late (164 DAS)	85.5	86.4	2.77	2.81	6.78	6.67	5.39	5.42	2.80	2.80
F. test	NS	NS	NS	NS	NS	NS	*	NS	NS	NS
LSD 5 %	-	-	-	-	-	-	0.07	-	-	-
D- Interactions:										
A X B	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
A X C	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
B X C	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
A X B X C	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Conclusion

According to the results obtained from this study, it can be concluded that, storage large or medium size of mother bulbs at 5 °C for 2 months before sowing and harvesting after 157 days from sowing could be recommend to raise onion productivity and seed quality under the environmental conditions of Tag El-Ezz district, Dakahlia Governorate.

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تأثر محصول وجودة بذور البصل طرق التخزين وحجم الأبصال ومواعيد الحصاد

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أجريت تجربتان حقليتان بمزرعة محطة البحوث الزراعية بتاج العز – محافظة الدقهلية – مركز البحوث الزراعية خلال موسمى ٢٠٠٨/٢٠٠٧ و ٢٠٠٩/٢٠٠٨ لدراسة تأثير طرق تخزين الأبصال وهى تخزين عادى فى درجة حرارة الغرفة وتخزين بارد على درجة ٥ °م لمدة شهرين قبل الزراعة وحجم الأبصال مثل الحجم الكبير (> ٧سم)، المتوسط (٥-٦ سم) والصغير (٣-٤ سم) وأيضاً مواعيد حصاد البذور مثل الحصاد المبكر (بعد ١٥٠ يوم من الزراعة) ، المتوسط (بعد ١٥٧ يوم من الزراعة) والمتأخر (بعد ١٦٤ يوم من الزراعة) وكذلك التفاعل بينهم على نمو ومحصول البذور ومكوناته. كذلك أجريت تجارب معملية لتقدير جودة التقاوى عن طريق إختبارات الإنبات وقوة البادرات للتقاوى الناتجة من التجربة الحقلية.

تشير النتائج المتحصل عليها أن تخزين الأبصال على درجة ٥ °م لمدة شهرين قبل الزراعة أدى إلى الحصول على أعلى القيم لجميع صفات النمو ومحصول البذور ومكوناته وكذلك بعض صفات جودة التقاوى فى كلا الموسمين.

كما أدى إستخدام الأبصال كبيرة الحجم فى الزراعة للحصول على أعلى القيم لجميع الصفات تحت الدراسة فى كلا الموسمين. وحيث أنه بإستخدام الأبصال كبيرة الحجم فى الزراعة يؤدى إلى زيادة معدل التقاوى بالتالى تكون غير إقتصادية لذلك فإن الأبصال متوسطة الحجم تكون هى الأفضل.

كذلك أثرت مواعيد حصاد البذور معنوياً فى كل من عدد الأوراق للنبات ، وطول الجذير (فى الموسم الأول) ، عدد حوامل النورات للنبات ، وزن النورة ، عدد الأزهار بالنورة ، عدد البذور للنورة ، وزن بذور النورة ومحصول بذور النبات والفدان فى كلا الموسمين. أدى حصاد بذور البصل بعد ١٥٧ يوم من الزراعة للحصول على أعلى محصول بذور للنبات والفدان.

من النتائج المتحصل عليها فى هذه الدراسة يوصى بتخزين الأبصال الكبيرة أو المتوسطة فى الثلاجة (٥ °م) لمدة شهرين قبل الزراعة والحصاد بعد ١٥٧ يوم من الزراعة للحصول على أعلى إنتاجية وجودة لتقاوى البصل فى منطقة تاج العز بمحافظة الدقهلية.

قام بتحكيم البحث

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