EFFECT OF SOWING DATE AND PLANT SPACING ON SEED YIELD AND QUALITY OF TURNIP *BRASSICA COMPESTRIS*

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Abstract

Two field experiments were carried out in Barrage Horticultural Research Station, Miniistry of Agriculture, Kaliubia Governorate. Seeds of turnip cv. Iraky (*Brassica compestres*, var Rapa, L) were sown at three dates i.e on 1st Sep., 1st Oct., and 1st Nov. during the two growing seasons. Bulbs of rooted seedling were transplanted at spacing of 20, 40 and 60 cm. between hills on 15th Oct., 15 th Nov. and 15 th Dec. during 1994 and 1995 seasons. Obtained results indicated that rooted bulbs planted on 15th Dec. produced the earliest flowers. However the highest average length of the main seedstalk, number of seedstalks, pods weight/plot, seed weight/plot, seed weight/fed., seed index, germination percentage and faster germination rate were obtained by the second sowing date (15 th Nov.).

Data indicated that planting rooted bulbs at 15 th Nov. and at spacing of 40 and 60 cm gave the best seed quality during the two seasons. However, the highest seed yield was obtained with the closest space (20 cm), when the bulbs planted on 15th Nov., where yield was 609.52 and 643.38 kg/Fed for the two seasons, 1994 and 1995, respectively.

INTRODUCTION

Turnip (*Brassica compestris*, var. rapa) is one of the most popular vegetable crops in Egypt. The acreage in 1994 year was 8168 feddans produced 78034 tons of roots .

Seed production and quality depend on planting date and spacing. Planting date has been studied by many investigators i.e. Simao 1960 and Pandey and Arora 1969. They found that the most suitable sowing date for turnip was early Oct. which gave the highest yield. In this connection, Nandpuri *et al.* (1977), Singh *et al.* (1990) and Chatterjee (1989) reported that seed yield of radish produced from Oct. showed the highest germination percentage.

Concerning the effect of plant spacing, numerous workers i.e. Bradlley *et al.* (1973) on turnip, Brar and Kaul (1971), Singht *et al.* (1990), Maurya *et al.* (1990) and Chatterjee and Som (1991) on radish, found that wider spacing resulted in a slightly higher number of branches/plant and significantly increased 1000 seed weight, however seed yield was higher at the closer spacing .

Regarding the combined effect of sowing date and plant spacing on seed yield quality of turnip, Brar and Kaul (1971), Cerne (1981), Benjamin (1987), Maurgo *et al* .(1990) and Singh *et al.* (1990) noticed that the seed yield/plant was not affected by spacing. However planting date had a noticeable effect on this phenomena.

The aim of this study was to find out the most suitable planting date and spacing of turnip cv. Iraki during winter season to obtain higher seed yield good quality under the environmental conditions of Barrage station .

MATERIALS AND METHODS

Two experiments were carried out during winter seasons of 1994 and 1995 at Barrage Horticultural Research Station. The soil of this farm is of clay loam texture. Turnip seeds were sown in the nursery at three planting dates, 1st Sep., 1st Oct. and 1st Nov. Rooted seedlings were transplanted 45 days after seed sowing and planted on 15th Oct., 15th Nov. and 15th Dec. at three spacing of 60 cm x 20 cm, x 40 cm and 60 cm x 60 cm. The area of experimintal plot was 9.45 m2. Treatments were distributed in 4 replicates in a split plot design where dates of planting were located at the main plots and spacing treatment at the sub. plots.

Determination of the studied characters was carried as follows :-

- Earliness of flowering .

- Number of seedstalks (the average number of seedstalks per each plant was ob-

tained counting the seed stalks of 8 plant).

- Average length of the main seedstalks (was calculated by measuring main seedstalks of 8 plants at harvest pods).
- Pods weight/plot.
- Seed weight/Plot.
- Seed weight/Fed.
- Seed quality included seed index (weight of 1000 seeds), germination percentage and germination rate.

All data were subjected to the statistical analysis of variance according to the method described by Snedecor and Cochran (1967).

RESULTS AND DISCUSSION

Earliness of flowering :

The effect of sowing date and spacing on earliness of flowering, average length and number of the main seedstalks are shown in table 1. It is clear from the table that bulbs planted on 15 th Oct. resulted significantly in higher number of flowering days to form seedstalks. However bulbs planted on 15 th Dec. produced the earliest flowers, this was true in both seasons .

It was observed that earliness of flowering and development of seedstalks in different sowing dates were affected by the environmental conditions.

The comparison among the three various spacings in the two growing seasons, showed that the spacings gave a significant effect on the earliness of flowering. However it was noticed that the wide spacing tended to earliest flowers.

Table 1 also shows that the interaction between spacing and planting dates. Significantly affected the earliness of flowering. Similar trend was obtained by El-shinawi 1967 on carrot, where he found that low temperature accelerated flower stalk development.

Average length of the main seedstalk :

Table 1 shows that there was significant effect of rooted bulbs in planting

dates on average length of the main seedstalk. Bulbs planted at 15 th Nov. showed its significant superiority over the other two sowing dates in 1994 and 1995 experiments.

Data shown in Table 1 indicated that close spacing (20 cm) resulted in larger main seedstalk while the wide spacing produced smaller ones. Interaction among spacing and dates of planting on the length of the main seedstalk were studied. The statistical analysis showed interactions between spacing and planting date which gave significant effect on average length of the main seedstalk. These results are supported by El-Oksh 1961 who found that plants grown at 20 cm. spacing were significantly higher than those of plants grown at 40 cm. spacing.

Number of seedstalk :

Data in Table 1 indicates that the bulbs planted on 15th Nov. produced higher number of seedstalk than any other date. Data indicated that closer spacing (20 cm) gave the least number of seedstalks. However, the wider spacing significantly produced greater number of seedstalks. Similar findings were obtained on carrot by Harrington (1951) and El-oksh (1961) on turnip. They found that great number of seedstalks were formed in each plant grown at wide spacing .

Table 1. Effect of planting date and spacing on vegetative growth characters of root of turnp.

	days for early flowering				Average length of the mean seed stalks cm)				No. of seed stalks			
Spacing planting date	20 cm	40 cm	60 cm	mean	20 cm	40 cm	60 cm	mean	20 cm	40 cm	60 cm	mean
15 th Oct.	17.7	70.5	70.5	70.9	137.5	130.7	128.5	132.2	13.3	16.1	23.2	17.5
15 th Nov.	64.6	63.8	60.3	62.9	179.6	168.7	166.1	171.5	17.7	22.5	30.5	23.6
15 th Dec.	61.0	61.0	61.0	61.0	143.4	140.6	130.6	138.2	14.2	18.0	25.4	19.2
Mean	65.8	65.1	63.9		153.5	146.7	141.7		15.1	18.9	26.4	
					1995							
15 th Oct.	71.8	64.3	70.5	71.2	140.3	135.2	130.6	135.4	14.4	19.5	24.8	19.6
15 th Nov.	64.3	64.3	60.3	63.7	185.2	170.9	167.6	174.6	18.8	23.6	32.9	25.1
15 th Dec.	61.3	61.3	61.0	61.3	148.1	146.2	136.4	143.6	14.9	19.7	28.7	21.1
Mean	65.8	63.3	63.9		157.9	150.8	144.9		16.0	20.9	28.8	
L.S.D at 5%	1994	1995			1994	1995			1994	1994		
Plant date	0.9	1.4			5.4	2.6			1.3	1.1		
Spacing	1.4	0.9			7.8	6.4			0.8	0.9		
Plant date x Spacing	2.5	1.6			13.5	11.2			1.4	1.7		

Interaction between planting date and root spacing showed significant variations on the number of seedstalks during 1994 and 1995 seasons. These results could be attributed to the greater number of seedstalk produced from wide spacing treatment which could have possibly encouraged root development that supplied plants with more nutrients. However, close spacing produced lower number of seedstalks could be attributed to greater number of plants in a given area. The most suitable treatment was roots planted on 15th Nov. at spacing of (40 cm - 60 cm).

Pods weight/plot :

Data presented in Table 2 show that the pods weight per plot produced by bulbs planted on 15 th Nov. was significantly higher than those produced by the other two planting dates. This finding is in accordance with that reported on turnip by Simao (1960) and pandey and Arora (1969).

It is obvious from Table 2 that the highest values of pods weight were obtained from close spacing. This could be attributed to the greater number of plants in a given area. Obtained results were in agreement with those reported by Bradly *et al.* (1973), on turnip and Singh *et al.* (1990) on radish. It is also evident from such data in Table 2 that the interaction between the root bulbs spacing and dates, significantly produced the highest values in this respect.

Seed weight :

Table 2 presents the effect of planting date and spacing on seed yield of turinp. It is clear from the table that significant difference in seed yield occurred between the different planting dates. The second planting date (15th Nov.) gave the highest rate followed by the third planting date (15 th Dec.) and the lowest was the first (15 th Oct.) . The percentages increase of seed yield of the second date (15 th Nov.) than of both the third and the first were 26% and 19% in 1994 and 20% and 17% in 1995 respectively. Similar trend was obtained by Nandpuri *et al.* (1977), Gill and Hari (1979), maurya *et al.* (1990) Singh *et al.* (1990) and Chatterjee (1989). They found that the narrow spacing between roots i.e 20 cm. resulted in a significant higher value of seed weight than those of the wider spacing i.e 40 and 60 cm. Close spacing produced more seed yield. This could be attributed to the greater number of plants in a given area. These findings are in accordance with those of Bradley *et al.* (1973) on turnip. Singe *et al.* (1973), Maurya *et al.* (1990) and Chatterjee and som (1991) for radish. Table 2 also shows the interaction between the different spacings and root planting dates. Data generally revealed significant variation between all

treatments. Planting date at 15th Nov. Combined with root planting at 20 cm. resulted in the highest significant values in this respect. The weight of seeds/Fed. increases with increasing plant number and the highest values were (609.52 Kg and 643.38 Kg/Fed. for 1994 and 1995, respectively) .

Table 2. Effect of planting date and spacing on vegetative growth characters of root of turninp.

	days for early flowering				Average length of the mean seed stalks cm)				No. of seed stalks			
Spacing planting date	20 cm	40 cm	60 cm	mean	20 cm	40 cm	60 cm	mean	20 cm	40 cm	60 cm	mean
15 th Oct.	2.782	2.324	1.932	2.438	1.080	0.900	0.768	0.916	457.14	380.95	325.08	387.72
15 th Nov.	3.670	3.170	2.602	3.149	1.440	1.260	1.008	1.236	609.52	533.33	426.67	523.17
15 th Dec.	2.825	2.569	2.169	2.521	1.152	1.008	0.840	1.000	487.61	426.67	355.56	423.28
Mean	3.094	2.687	2.234		1.224	1.056	0.872		518.09	446.69	367.10	
	1995											
15 th Oct.	3.021	2.892	2.214	2.709	1.170	1.120	0.880	1.057	495.24	474.07	372.48	447.26
15 th Nov.	3.895	3.397	2.866	3.379	1.520	1.350	1.110	1.327	643.38	571.43	469.84	561.55
15 th Dec.	3.044	2.880	2.504	2.809	1.210	1.130	0.970	1.103	512.17	478.30	410.58	467.02
Mean	3.313	3.056	2.528		1.300	1.200	0.987		550.03	507.93	417.63	
L.S.D at 5%	1994	1995			1994	1995			1994	1994		
Plant date	0.260	0.274			0.096	0.126			49.37	46.85		
Spacing	0.422	0.248			0.502	0.130			35.37	58.28		
Plant date x Spacing	0.732	0.430			0.870	0.230			60.77	100.95		

Seed index :

Data presented in Table 3 showed clearly that the weight of 1000 seeds (seed index) extracted of seedstalks from root sowing on 15th Nov. was significantly higher than from each other dates.

The same data at Table 3 show that the narrow spacing 20 cm. resulted in significantly lower value (1.99 g) of seed index than those of wide spacing i.e 40 and 60 cm. (2.06 g and 2.21 g) .

It is generally evident, from such data in Table 3, that the combined effect of both factors under study was statisticaly significant. It is also obvious that treatments of root sowing on 15th Nov. and spacing 60 cm. resulted in the highest values in this respect. Obtained results were in agreement with those reported by Singh *et*

al. (1990) on turnip and Sharma and Gulshan Lal (1990) on radish.

Germination percentage :

Data dealing with the percentage of seed germination, illustrated in Table 3, show that germination percentage of root planted at 15th Nov. of spacing at 40 cm. and 60 cm. apart resulted in the highest significant values in this respect. This was true at the two growing seasons of this work. This may be due to the increase of seed index as result of such treatments as shown by data at Table 3.

Germination rate :

Data presented in Table 3 show that each of planting date and spacing as well as their interaction gave a significant effect on seed germination rate. However, the treatment of root planted on 15th Nov. at 60 cm. apart tended to have a relatively lower germination rate than other treatments in both seasons.

Table 3. Effect of planting date and spacing on vegetative growth characters of root turnip.

	days for early flowering				Average length of the mean seed stalks cm)				No. of seed stalks			
Spacing planting date	20 cm	40 cm	60 cm	mean	20 cm	40 cm	60 cm	mean	20 cm	40 cm	60 cm	mean
15 th Oct.	1.71	1.80	2.13	1.88	88	90	92	90	3.3	3.2	3.1	3.2
15 th Nov.	2.16	2.21	2.30	2.22	93	96	97	95	3.1	3.0	3.0	3.0
15 th Dec.	2.10	2.18	2.21	2.16	92	94	96	94	3.2	3.1	3.0	3.1
Mean	1.99	2.06	2.21		91	93	95		3.2	3.1	3.0	
					1995							
15 th Oct.	1.80	1.90	2.21	1.97	90	95	97	94	3.2	3.1	3.0	3.1
15 th Nov.	2.21	2.22	2.32	2.25	95	98	99	97	3.0	3.0	3.0	3.0
15 th Dec.	2.15	2.11	2.26	2.20	94	96	98	96	3.3	3.1	3.0	3.1
Mean	2.05	2.11	2.26		93	96	98		3.2	3.1	3.0	

L.S.D at 5%	1994	1995	1994	1995	1994	1994
Planting date	0.18	0.23	2.0	1.0	0.05	0.04
Spacing	0.14	0.18	1.8	1.0	0.06	0.05
Planting date x Spacing	0.25	0.32	3.2	1.6	0.10	0.08

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تأثير مواعيد الزراعة ومسافات الزراعة على جودة بذور اللفت العراقى

أنيسة ابراهيم اسماعيل ، عامر سليمان سليمان

شعبة بحوث الخضر معهد بحوث البساتين مركز البحوث الزراعية .

اجريت تجربتان خلال عامى ١٩٩٤ و ١٩٥ لدراسة تأثير مواعيد ومسافات الزراعة على جودة بذور اللفت العراقى.

وقد تم اجراء التجربة فى محطة بحوث البساتين بالقناطر الخيرية محافظة القليوبية وزرعت البذور فى المشتل فى ثلاث مواعيد أول سبتمبر - أول اكتوبر - أول نوفمبر وتم نقل الجذور على مسافات ٢٠ ، ٤٠ ، ٦٠ سم فى ١٥ أكتوبر و ١٥ نوفمبر و ١٥ ديسمبر على التوالى وقد اوضحت النتائج ما يلى :-

- أعطى ميعاد زراعة الجذور فى ١٥ ديسمبر ازهاراً مبكره عن مواعيد الزراعة الأخرى.
- أعطى ميعاد زراعة الجذور فى ١٥ نوفمبر ارتفاعا فى متوسط طول وعدد الشماريخ الزهرية وزيادة وزن القرون والبذور الجافة فى الوحدة التجريبية وزيادة المحصول البذرى للفدان وزيادة فى متوسط وزن ١٠٠٠ بذرة وزيادة نسبة الانبات - اسرع انبات للبذور.
- واظهرت النتائج ايضا ان ميعاد زراعة فى ١٥ نوفمبر مع مسافة ٤٠ و ٦٠ سم اعطى اعلى صفات لجودة البذور بينما كان اعلى محصول للبذور تم الحصول علية من مسافة ٢٠ سم (٦٠٩,٥٢ ك جرام / للفدان و ٦٤٣,٣٨ ك جرام / للفدان فى عام ١٩٩٤ وعام ١٩٩٥ على التوالى).