

## **BROCCOLI (*Brassica oleracea* var. *italica*) GROWTH AND YIELD UNDER ASSIUT CONDITIONS**

### **I- YIELD AND VEGETATIVE CHARACTERS**

Shimaa H.M.H\*; M.H. Aboul-Nasr\*\* ; M.M.A. Abdalla\*\* and  
A.K. Metwaly\*\*

\* Graduate student, Faculty of Agriculture, Assiut University

\*\*Department of Horticulture, Faculty of Agriculture, Assiut  
University

---

**Abstract:** This experiment was carried out at the Vegetable Experimental Farm of the Faculty of Agriculture, Assiut University, Assiut during the two successive seasons of 2002-2003 and 2003-2004 to study the effect of sowing dates (July 15<sup>th</sup>, Aug. 15<sup>th</sup>, Sept. 15<sup>th</sup>, Oct. 15<sup>th</sup> and Nov. 15<sup>th</sup>) on yield and quality characteristics of broccoli heads of three genotypes (Assiut 1, Italian and Southern star hybrid) under Assiut conditions. Results showed that there were significant differences among planting dates. The earliest planting date (July 15<sup>th</sup>) gave the heaviest plant fresh weight, number of leaves per plant, florets number per main head and

number of days from seed sowing to harvest time in both seasons. In addition, the number of days from sowing to harvest time was significantly increased as a result of earlier planting. On the other hand, the Italian genotype gave the highest value of head compactness and number of days from sowing to harvest time during both seasons. The interaction effect between planting date × genotype was significant for most of studied traits. Results of this study indicated that Assiut-1 genotype gave the highest plant fresh weight, number of leaves per plant on July 15<sup>th</sup>, while the Italian genotype gave the highest head compactness on Oct., 15<sup>th</sup>.

---

**Key words:** Broccoli, sowing dates, genotype.

#### **Introduction**

Broccoli (*Brassica oleracea* var. *italica*) is a minor vegetable crop cultivated in a very small area over all Egypt. No statistics were found to determine such area in Egypt not even in F.A.O.

statistics data base. Broccoli is highly nutritious, and has been deemed as a vegetable with potential anti-cancer activity due to high levels of glucoraphanin, which can hydrolyses to form sulphoraphane, an isothiocyanate.

---

**Received on:** 29/3/2009

**Accepted for publication on:** 11/4/2009

**Referees:** Prof.Dr. Esmat A. Wali

Prof.Dr. Nashat M. Kandel

Broccoli sprouts have been reported to have 20–50 times the glucoraphanin concentration of mature broccoli heads. Moreover, dietary antioxidants, vitamins and non-nutrient components such as flavonoids, are present in crucifers and may decrease the risk for certain cancers (Lindsay and Astley, 2002). Aboul-Nasr and Ragab, 2000 studied the effect of two sowing dates on yield and quality characteristics of broccoli heads of Assiut-1 genotype grown at two successive winter seasons of 1996-97 and 1997-98 under Assiut conditions. They found that there were significant differences among the two planting dates (Oct. 1<sup>st</sup> and Oct. 15<sup>th</sup>) studied broccoli character such as head height, florets number per head and head compactness. The heads that were produced in the second planting date were exceeded those produced in the first planting date by 22.2%. However, The real extending period of the crop were 23.5 days, since the second planting date was sowed 15 days later ( Oct. 15<sup>th</sup> ) than the first planting date ( Oct. 1<sup>st</sup> ). The 15 days in

sowing date difference did not affect the head height, florets number per head, the florets length or the head compactness.

This experiment aimed to study the effect of five sowing dates (July 15<sup>th</sup>, Aug. 15<sup>th</sup>, Sept. 15<sup>th</sup>, Oct. 15<sup>th</sup> and Nov. 15<sup>th</sup>) on yield and quality characteristics of broccoli heads of three genotypes (Assiut 1 (genotype), Italian (genotype) and Southern star (hybrid) under Assiut conditions

### **Materials and Methods**

This investigation was carried out in a loamy clay soil at the Experimental Farm of the Faculty of Agriculture, Assiut University, Assiut during two successive winter seasons of 2002/2003 and 2003/2004. The effect of five planting dates and three broccoli genotypes on growth and yield of broccoli were studied. The five sowing dates were July 15<sup>th</sup>, August 15<sup>th</sup>, September 15<sup>th</sup>, October 15<sup>th</sup> and November 15<sup>th</sup>. The tested broccoli genotypes were Assiut-1 (synthetic variety), Italian (genotype) and Southern Star (hybrid). Source of the genotypes used in this work are presented in Table (1).

**Table (1):**

Genotypes no.	Genotypes	Source
1	Assiut-1	Damarany, A.M. and M.H, Aboul-Nasr (Personal communication)
2	Italian	Battistini Sementi s.n.c. GAARA Seed Comp. Cairo, Egypt
3	Southern star (hybrid)	TAKII,S

Assiut-1 is a synthetic genotype that was produced at the Department of Horticulture, Assiut University by Damarany and Aboul-Nasr (2000). The original parents of this genotype were namely Parma, Atlantic, Walthon-29 and Toro. A mass selection was conducted for eight years to get a late flowering broccoli genotype under Assiut conditions.

A complete block design with split plot arrangement that have four replicates were used in this study. Planting dates were assigned to the main plots and genotypes were distributed at random in the sub plots. Planting was practiced in rows 3.5 m long and 75 cm wide and transplants were planted at 45 cm apart between hills in the rows. Each plot consisted of four rows and the plot area was 10.5 m<sup>2</sup>. Harvesting was done when maturity was attained.

Normal cultural practices for broccoli production in Assiut were applied (irrigation, fertilization, weed and pest controls).

**The following data were recorded:** for all the plants/plot.

1-Fresh weight of the whole plant (kg): plants were digged from the soil by hand and whole

plants including recovered roots were weighed.

2- Number of leaves per plant:

3- Head height (cm):

4- Florets number per main head:

5- Head compactness: which was graded in scale from 1 (very loose), 2 (loose), 3 (moderate), 4 (compact) and 5 (very compact).

6- Number of days from seed sowing to transplanting:

7- Number of days from seed sowing to harvest time:

### **Statistical analysis**

The experiment was designed as split plot design. Planting dates were assigned to the main plots and genotypes were distributed at random in the sub plots. All data were statistically analyzed using the ANOVA and means of treatments were compared using Duncin Multiple Range Test (DMRT) at 5% level according to Gomez and Gomez (1984).

### **Experimental Results**

#### **Fresh weight of the whole plant (kg):**

Data for Plant fresh weight are presented in Table (2). All studied factors (planting date , genotypes and the interaction) were significantly affect the plant fresh weight. The latest planting date Nov.15<sup>th</sup> gave significantly lower Plant fresh weight, than the earliest planting date July 15<sup>th</sup>.

Assiut-1 genotype gave the heaviest plant fresh weight during the two seasons, while broccoli Hybrid Southern Star in

**Table(2):** Whole plant fresh weight (kg) as affected by five planting dates and three broccoli genotypes grown in two successive seasons of 2002-2003 and 2003-2004 under Assiut conditions.

Genotypes	Sowing date					Average
	15 <sup>th</sup> of July July	15 <sup>th</sup> of Aug. Aug.	15 <sup>th</sup> of Sept. Sept.	15 <sup>th</sup> of Oct. Oct.	15 <sup>th</sup> of Nov. Nov.	
2002-2003 season						
Assiut-1	8.66 a	7.37 b	1.31 f	1.06 fg	0.31 g	3.74 A
Italian	5.03 c	4.37 cd	1.48 f	0.84 fg	0.25 g	2.39 B
Southern Star, Hybrid	3.69 de	3.22 e	1.19 f	0.96 fg	0.28 g	1.87 B
Average	5.79 A	4.98 B	1.33 C	0.95 C	0.28 D	
2003-2004 season						
Assiut-1	6.05 a	1.67 c	1.42 cd	0.91 cde	0.33 e	2.08 A
Italian	2.9 b	0.84 cde	1.05 cde	0.73 de	0.34 e	1.17 A
Southern Star, Hybrid	3.32 b	1.59 cd	1.08 cde	0.85 cde	0.25 e	1.42 A
Average	4.09 A	1.37 B	1.18 BC	0.83 BC	0.31 C	

For each season, means followed by the same letter/s for each of genotypes, planting dates or their interactions are not significantly different at the P = 0.05

the first season and Italian in the second season gave the lightest Plant fresh weight value.

#### **Number of leaves per plant:**

As shown in Table (3). All studied factors (planting date, genotypes and the interaction) were significantly affect number of leaves per plant in both seasons. The highest number of leaves per plant was obtained from the first planting date, and the lowest number of leaves per plant was obtained from the latest one. There was a consistent significant decrease in number of leaves per plant with each delay in planting date. Genotype Assiut-1 gave the highest value of number of leaves per plant in the first season of study, and the lowest number of leaves per plant was obtained from (Oct. 15<sup>th</sup>) in the first season and the latest planting date (Nov. 15<sup>th</sup>) in the second season. The most highest number of leaves per plant was obtained when Italian genotype was cultivated at July 15<sup>th</sup>. On the other hand, the lowest value was obtained when Assiut-1 genotype was cultivated at Nov. 15<sup>th</sup>.

#### **Head height (cm):**

Results for this character are presented in Table (4). Plant head height was significantly affected by planting date in both seasons. Results of all tested genotypes, revealed that the highest plant head was obtained from the

second and the third planting date in the first season, and the first planting date in the second season. The lowest plant head height was obtained from the latest one.

Assiut-1 genotype gave the highest value of plant head height during both seasons of study. On the other hand, Italian genotype gave the shortest plants in 2002-2003 and 2003-2004 seasons. The interaction effect of planting date x genotypes was significant in both seasons. On the other hand, the lowest value was obtained when hybrid was cultivated at Nov.15<sup>th</sup>.

#### **Florets number per main head:**

The florets number per main head is presented in Table (5). Results of all tested genotypes, indicated that the highest florets number per main head was obtained from the earliest planting date (15<sup>th</sup> July). The lowest florets number per main head was obtained from the latest planting date (15<sup>th</sup> of Nov.). In both seasons hybrid Southern Star gave the highest florets number per main head, and Italian genotype gave the lowest values. The interaction effect of planting date x genotypes was significant in both seasons. The highest florets number per main head was obtained when hybrid Southern Star was cultivated at July 15<sup>th</sup>. On the other hand, the lowest value was obtained when

**Table(3):** Number of leaves per plant as affected by five planting dates and three broccoli genotypes grown in two successive winter seasons of 2002-2003 and 2003-2004 under Assiut conditions.

Genotypes	Sowing date					Average
	15 <sup>th</sup> of July	15 <sup>th</sup> of Aug.	15 <sup>th</sup> of Sept.	15 <sup>th</sup> of Oct.	15 <sup>th</sup> of Nov.	
2002-2003 season						
Assiut-1	96.1 c	62.97 d	20.44 i	18.82 i	22.7 hi	44.2 B
Italian	132.5 a	70.31 d	40.02 ef	30.1 gh	44.77 e	63.54 A
Southern Star, Hybrid	114.7 b	63.67 d	25.46 ghi	31.14 gh	33.35 fg	53.67 AB
Average	114.4 A	65.65 B	28.64 C	26.69 C	33.61 C	
2003-2004 season						
Assiut-1	93.08 a	28.53 de	24.29 de	33.36 bcd	17.78 e	39.41 A
Italian	100 a	37.75 bcd	43.43 bc	28.55 de	26.79 de	47.3 A
Southern Star, Hybrid	94.15 a	47.19 b	34.34 bcd	30.39 cde	17.89 e	44.79 A
Average	95.74 A	37.82 B	34.02 BC	30.76 BC	20.82 C	

For each season, means followed by the same letter/s for each of genotypes, planting dates or their interactions are not significantly different at the  $P = 0.05$

**Table(4):** Plant head height as affected by five planting dates and three broccoli genotypes grown in two successive winter seasons of (2002-2003) and (2003-2004) under Assiut conditions.

Genotypes	Sowing date					Average
	15 <sup>th</sup> of July	15 <sup>th</sup> of Aug.	15 <sup>th</sup> of Sept.	15 <sup>th</sup> of Oct.	15 <sup>th</sup> of Nov.	
Assiut-1	33.99 b	35.33 ab	36.22 a	29.37 c	15.16 h	30.01 A
Italian	24.75 e	25.4 e	22.92 f	19.2 g	10.1 j	20.47 C
Southern Star, Hybrid	24.20 ef	27.42 d	30.05 c	25.64 e	13.56 i	24.17 B
Average	27.65 A	29.38 A	29.73 A	24.74 B	12.94 C	
2003-2004 season						
Assiut-1	25.16 a	25.67 a	25.12 a	25.36 a	15.46 gh	23.35 A
Italian	18.50 cde	17.05 efg	16.45 fgh	15.31 h	12.54 i	15.97 B
Southern Star, Hybrid	21.39 b	18.06 def	18.85 cd	20.17 bc	11.94 i	18.08 B
Average	21.68 A	20.26 A	20.14 A	20.28 A	13.31 B	

For each season, means followed by the same letter/s for each of genotypes, planting dates or their interactions are not significantly different at the P = 0.05

**Table(5):** The florets number per main head as affected by five planting dates and three broccoli genotypes grown in two successive winter seasons of 2002-2003 and 2003-2004 under Assiut conditions.

Genotypes	Sowing date					Average
	15 <sup>th</sup> of July July	15 <sup>th</sup> of Aug.	15 <sup>th</sup> of Sept.	15 <sup>th</sup> of Oct.	15 <sup>th</sup> of Nov.	
2002-2003 season						
Assiut-1	24 bc	24.61 b	23.46 bcd	19.60 f	8.83 i	20.10 B
Italian	22.45 de	21.30 e	22.67 cde	17.20 g	9.21 hi	18.57 C
Southern Star, Hybrid	28.91 a	23.89 bc	22.30 de	23.05 cd	10.27 h	21.69 A
Average	25.12 A	23.26 B	22.81 B	19.95 C	9.44 D	
2003-2004 season						
Assiut-1	18 a	14.61 c	13.18 cd	11.02 ef	9.08 g	13.18 A
Italian	16.44 b	10.80 ef	11.93 de	10.43 fg	11.05 ef	12.13 A
Southern Star, Hybrid	18.84 a	16 b	13.89 c	13.45 c	10.94 ef	14.62 A
Average	17.76 A	13.80 B	13 B	11.63 BC	10.36 C	

For each season, means followed by the same letter/s for each of genotypes, planting dates or their interactions are not significantly different at the  $P = 0.05$



Assiut-1 genotype was cultivated at Nov. 15<sup>th</sup>.

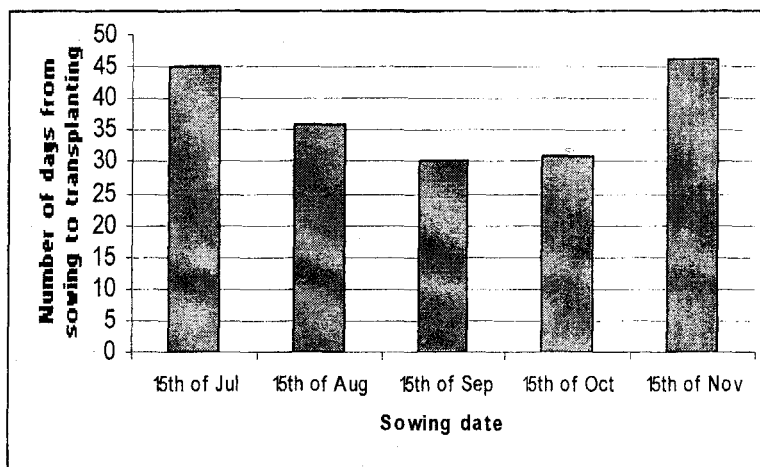
### Head compactness

As shown in Table (6), Data of the two seasons indicated that the highest compactness were obtained from Oct.15<sup>th</sup> in the first season with no significant differences with the second and fourth dates and the earliest planting date (July,15<sup>th</sup>) in the second season. The lowest value was obtained from the third planting date in 2002-2003 season, and the second planting date in 2003-2004 season. The interaction effect of planting date x genotypes was significant in both season. The highest values of head compactness was obtained when Assiut-1 genotype was cultivated at July 15<sup>th</sup>. On the other hand , the lowest value

was obtained when Assiut-1 genotype was cultivated at Nov.15<sup>th</sup>.

### Number of days from seed sowing to transplanting:

Results for this character are presented in Fig (1) for 2002-2003 and 2003-2004 seasons. There were differences between the five planting dates in number of days from seed sowing to transplanting in both seasons. The average data of the two seasons indicated that the longest period from seed sowing to transplanting were on July, 15<sup>th</sup> and Nov., 15<sup>th</sup> (45-46 days) while the shortest period were in Sep.,15<sup>th</sup> and Oct.,15<sup>th</sup> (30-32 days). On the other hand, the plants were transplanted after (36-38 days) in Aug.,15<sup>th</sup>.



Fig(1): Number of days from seed sowing to transplanting at five sowing dates as an average of both seasons.

**Table(6):** head compactness as affected by five planting dates and three broccoli genotypes grown in two successive winter seasons of 2002-2003 and 2003-2004 under Assiut conditions.

Genotypes	Sowing date					Average
	15 <sup>th</sup> of July	15 <sup>th</sup> of Aug.	15 <sup>th</sup> of Sept.	15 <sup>th</sup> of Oct.	15 <sup>th</sup> of Nov.	
2002-2003 season						
Assiut-1	2.52 gh	2.68 fg	1.78 j	2.88 def	2.36 h	2.44 C
Italian	3.75 b	3.79 b	3.35 c	4.2 a	2.99 de	3.61 A
Southern Star, Hybrid	3.41 c	3.07 d	2.15 i	2.87 def	2.83 ef	2.86 B
Average	3.23 A	3.18 A	2.42 C	3.32 A	2.73 B	
2003-2004 season						
Assiut-1	3.64 f	2.82 h	3.61 fg	3.38 g	3.47 fg	3.38 B
Italian	5 a	3.6 fg	4.57 b	4.75 b	4.18 cd	4.42 A
Southern Star, Hybrid	4.63 b	4 de	4.25 c	3.89 e	3.95 de	4.14 A
Average	4.42 A	3.47 C	4.14 AB	4 AB	3.86 BC	

For each season, means followed by the same letter/s for each of genotypes, planting dates or their interactions are not significantly different at the  $P = 0.05$

### **Number of days from seed sowing to harvest time:**

As shown in Table (7), Number of days from seed sowing to harvest time was significantly different in both seasons. Results of all tested genotypes, revealed that the earliest planting date (July 15<sup>th</sup>) gave the highest number of days, while the latest date gave the lowest value in both seasons. Italian genotype gave the highest number of days, while, Southern Star and Assiut-1 genotypes were the lowest in this respect. The interaction effect of planting date x genotypes was significant in both seasons. Italian genotype had the highest number of days from seed sowing to harvest with earlier planting, Southern Star hybrid gave significantly lower number of days from seed sowing to harvest in the earliest date.

### **Discussion**

#### **The effect of sowing dates:**

The earliest planting date (July 15<sup>th</sup>) gave the heaviest plant fresh weight. Which might be related to higher accumulation of food storage with high temperature at the beginning of season rather than low temperature at the end of season. However, at the latest planting dates low temperature prevailed during early stages of growth stimulated curd initiation and stopped emergence of more

leaves which is the source of food storage and this resulted in plants with lowest plant fresh weight in both seasons. Further, the lowest Plant fresh weight obtained from the latest planting date in both seasons. Benoit and Ceustermans (1986) stated that the earliest planting dates gave the highest Plant fresh weight.

Shreen Yacoub, (2001) showed that the earliest planting date (July 12<sup>th</sup>) of cauliflower grown under Assiut conditions gave significantly the highest values Plant fresh weight found that broccoli Plant grown during the autumn season had the heaviest Plant fresh weight. Most researchers who investigated the effects of planting dates on broccoli growth and development have shown that earlier planting dates significantly increased yield and morphological Characters (Shreen Yacoub, 2001 and Mihov and Antonova, 2002).

The earliest planting dates gave the highest number of leaves per plant and heavier head weight than the latest planting date (Nov. 15<sup>th</sup>). Which might be related to higher accumulation of food storage with high temperature at the beginning of season rather than low temperature at the end of season. Rooster and De-Rooster (1997) found that harvesting was not advanced but yields were increased by earlier sowing. These results were in agreement

**Table (7):** Number of days from seed sowing to harvest time as affected by five planting dates and three broccoli genotypes grown in two successive winter seasons of 2002-2003 and 2003-2004 under Assiut conditions.

Genotypes	Sowing date					Average
	15 <sup>th</sup> of July July	15 <sup>th</sup> of Aug.	15 <sup>th</sup> of Sept.	15 <sup>th</sup> of Oct.	15 <sup>th</sup> of Nov.	
2002-2003 season						
Assiut-1	148.3 b	129.5 cde	127.0 def	123.3 f	122.0 f	130.0 B
Italian	170.5 a	152.5 b	134.3 c	129.8 cde	124.5 ef	142.3 A
Southern Star, Hybrid	131.0 cd	127.0 def	127.0 def	125.5 def	124.3 ef	126.9 B
Average	149.9 A	136.3 B	129.4 B	126.2 B	123.6 B	
2003-2004 season						
Assiut-1	165.5 b	136.8 d	128.0 e	115.0 g	107.0 h	130.5 B
Italian	178.5 a	148.8 c	136.3 d	124.8 ef	107.0 h	139.0 A
Southern Star, Hybrid	162.0 b	133.5 d	122.3 f	121.0 f	107.0 h	129.2 B
Average	168.7 A	139.7 B	128.8 C	120.3 D	107.0 E	

For each season, means followed by the same letter/s for each of genotypes, planting dates or their interactions are not significantly different at the  $P = 0.05$

with the findings of Benoit and Ceustermans (1986) who cultivated broccoli seeds at intervals between 18 July and 3 August and planted out between 10 and 24 August. They indicated that the highest average plant weight, percentage of large (200 g and above) plants and inflorescence head diameter were obtained with the earliest sowing and planting dates. The same findings were recorded by Shreen Yacoub, (2001) Ahmed and Wajid-Siddique (2004) they showed that early sowing of broccoli seeds (5<sup>th</sup> of May ) produced higher number of leaves per plant compared with later dates.

The latest planting date (Nov. 15<sup>th</sup>) decreased the plant fresh weight, number of leaves per plant. This could be interoperated as that at the latest planting date the low temperature prevailed during early stages of growth stimulated curd initiation rather than leaves. The latest planting dates gave significantly lower head height and florets number per main head than the earliest planting date. This may be due to low temperature and therefore, In order to induce flowering the plants should pass a good vegetative growth period until they reach reasonable size sufficient to form a marketable curd. While at the latest planting dates low temperature prevailed during early stages of growth stimulated curd initiation and

stopped emergence of more leaves which is the source of food storage and this resulted in plants with small heads.

These results agree with Chung and Strickland (1986) who suggested that the lower growing temperatures of later sowings might cause floral initiation at a younger physiological age. Plants therefore develop heads before reaching full size and the spears are small and take a longer time to reach maturity.

#### **The effect of Genotypes:**

Assiut -1 genotype gave the heaviest plant fresh weight, number of leaves per plant and head height. This may be due to genotype variation. Assiut -1 genotype may be were adapted to climate under Assiut conditions than the other two genotypes. Italian genotype gave the highest value of compact heads and number of days from seed sowing to harvest time than Assiut -1 genotype

#### **References:**

- Aboul-Nasr, H.S. and W.S.M. Ragab. 2000. Yield, head quality and nutritional composition of a new late flowering broccoli variety grown under Assiut condition. *Assiut J. Agric. Sci.* 31 (1): 55-78.
- Ahmed, M.J. and Wajid-Siddique. 2004. Effect of

- sowing dates on growth and yield of broccoli (*Brassica oleracea* L.) under Rawalakot conditions. *Asian J. Plant Sci.* 3(2): 167-169. (C.F. CAB Abstracts CD).
- Benoit, F. and N. Ceustermans. 1986. Winter broccoli under glass. *Boer-en-de-Tuinder.* 92: 25, 20. (C.F.CAB Abstracts CD)
- Chung, B. and H.L. Strickland. 1986. Effect of sowing time on the once-over harvest yield of broccoli genotypes in north-west Tasmania. *Australian J. Experimental Agriculture.* 26(4): 497-500. (C.F.CAB Abstracts 1984-1986)
- Gomez, K. A. and Gomez, AA. 1984. *Statistical Procedure for Agricultural Research.* Wiley-Intersciens Publication, John Wiley & Sons Inc. New York, USA.
- Lindsay, D. G., & Astley, S. B. 2002. European research on the fundamental effects of dietary antioxidants. *Molecular Aspects of Medicine,* 23, 1-38.
- Mihov, K. and G. Antonova. 2002. Some morphological characteristics of broccoli (*Brassica oleracea* var. *italica* PI.) hybrids grown as spring, summer and autumn crops (under the conditions of Bulgaria). *Horticultural Abst.* Vol. 72, No.1 (Abstract no. 403).
- Rooster, L.de and L. De-Rooster. 1997. Broccoli in continuous culture. Continuous culture with broccoli quite possible. *Proeftuinnieuws.* 7 (16) 22-23. (C.F.CAB Abstracts 1996-1998/07).
- Yacoub, Shreen A.A. 2001. The response of some ecotypes and genotypes of cauliflower to planting dates under Assiut conditions. M.Sc. Thesis, Fac. of Agric. Assiut Univ., Egypt

## نمو و محصول البروكولي تحت ظروف أسيوط

### ١- المحصول و الصفات الخضرية

شيماء حسن مسلم حسن\* ، محمد حسام أبو النصر\*\* ، محمد محمد على عبد  
الله\*\* ، أيمن قطب متولى\*\*

\* طالبه دراسات عليا بكلية الزراعة ، جامعة أسيوط

\*\* أستاذ الخضر بكلية الزراعة ، جامعة أسيوط

تم إجراء هذه التجارب بالمزرعة البحثية لقسم الخضر بكلية الزراعة جامعة أسيوط خلال موسمي شتاء (٢٠٠٢-٢٠٠٣) و (٢٠٠٣-٢٠٠٤). وقد استهدفت الدراسة تأثير خمس مواعيد زراعة (١٥ يوليو ، ١٥ أغسطس ، ١٥ سبتمبر ، ١٥ أكتوبر ، ١٥ نوفمبر) على المحصول والصفات الخضرية لثلاث طرز وراثيه للبروكولي (أسيوط ١) وهو صنف تركيبي منتج بجامعة أسيوط ، والصنف الإيطالي ، والهجين سوثيرن سستار) تحت ظروف أسيوط .

أوضحت النتائج اختلافات معنوية في تأثير مواعيد الزراعة وقد تفوق ميعاد الزراعة الأول من حيث وزن النبات الطازج ، عدد الأوراق على النبات و عدد الحوامل الزهرية في كلا الموسمين. بالإضافة إلى زيادة معنوية في عدد الأيام من زراعة البذرة إلى الحصاد . بينما أعطى ميعاد الزراعة الأخير أقل ارتفاع لقرص النبات. و وجد أيضا اختلافات معنوية بين الأصناف المختبره. فقد أنتج الصنف أسيوط-١ أثقل وزن للنبات الطازج ، عدد الأوراق على النبات و ارتفاع القرص. بينما كان الصنف الإيطالي أعلى في درجة أندماج القرص و عدد الأيام من زراعة البذرة الى الحصاد أثناء الموسمين. و قد أظهر التفاعل بين مواعيد الزراعة و الأصناف فروقا معنوية لمعظم جوانب الدراسة. فقد أوضحت نتائج هذه الدراسة أن الصنف أسيوط-١ الأعلى من حيث وزن النبات الطازج، عدد الأوراق على النبات المزروعة في ١٥ يوليو بينما أعطى الصنف الإيطالي أعلى درجة أندماج للأقراص في ١٥ أكتوبر.