

EFFECT OF PLANTING DATE ON GROWTH, YIELD, FRUIT QUALITY AS WELL AS THE INFECTION WITH VIRUS DISEASES OF SQUASH PLANTS IN FALL SEASON AT MIDDLE EGYPT

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ABSTRACT

This study was conducted during the two fall seasons of 1995 and 1996 at Sids Horticulture Experiment Station to study four planting dates of squash (15th August, 1st September, 15th September and 1st October), the Eskandarani variety was used in the experiments. These experiments was to study the effect of planting date on growth, yield, fruit quality as well as the spread of cucurbita viruses on squash plants during these planting dates. The obtained results indicated that increasing the percentage of infection squash plants with virus diseases was increased in the first, second and third planting dates, while was lower in fourth planting date. The first planting date gave highest infection percentages with virus diseases, which were 100% and 97.9% in the first and second season, respectively, while were 25.6% and 20.3% for fourth planting date in both season, respectively. These differences of infection percentage of plants between various planting dates were reflected on vegetative growth, yield component and fruit characteristics, where as, the fourth planting date gave significantly higher in all measurements of growth, yield and fruit quality under this study, while the first and second planting dates were low values of all measurements under the study. The third planting date was medium of percentage of non marketable yield because the late infection with virus diseases. In summary to get good squash yield and best quality, sowing of squash plants in fall season at middle of Egypt sowing could be during October month.

INTRODUCTION

Squash is one of the most important vegetable crops in human diets in Egypt. Sowing this crop in fall season is determined by the infection with cucurbita viruses due to the infection with insects causing the infection. Choose the most suitable planting date during fall season may reduce infection with these diseases. In this respect Palumbo *et al.* (1991) found that the growth, yield and fruit characters directly influenced by planting date in summer squash, in addition this planting date gave rise significantly more on leaves / plant and leaf size. Mulkey and Talbot (1993) in planting date trial of fancy grade (fresh market) zucchini squash (*Cucurbita pepo*) found that Jade var. produced significantly higher yields than the other 12 varieties at planting on 16th April. The choose of planting date was very important for growth, yield and fruit traits. Abo-El yazid *et al.* (1990) in field trials in Egypt during 1988 – 89 found that the incidence of (WMV2) was lowest and vegetative growth was greatest at early sown squash. Nesmith *et al.* (1994) found that the number of female and male flowers counts of squash fluctuate under varying environmental conditions and maintaining production over a range of planting dates depends on careful cultivar selection. Provvidenti and Schroeder (1970) showed that (WMV-1) incited an especially leaf mottle and rugosity on

Marketer variety. The subsequent growing, flower, buds were clustered and plant leaves were very small in cucumber. Nameth *et al.* (1985b) reported that, the mixed infection with viruses causes a severe mosaic and stunting of the melon vines. Thomas (1971) found that early infection with virus diseases caused reduction in yield of Buttercup squash (63%), Golden Hubbard squash 53% and pumpkin 49%. No yield reduction was recorded with a late infection of virus diseases in any of the four cucurbit species. Similar results were found by Provvidenti and Schroeder (1970). Thomas (1971) reported that infected fruits of golden Hubbard squash showed severe distortion and dark green mottle. Late in the season fruit of infected Buttercup squash showed transient symptoms during development, but appeared normal at maturity. Nameth *et al.* (1985a) and Ibrahim (1986) indicated that the percentage of infection by (ZYMV) in the samples from Beni-Suef was 48-98% during summer season, but percentage were 28-20% throughout the fall season. Provvidenti and Gonsalves (1984) reported that the squash plants infected with (ZYMV) showed a necrosis and foliage destruction.

This study was carried out to choose the most suitable planting date to give the lowest infection with such diseases and give the highest yield and good fruit quality.

MATERIALS AND METHODS

Field experiments were conducted during the fall seasons of 1995 and 1996 at Sids Horticulture Research Station. The experiments were carried out to study the effect of planting date on the Spread of cucurbita viruses on Squash plants during the fall season, choose the most suitable planting date showing less infection with virus diseases and gave the highest yield and good fruit quality.

The treatments of the experiment in both seasons included.

- 1- First planting date : Sowing seeds started on August 15th directly in field.
- 2- Second planting date :Sowing seeds started on September First directly in field.
- 3- Third planting date : Sowing seeds started on September 15th directly in field.
- 4- Fourth planting date : Sowing seeds started on October first directly in field.

The randomized complete block design with four replicates was used in this experiment, every plot was consisted of four rows from each planting date, each row included ten plants. The row was 4.5 m long, 80 cm wide and plant Spacing was 40 cm apart. All agriculture practices i.e. irrigation, fertilization, fungal diseases were only controlled with fungicides and the plants were left to natural infection with virus diseases without using insecticides to aphids and white fly.

Data recorded:

- 1- Plant growth vigour was estimated on ten plants by weight of plant (kg), main stem length measured and leaf area in cm² from each treatment in every replicate.

- 2- Yield was recorded by weight and number of fruits for early and total yields and percentage of non marketable yield was estimated.
- 3- The percentage of simitten plants with cucurbita viruses in each replicate for every treatment was estimated.
- 4- Five fruits were taken to estimate fruit quality such as, average fruit weight, length and diameter of fruit in each harvest from each planting date.

The obtained data were statistically analysed according to the procedure out lined by Steel and Torrie (1960).

RESULTS AND DISCUSSION

1. Effect of planting dates on the percentage of infection plants:

Data presented in Table (1) represent the effect of different planting dates on the percentage of infection of squash plants with cucurbita virus diseases . The data show high percentage of infection plants during the planting date of August and September months, while the planting of October month gave greater depression in percentage of infected plants, this percentage being 25.6% and 20.5% in October 1995 and 1996 respectively, while the percentages were 100% and 97.9% during August and 98.8% and 96.9% in September in both seasons, respectively. These results confirmed the relationship between percentage of infection of plants with virus diseases and planting date, which was connected with degree of temperature during growth time suitable for the spread of insects responsible for the transmiion of diseases such as aphids and white flay. These results were in agreement with Thomas (1971), Nameth *et al.* (1985a&b) and Abo El-yazid *et al.* (1990) on squash.

2. Effect of planting dates on vegetative growth:

A- Total plant fresh weight:

Data in Table (2) represent the effect of planting date on the total plant fresh weight of squash. Total plant fresh weight at the fourth planting date (October first) was significantly higher than that of the other planting dates in both seasons. The third planting date gave significant increase of plant fresh weight than the first and second planting date in the first season, while there was no significant difference in the second season. This depression of plant fresh weight between planting dates was connected with percentage of infection plants with virus diseases.

B- Plant length:

Data presented in the same table, represent the effect of different planting dates on stem length of squash plants. The data showed that the third and fourth planting dates gave significantly higher values of stem length than the first and second planting dates, this increase of stem length in third and fourth planting dates were mainly due to the lower degree of the percentage of infection plants with viruses than the first and second planting dates. This result was observed in both seasons.

Table (1): Effect of planting date on the spread of cucurbita viruses in Squash plants in fall season of 1995 and 1996 years.

Planting Dates	Season 1995				Season 1996			
	No. of sown plants	No. of infection plants	Percentage infection plants %	Arcsin percentage Trans formation	No. of sown plants	No. of infection plants	Percentage infection plants %	Arcsin percentage Trans formation
First Date (15 th August)	154	154	100	90.0	144	140	97.9	85.82
Second Date (1 st September)	160	158	98.8	87.12	137	132	96.9	84.83
Third Date (15 th September)	158	154	97.5	83.54	151	146	96.1	82.16
Fourth Date (1 st October)	160	41	25.6	28.29	160	30	20.3	26.26
L.S.D at 0.05 at 0.01	-	-	-	9.87 14.18	-	-	-	14.40 20.69

Table (2): Effect of planting dates on vegetative growth in fall seasons of 1995 and 1996 years.

Planting Dates	Season 1995			Season 1996		
	Plant weight (kg)	Stem length (cm)	Leaf area (cm ²)	Plant weight (kg)	Stem length (cm)	Leaf area (cm ²)
First Date (15 th August)	0.46	47.3	73.4	0.47	43.3	81.7
Second Date (1 st September)	0.47	41.4	141.9	0.47	40.7	165.0
Third Date (15 th September)	0.71	66.3	1025.0	0.80	71.2	1041.7
Fourth Date (1 st October)	1.45	93.9	1389.2	1.99	98.3	1510.9
L.S.D at 0.05 at 0.01	0.26 0.38	6.4 9.2	106.3 152.7	0.44 0.63	3.5 5.1	140.3 201.6

C- Leaf area:

Data in Table (3) represent the effect of planting dates on the leaf area of Squash plants. The data showed that the single leaf area in the third and fourth planting dates was significantly larger than that the first and second planting dates. There were insignificant differences between the first and second planting dates for leaf area in both seasons.

The reduction in leaf area and planting weight, were clearly appeared with the higher infection with viruses especially in the first and second planting dates. These results were in agreement with Palumbo *et al.* (1991), Mulkey and Tablbot (1993), Nesmith *et al.* (1994) and Provideti and Schroeder (1970) on squash.

3. Effect of planting dates on yield component:

A- Early number and fruit weight:

Data in Table (3) represent, the effect of planting dates on the early fruit weight per plant (Kg.) of squash. It could be seen from the results that early fruit weight per plant of the fourth planting date was significantly higher than that of the other planting dates in both seasons. There were no significant differences between the first, second and third planting dates in early fruit weight in both seasons. The higher vegetative growth due to the low infection of plants appeared in early yield. This means that higher percentage of infection plants at first, second and third planting dates reduced early yield of fruit weight per plant.

Concerning the effect of planting dates on early number of fruits per plant, data in the same table, it was showed that early number of fruits at fourth planting date was significantly higher than the other planting dates under study. A significant difference was not detected between first, second and third planting dates for the early number of fruits. These results confirmed the increase of early fruit weight of fourth planting date than other planting dates. These results were in agreement with Nameth *et al.* (1985b) and Ibrahim (1986) on squash.

B- Total number and fruit weight:

Data in Table (3) show the effect of planting dates on total fruit weight per plant. Total fruit weight of the fourth planting date was significantly higher than all other planting dates and the values reached 0.526 and 0.569 kg per plant in 1995 and 1996 seasons respectively, while the values of the total fruit weight for the first, second and third planting dates were 0.194, 0.151 and 0.198 kg in 1995 and 0.150, 0.128 and 0.203 kg in 1996 respectively. However, no significant difference between them was observed. This results indicated that, the early infection of plants with virus diseases in the first, second and third planting dates was due to the suitable temperature degrees for the spread of insects responsible for the transmission of viruses in the early stage of plant growth, which greatly affected the total yield.

Concerning the total number of fruits, the data in the same table revealed that total number of fruits at fourth planting date was significantly higher than all other planting dates, while the third planting date was significantly higher than the second planting date only. It could be seen from the results that early and total weight and number of fruits of second date was lower than any

other planting dates under study. These results were in agreement with Mulkey and Talbot (1993), Thomas (1971) and Ibrahim (1986) on squash.

C- Non marketable yield by weight and number of fruits:

The percentage of non marketable yield by weight and number of fruits were estimated from total yield. The results shown in Table (3) represent the effect of planting dates on the degree of infection of plants with virus diseases which reflected on the good quantity and quality of yield, the data show that the third and fourth planting dates were less in percentage of non marketable yield by weight and by number of fruits, the values reached 19.69% and 25.49% in 1995, while it was 17.20% and 25.20 in 1996 season at fourth planting date for weight and number of fruits respectively, while it was third planting date 43.26% and 51.9% in first season and 43.41% and 51.75% in second season for weight and number of non marketable yield respectively. In addition first and second planting dates gave high percentage of non marketable yield by weight and number of fruits. These results indicated that, the percentage of infection of plants with virus diseases was effective on quantity and also of quality of yield. These results were in agreement with Thomas (1971) and Ibrahim (1986) on squash.

Table (3): Effect of planting dates on yield component in fall seasons of 1995 and 1996 years.

Planting Dates	Early yield / plant		Total yield / plant		Percentage of Non marketable yield	
	Fruit weight (Kg)	No.of fruits	Fruit weight (Kg)	No.of fruits	Fruit weight	No.of fruits
Season 1995						
First Date (15 th August)	0.129	1.12	0.194	1.65	80.13	78.93
Second Date (1 st September)	0.106	0.82	0.151	1.13	85.94	80.32
Third Date (15 th Septembr)	0.134	1.27	0.198	1.88	43.26	51.90
Fourth Date (1 st October)	0.357	3.41	0.526	5.03	19.69	25.49
L.S.D at 0.05	0.055	0.47	0.080	0.70	8.03	12.82
at 0.01	0.079	0.64	0.115	1.01	11.54	18.42
Season 1996						
First Date (15 th August)	0.113	1.19	0.150	1.78	80.70	78.67
Second Date (1 st September)	0.086	0.96	0.128	1.35	83.36	84.94
Third Date (15 th Septembr)	0.135	1.48	0.203	2.18	43.41	51.75
Fourth Date (1 st October)	0.381	2.56	0.569	4.15	17.20	25.20
L.S.D at 0.05	0.069	0.53	0.103	0.77	6.47	7.06
at 0.01	0.099	0.72	0.148	1.11	9.30	10.14

4. Effect of planting dates on fruit characteristics:

A- Average fruit weight:

Data in Table (4) showed that average fruit weight for the third and fourth planting dates was significantly higher than that of the first and second planting dates in both seasons. The data show, no significant difference between first and second dates and also between third and fourth planting dates for average fruit weight. Thus, higher average fruit weight of third and fourth planting dates could be attributed to the positive effect of lower or delayed of infection of plants with virus diseases on the growth of fruits.

B- Fruit length:

Data in the same table, show the same trend of results observed in average fruit weight as found in fruit length. The fruit length at third and fourth planting dates was significantly larger than the first and second planting dates in both seasons. In addition, the second planting date gave shorter fruit length than the other planting dates.

C- Fruit diameter:

It is obvious from the obtained results that diameter of fruits at third and fourth planting dates was less than the first and second planting dates, these depression of fruit diameter was highly significant in both seasons. These results were mainly due to the high infection with virus diseases in first and second planting dates which affect the shape and cause m, shaped fruits. These results were in agreement with Mulkey and Talbot (1993), Nesmith *et al.* (1994), Thomas (1971) and Provvidenti and Gonsalves (1984) and Ibrahim (1986) on squash.

Table (4): Effect of planting dates on fruit characteristics in fall seasons of 1995 and 1996 years.

Planting Dates	Fruit characteristics					
	Season 1995			Season 1996		
	Average Fruit weight (gm)	Fruit length (cm)	Fruit Diameter (cm)	Average Fruit weight (gm)	Fruit length (cm)	Fruit Diameter (cm)
First Date (15 th August)	102.6	9.8	3.9	110.2	10.1	4.1
Second Date (1 st September)	103.7	9.2	4.2	112.2	9.5	4.4
Third Date (15 th September)	120.8	12.4	3.6	119.3	12.7	3.5
Fourth Date (1 st October)	132.3	14.5	3.4	125.1	13.9	3.3
L.S.D at 0.05	12.2	1.6	0.3	2.6	0.7	0.5
at 0.01	17.6	2.3	0.5	3.7	1.0	0.6

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تأثير ميعاد الزراعة على النمو، المحصول، جودة الثمار وأيضاً الإصابة بالأمراض الفيروسية لنباتات الكوسة في العروة النيلى لمصر الوسطى

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أجريت هذه الدراسة خلال العروة النيلى فى عامى ١٩٩٥ – ١٩٩٦ بمحطة تجارب البساتين بسدس – لدراسة تأثير أربع مواعيد لزراعة الكوسة الأسكندراني (١٥ أغسطس – أول سبتمبر – ١٥ سبتمبر وأول أكتوبر) على النمو والمحصول وجودة الثمار وكذلك إنتشار الأمراض الفيروسية. يمكن تلخيص النتائج المتحصل عليها كالتالى:

- إزدادت نسبة الإصابة لنباتات الكوسة بالأمراض الفيروسية فى الميعاد الأول والثانى والثالث ، بينما كانت منخفضة فى ميعاد الزراعة الرابع . أعطى ميعاد الزراعة الأول أعلى نسبة للإصابة بالأمراض الفيروسية والتي كانت ١٠٠% و ٩٧% خلال الموسم الأول والثانى على التوالى ، بينما كانت ٢٥% و ٢٠% لميعاد الزراعة الرابع فى كلا الموسمين على التوالى . ولقد انعكست هذه الاختلافات فى نسبة الإصابة للنباتات بين المواعيد المختلفة على النمو الخضرى – المحصول وصفات الثمار حيث أن الميعاد الرابع أعطى نتائج عالية المعنوية فى جميع صفات النمو الخضرى والمحصول وجودة الثمار - بينما الميعاد الأول والثانى للزراعة كان منخفض القيمة فى هذه الصفات تحت الدراسة.

- أعطى الميعاد الثالث للزراعة قيم متوسطة فيما يتعلق بنسبة المحصول الغير مسوق بسبب تأخر الإصابة للنباتات بالأمراض الفيروسية .

من هذه الدراسة يمكن التوصية بزراعة محصول الكوسة فى العروة النيلى فى مصر الوسطى خلال شهر أكتوبر من أجل محصول جيد وثمار عالية الجودة .