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EXTRACT AND EVALUATION OF LOCAL TOMATO LINES WITH HIGH YIELDING AND IMPROVED QUALITY

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ABSTRACT

Through hybridization and selection breeding programme carried out at Department of Agricultural Botany in the Agricultural Experiments and Researches Station, Faculty of Agriculture, Cairo University, to increased yield and improve quality of tomato crop, a few number of F2 –transgressive segregant plants were obtained from crossing of three tomato cultivars (Marmande,UC 97-3 and Tamina). Viability test of seeds for all F2-segregant plants was done to select F2-segregants which showed high seed viability.

Seeds of F2-segregant plants which showed high viability as well as seeds of the original cultivars and of imported hybrid (Grandure) were sown on 15th February, 1999 in seedling trays containing a mixture of peatmoss and vermiculite at ratio of 1:1. Six weeks later, seedlings of all genotypes were harvested from trays and transplanted in a plastic greenhouse in a randomized complete block design with three replicates to follow up the vegetative and reproductive growth of the F3-generation in comparison with their parental cultivars and imported hybrid.

The experiment was replicated in the second season at the end of February, 2000 to follow up the vegetative and reproductive growth of F4-generation in the same manner that reported in F3-generation.

The evaluation included studies on morphological characters, earliness, yield and fruit quality characters as well as the anatomical structure of the main stem. The obtained results indicated that all studied characters were significantly affected by the genotype and some selections surpassed significantly their parental cultivars and the imported hybrid in this respect. In F3-generation, it is worthy to note that the selection U x M 20-22 recorded 1338.2g for fruit yield per plant which exceeded significantly the best cultivar Marmande (782.6g fruit yield per plant) by 71% and the imported hybrid Grandure (1015.7g fruit yield per plant) by 31.8%. In F4-generation, the selection M x T 21-2 recorded 1740.0g for fruit yield per plant which exceeded significantly the best cultivar Marmande (1037.6g fruit yield per plant) by 67.8% and the imported hybrid Grandure (1289.5g fruit yield per plant) by 34.9%.

Keywords: Extract, Evaluation, Tomato lines, High yield.

INTRODUCTION

Tomato grown at present time in glass-houses are all introduced hybrids. These hybrids have several desirable characteristics,such as an indeterminate growth which have the opportunity for higher yield per unit area, earliness in flowering, increased number of fruits in the bunch and large fruit size. However, the imported hybrids are very expensive since the price of 1 kg seeds reaches about 1100 Egyptian pounds. Moreover, most of these hybrids have soft fruits and are sensitive to viral diseases. Therefore, developing new strains, which combine both of the desirable characters of imported hybrids and of local cultivars, to fulfill the local cultivation under plastic house conditions is one of the important objectives today. This may save a lot of money used to import hybrid seeds, minimize the extension of

viral diseases which often comes with the imported seeds and reduce the cost of production per unit area.

In this respect,hybridization and selection breeding programme was carried out at Department of Agricultural Botany in the Agricultural Experiments and Researches Station, Faculty of Agriculture, Cairo University to increased yield and improve quality of tomato crop. In this programme, all possible crosses were made among the three tomato cultivars Marmande, UC 97-3 and Tamina. A few number of transgressive segregant plants were obtained in F2-generation which were characterized by high yield and some of them surpassed their parental cultivars by more than 50% in fruit yield per plant (El-Kobisy, 1996).

Therefore, it is planned to study the behavior of these segregants in advanced generations in order to select high yield strains with high quality to release them as a new improved tomato cultivars in the future.

In this connection, Gabal *et al.* (1985) evaluated some American tomato cultivars grown for early summer production in Egypt. The obtained results indicated that the tomato cv. Yates showed the greatest, and the tomato strain B showed the least, vegetative growth assessed by stem length and thickness, number of internodes and leaves, and foliage fresh weight. Strain B flowered and set fruit first, followed by Marmande, Yates and VFN Bush. The early flowering genotypes bore the first cluster on lower internodes than the latter cultivars.Mean fruit weights varied considerably (from 66.6g in strain B to 99.7g in VFN Bush), as did fruit length, diameter, shape index and the number of locules. VFN Bush and strain B fruits had slightly oblong, firm, fleshy fruits with higher total soluble solids, vitamin C and total sugar contents and less juice than Yates or Marmande. Total acidity ranged from 430mg /100g (strain B) to 545 mg/100g (Yates).Strain B and Marmande produced high early yields, but the mean total yields were 22.4, 14.5, 12.6 and 11.9 tons /feddan for VFN Bush, strain B, Yates and Marmande; respectively.

Evaluation of some tomato genotypes under protected cultivation for fresh consumption was carried out by Martinetti (1985). Thirteen F1 hybrids were studied under glass with a sowing date in November. Significant differences existed among them for days to flowering, height, fruit diameter, flowers per truss, fruits per truss and fruit yield per plant; these differences among the hybrids were not consistent from one truss to another among the five trusses studied. Distribution of yield among 21 harvest dates also differed among the hybrids; Tetraline was of interest for its early yield.

Abu-Baker and Suwwan (1986) evaluated nine tomato hybrids and three tomato cultivars.The evaluation was carried out under plastic house conditions in the Jordan Valley for two seasons.It was found that early yields, fruit numbers and total yields (about 220 t/ha) were highest with the entry Hy. yield F1 hyb.18109 b in both seasons. The highest average fruit weight(206 g) was obtained with Pik-Red hyb.in the first season and with Claudia Raf(172 g) in the second one. The highest vegetative growth (dry weight) in both seasons occurred in Hy. crop F1 hyb.18110 b,Carmello F1 hyb.,and Hy.yield F1 hyb 18109 b.

Nassar (1988) evaluated some tomato F1 hybrids grown in Fayoum, Egypt. Significant differences were noted for early, marketable and total

yields, fruit weight, titratable acidity, total soluble solids, citric acid ratio and N,P,K and Ca concentrations in the fruits. Mainly on the basis of total and marketable yield, Castlex 1036 and Castlehy 1017 were recommended for autumn fruit production in Fayoum.

Evaluation of tomato varieties in Diara area of Bihar was carried out by Prasad and Singh (1990).Tomato cultivars Pusa Ruby, HS 101, Marglobe and Punjab Chhuhara were grown during 1987-88 at 3 locations, Kalyantola. Badlain Bahair and Nazira.Pusa Ruby was superior to the other cultivars in most characters, including yield, although Chhuhara gave the highest number of fruits per plant.Performance differed significantly among locations.

Determinate (6 hybrids and 2 cultivars) and indeterminate (5 hybrids and 2 varieties) types of tomato were evaluated by Jasmine *et al.*(1993) for plant height, number of fruits /plant, mean fruit weight and yield /plant at Coimbatore during 3 seasons: December 1989-April 1990, May-September 1990 and October1990-February 1991.The obtained results indicated that the indeterminate types were taller than the determinate ones and the indeterminate hybrid FM2 gave the greatest fruit weight (69.9 g). The highest yielders were the indeterminate types ARTH4 and Pusa Ruby (1.06 and 1.04 kg/plant; respectively) and the determinate types ARTH3 and KT3 (1.18 and 1.05 kg/plant; respectively), with the over all mean of the determinate group being greater than that of the indeterminate group (0.91vs.0.74 kg/plant). Highest yields were obtained from crops of both types when planted out in December or October.

MATERIALS AND METHODS

1-Source of tomato seeds:

Through hybridization and selection breeding programme which was carried out at Department of Agricultural Botany in the Agricultural Experiments and Researches Station, Faculty of Agriculture, Cairo University to increase yield and improve quality of tomato crop, crosses were made among the three tomato cultivars Marmande (M), UC 97-3 (U) and Tamina (T). A few number of transgressive segregant plants were obtained in F2-generation which were characterized by high yield and some of them surpassed their parental cultivars by more than 50% in fruit yield per plant(EL-Kobisy,1996).Seeds of such transgressive segregant plants as well as those of parental cultivars and of imported hybrid (Grandure) were the raw materials of the present study.

2-Viability test of tomato seeds:

Germination test was carried out to estimate viability of seeds especially those of transgressive segregant plants.Fourty seeds of each entry were sown in seedling trays (at the beginning of January, 1999) containing a mixture of peatmoss and vermiculite at ratio of 1:1. A month later, seedlings were counted and germination percentage of each entry was estimated. Entries showed high percentages of seed germination proved to be of high viability (Figure 1).

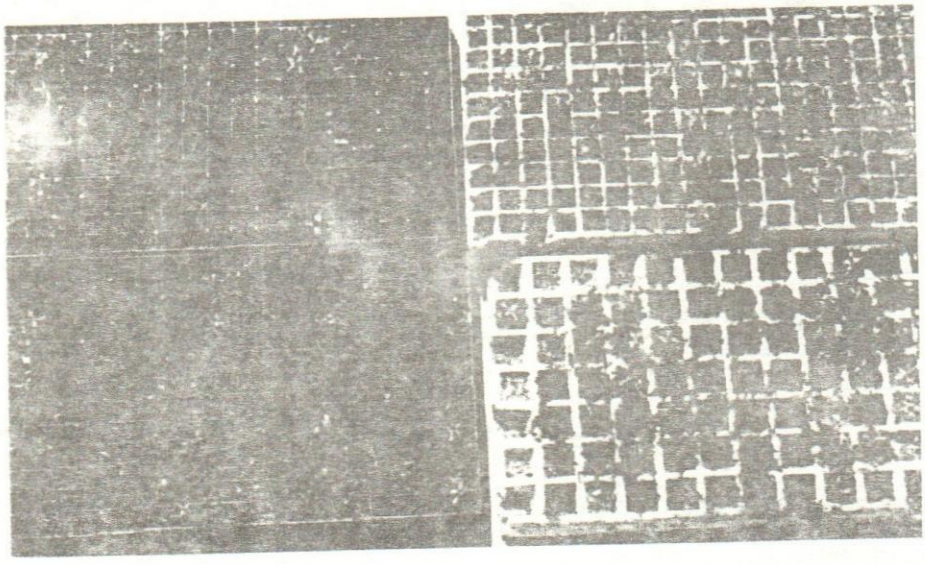


Figure (1): A side of viability test experiment for tomato seeds of M2-transgressive segregant plants.

3-Field work procedure:

The field work was carried out in a plastic green-house at Department of Agricultural Botany in the Agricultural Experiments and Researches Station, Faculty of Agriculture, Cairo University, Giza, Egypt, during the two growing seasons of 1999 and 2000, representing F3 and F4-generation; respectively.

Seeds of F2-transgressive segregant plants which showed high viability were sown with those of original cultivars and of imported hybrid in seedling trays(at mid February,1999) containing a mixture of peatmoss and vermiculite at ratio of 1:1. A month later, seedlings of all genotypes were harvested from trays and transplanted in a plastic green-house in a randomized complete block design with three replicates to follow up the vegetative and reproductive growth of F3-generation(Figure2). The investigated genotypes are as follows:

1-The three parental tomato cultivars (Marmande, UC 97-3 and Tamina).

2- Imported hybrid (Grandure).

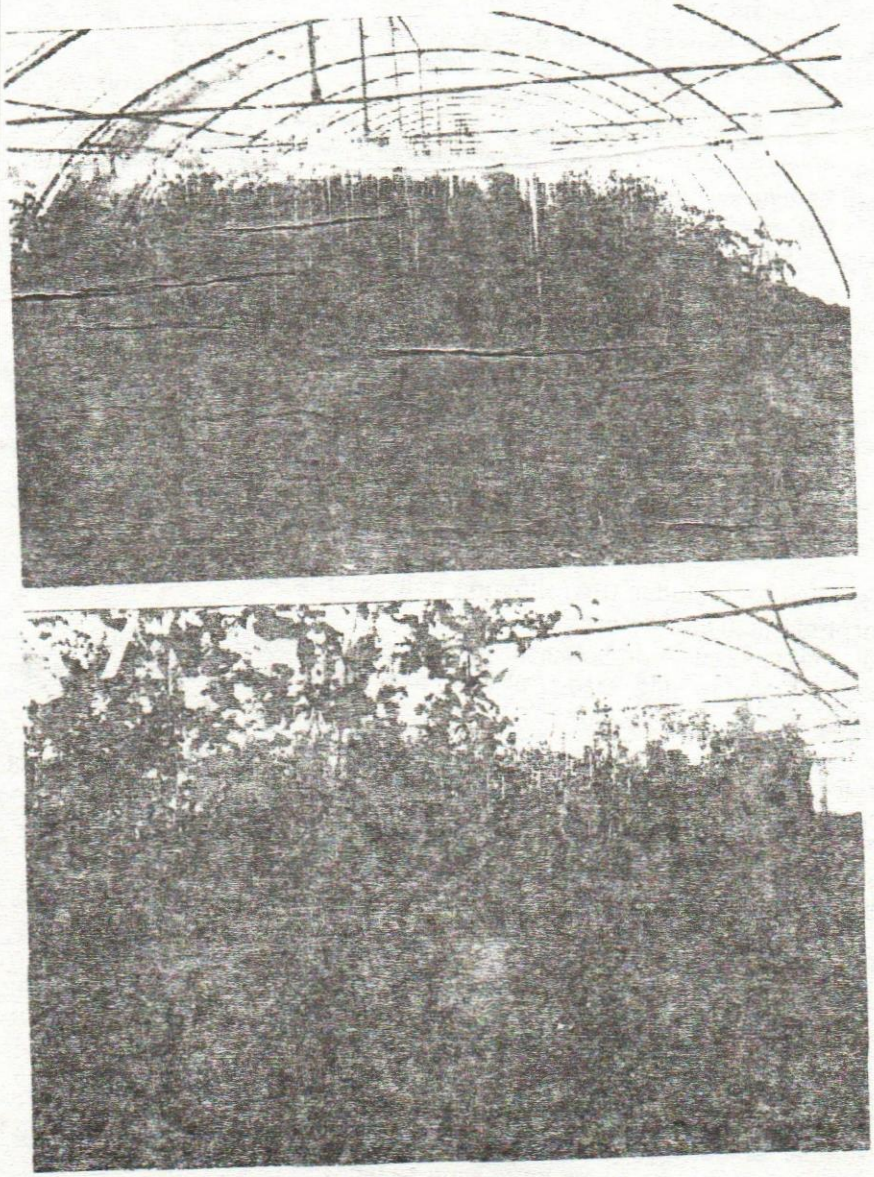


Figure (2): Two general views of the green-house experiment.
Above: Tomato entries at vegetative growth stage.
Below: Tomato entries at reproductive growth stage.

3- Seven selections from F2-transgressive segregant plants which showed high viability of their seeds as follows:

a- One selection from F2-transgressive segregant plants obtained from the cross Marmande x UC 97-3; namely MxU19-1.

b-Two selections from F2-transgressive segregant plants obtained from the cross UC 97-3 x Marmande; namely UxM 20-1 and UxM 20-22.

c- Two selections from F2-transgressive segregant plants obtained from the cross Marmande x Tamina; namely MxT 21-2 and MxT 21-22.

d- Two selections from F2-transgressive segregant plants obtained from the cross Tamina x Marmande; namely TxM 22-7 and TxM22-19.

The seedlings of each genotype were planted in ridges on both sides, the wide of the ridge was 100 cm and the interval between plants was 15-20 cm. Seedlings of all investigated entries (11) were arranged in a randomized complete block design in three replicates. Each replicate contained 20 plants from each entry.

The experiment was replicated in the second season at the end of February, 2000 to follow up the vegetative and reproductive growth of F4-generation, in the same manner that reported in F3-generation.

Pruning was done after 3 weeks of transplanting, single stem growth is maintained and the rest of the branches are pruned. The resulting plants were evaluated.

The evaluation includes the following characters:

1-Morphological characters:

All investigated morphological characters in both generations, were carried out at flowering stage (full blooming). The following characters were recorded:

a- Plant height (cm), measured from the cotyledonary node up to the shoot apex.

b- Thickness of the main stem (mm), measured at the median portion of the main stem by means of a vernier.

c- Number of leaves on the main stem.

2-Flowering date:

In both generations, date of flowering expressed as number of days from sowing date up to the date of opening of the first flower bud on plant.

3-Yield traits:

Recorded in both generations as follows:

a- Number of fruits per plant,calculated as the total number of all harvested fruits per plant in the whole harvesting season.

b- Yield of fruits (g) per plant, recorded as the total weight of all harvested fruits per plant throughout the entire harvesting season.

c- Average fruit weight (g) per plant, determined by dividing the total weight of all harvested fruits by their total number.

4-Fruit characters:

Estimated in plants of F3-generation as follows:

a-Thickness of the flesh (mm), measured by vernier.

b-Firmness (kg/cm^2). Mugness and Taylor pressure tested with 5/16 inch 2 plunger was used in this respect.

c-Total soluble solids,determined as a percentage by using a hand refractometer (Rick,1974) by putting a drop of juice for each fully ripened fruit after blending in a blender for 30 seconds on refractometer.

d- Vitamin C expressed as mg/100g fruits fresh weight (Anonymous, 1975).

5-Anatomical studies:

It was intended to carry out comparative anatomical studies on the best selections of the F3-generation, their original cultivars (parents) and imported hybrid (Grandure).For each selected entry, specimens were taken from the median internode of the main stem at flowering stage. Specimens were killed and fixed for at least 48 hr. in F.A.A.(10 ml. Formalin, 5 ml. glacial acetic acid and 85 ml. Ethyl alcohol 70%).The selected materials were washed in 50% ethyl alcohol, dehydrated in a normal butyl alcohol series, embedded in paraffin wax of 56C melting point, sectioned to a thickness of 20 microns, double stained with crystal violet erythrosin, cleared in xylene and mounted in Canada balsam (Willey, 1971).

Statistical analysis:

Data on morphological, yield and fruit characters of the investigated genotypes were subjected to conventional methods of analysis of variance according to Snedecor and Cochran (1982). The least significant difference (L.S.D.) for each character was calculated.

RESULTS AND DISCUSSION

I- Morphological characters:

The evaluation of the investigated morphological characters included : Plant height, diameter of the main stem and number of leaves developed on the main stem. Data on morphological characters are given in Table (1).

1-Plant height:

It is realized from Table (1) that the maximum height was recorded by the selection T x M 22-19 (206.5 cm in the F3 and 218.4 cm in the F4) followed by U x M 20-22 (202.0 cm in the F3 and 212.1 cm in the F4) and MxT 21-22 (194.0 cm in the F3 and 201.8 cm in the F4) which showed significant differences with all parental cultivars and imported hybrid. Among parental cultivars, Tamina recorded the maximum height (175.3 cm in the first season and 187.6 cm in the second one) and UC 97-3 recorded the minimum height (84.1 cm in the first season and 92.3 cm in the second one).

2-Stem diameter :

It is clear from Table (1) that the selection MxU 19-1 had the maximum stem diameter (12.4 mm in the F3 and 12.9 mm in the F4) which in turn being

statistically indifferent with the selections M x T 21-22 (12.2 mm in the F3 and 12.8 mm in the F4), UxM 20-22 (11.8 mm in the F3 and 12.4 mm in the F4), TxM 22-7(11.7mm in the F3 and 12.4 mm in the F4) and TxM 22-19(11.4 mm in the F3 and 11.9 mm in the F4) as well as with the imported hybrid Grandure (11.6 mm in the first season and 12.5 mm in the second one).The selections MxU 19-1 and MxT 21-22 surpassed the thicker parent Marmande (10.4 mm in the first season and 11.2 mm in the second one) with significant difference in both studied seasons.

Table (1): Mean values of some morphological characters and flowering date for eleven entries of tomato in two successive seasons of 1999 and 2000 representing F3 and F4 generations

Entries	Morphological characters						Flowering date (days)	
	Plant height (cm)		Stem diameter (mm)		No. of leaves/ Main stem			
	F3	F4	F3	F4	F3	F4	F3	F4
Parental cultivars:								
Marmande (M)	140.5	151.7	10.4	11.2	28.3	29.2	75.4	81.1
UC 97-3 (U)	84.1	92.3	7.9	8.6	18.5	19.7	79.1	86.3
Tamina (T)	175.3	187.6	9.5	10.4	31.9	33.1	71.5	76.8
Imported hybrid:								
Grandure (G)	156.5	165.9	11.6	12.5	29.8	30.7	64.0	69.2
Promising selections:								
M x U 19-1	165.0	176.5	12.4	12.9	31.4	32.6	75.7	79.9
U x M 20-1	113.3	122.4	9.8	10.3	23.2	24.8	81.8	87.2
U x M 20-22	202.0	212.1	11.8	12.4	36.8	37.7	62.0	66.8
M x T 21-2	185.2	196.3	10.2	11.0	34.6	35.9	70.7	78.1
M x T 21-22	194.0	201.8	12.2	12.8	35.0	36.4	72.4	78.8
T x M 22-7	188.0	197.4	11.7	12.4	34.5	35.7	79.8	84.2
T x M 22-19	206.5	218.4	11.4	11.9	35.5	36.6	70.6	75.9
L.S.D. (0.05)	13.7	14.2	1.3	1.4	2.1	2.5	5.1	5.9

3-Number of leaves /main stem:

Data presented in Table(1) clearly show that the selection U x M 20-22 recorded the highest number of leaves developed on the main stem (36.8 leaves in the F3 and 37.7 leaves in the F4) followed by T x M 22-19 (35.5 leaves in the F3 and 36.6 leaves in the F4), M x T 21-22 (35.0 leaves in the F3 and 36.4 leaves in the F4), M x T 21-2 (34.6 leaves in the F3 and 35.9 leaves in the F4) and T x M 22-7 (34.5 leaves in the F3 and 35.7 leaves in the F4) with no significant differences among them.

These entries surpassed significantly the best parent Tamina (31.9 leaves in the first season and 33.1 leaves in the second one) in this respect.

As inferred earlier, it could be stated that all studied morphological characters were significantly affected by genotype and some selections surpassed their parental cultivars in this respect.Similar results were also reported by Gabal *et al.* (1985) as well as by Jasmine *et al.* (1993).

II-Flowering date:

Results in Table (1) reveal that the entry U x M 20-22 flowered earlier (62.0 days in the F3 and 66.8 days in the F4) than their parental cultivars and followed by the imported hybrid Grandure (64.0 days in the first season and 69.2 days in the second one) which showed significant difference with any of the parental cultivars and with any of the other selections in this respect.

In this connection, Martinetti (1985) found significant differences among 13 tomato genotypes for days to flowering, being in agreement with the present findings.

III- Yield characters:

Data on yield characters are presented in Table(2).Traits which were followed up included: Total number of fruits per plant, total yield of fruits (g) per plant and average weight of fruit (g).

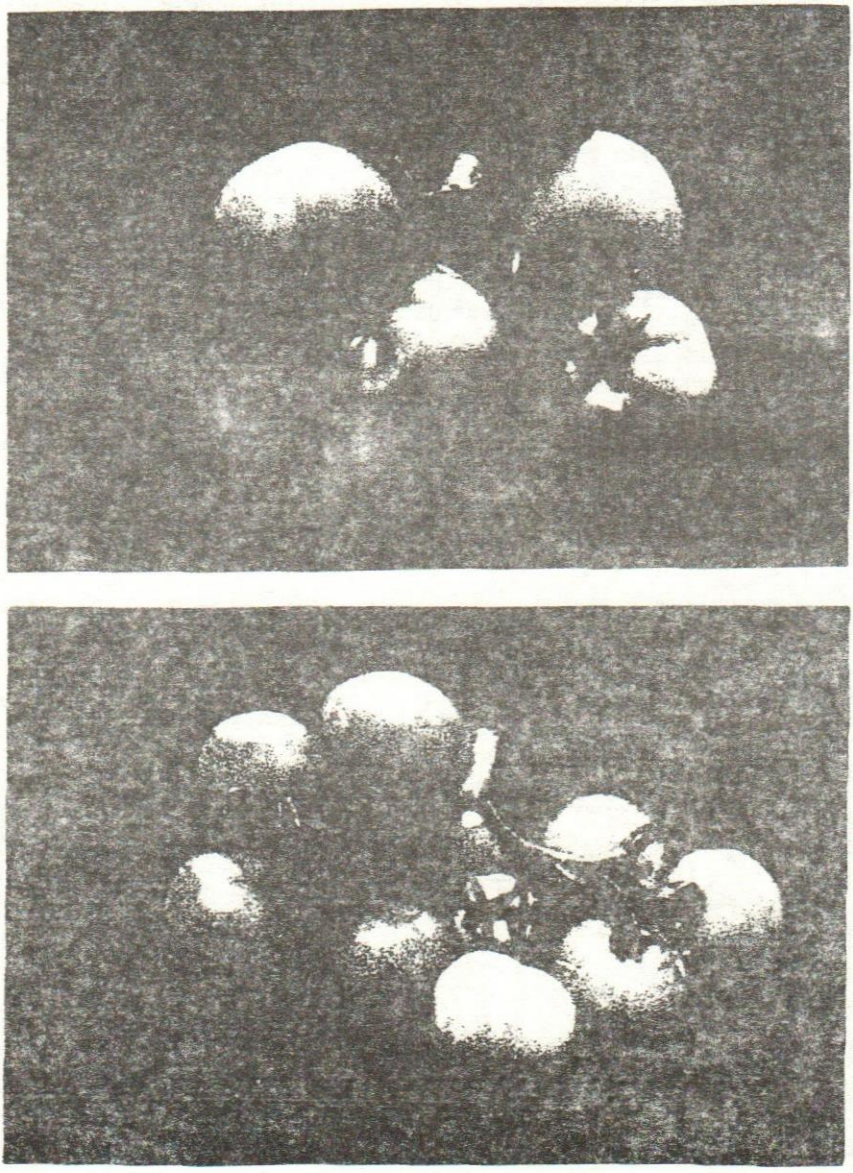
1-Total number of fruits / plant:

It is realized from Table (2) that the highest number of fruits per plant, in the F3-generation, was recorded by the selection TxM 22-7(21.5 fruits) followed by MxT 21-22(21.2 fruits)without significant difference between them. Such selections surpassed the best parental cultivar Tamina (17.2 fruits) and the imported hybrid Grandure (11.1 fruits) with significant difference in this respect. In the F4-generation, the highest number of fruits per plant was recorded by the selection TxM 22-19 (26.8fruits) which in turn being statistically indifferent with the selection TxM 22-7(26.3 fruits).These two selections exceeded the best parental cultivar Tamina (23.3 fruits) and the imported hybrid Grandure(14.4 fruits)with significant difference in this concern.

Photographs in Figure(3) clearly show the superiority of the promising selection TxM 22-7 over the imported hybrid Grandure in number of fruits per the first cluster.

Table (2): Mean values of yield characters for eleven entries of tomato in two successive seasons of 1999 and 2000 representing F3 and F4 generations

Entries	Yield characters					
	Total number of Fruits / plant		Total yield of Fruits (g) / plant		Average weight of fruit (g)	
	F3	F4	F3	F4	F3	F4
Parental cultivars:						
Marmande (M)	13.0	15.6	782.6	1037.2	60.2	66.4
UC 97-3 (U)	10.5	12.2	454.7	562.6	43.3	46.1
Tamina (T)	17.2	23.3	545.2	834.5	31.7	35.8
Imported hybrid:						
Grandure (G)	11.1	14.4	1015.7	1289.5	91.5	89.5
Promising selections:						
M x U 19-1	18.4	21.8	1081.9	1364.3	58.8	62.6
U x M 20-1	19.6	22.3	872.2	1068.7	44.5	47.9
U x M 20-22	16.3	18.2	1338.2	1512.5	82.1	83.2
M x T 21-2	16.5	24.9	1092.3	1740.0	66.2	69.8
M x T 21-22	21.2	23.8	960.4	1148.1	45.3	48.2
T x M 22-7	21.5	26.3	1057.8	1457.1	49.2	55.4
T x M 22-19	19.2	26.8	1082.9	1653.4	56.4	61.7
L.S.D. (0.05)	1.9	1.7	79.6	102.5	5.7	6.4



Figure(3): Mature fruits of the first cluster of the imported hybrid Grandure (A) and of the promising selection T x M 22-7 (B).

2-Total yield of fruits (g) / plant:

Data presented in Table (2) reveal that the imported hybrid Grandure significantly exceeded all parental cultivars in yield of fruits per plant in both studied seasons. In the F3-generation, the maximum yield (1338.2 g) was recorded by the selection U x M 20-22 which exceeded the best cultivar (Marmande, 782.6 g) by 71 % and the imported hybrid (Grandure, 1015.7 g) by 31.8 % with significant difference in this respect. The descending order of yield for promising selections was 1338.2, 1092.3, 1082.9, 1081.9, 1057.8, 960.4 and 872.2 g for UxM 20-22, MxT 21-2, TxM 22-19, MxU 19-1,TxM 22-7, MxT 21-22 and UxM 20-1; respectively. In the F4-generation, the highest yield (1740.0 g) was obtained by the promising selection MxT 21-2 which exceeded the best cultivar Marmande (1037.2g) by 67.8% and the imported hybrid Grandure (1289.5 g) by 34.9 % with significant difference in this concern. The descending order of yield for the promising selections was 1740.0, 1653.4, 1512.5, 1457.1, 1364.3, 1148.1 and 1068.7g for MxT 21-2, TxM 22-19,UxM 20-22,TxM 22-7,MxU 19-1, MxT 21-22 and UxM 20-1; respectively.

Photographs shown in Figure (4)exhibit the habit of mature plants of tomato through reproductive growth (fruiting stage) for the three parental cultivars and the imported hybrid. Whereas, photographs shown in Figure (5) exhibit the habit of mature plants through reproductive growth for the best four selections, in the F4-generation, which exceeded significantly the imported hybid Grandure in yield of fruits per plant; i.e., MxT 21-2, TxM 22-19, UxM 20-22 and TxM 22-7.

3-Average weight of fruit (g):

It is obvious from Table (2) that the maximum weight of fruit was recorded by the imported hybrid Grandure, being 91.5 g in the first season and 89.5 g in the second one. It is clear that the imported hybrid Grandure surpassed significantly all parental cultivars as well as all promising selections in both studied seasons. The only exception was found in the case of the selection UxM 20-22 in the F4-generation where the average weight of its fruit was 83.2g, being statistically indifferent with that of the imported hybrid Grandure (89.5g). Moreover, such selection (U x M 20-22) exceeded significantly the better cultivar (Marmande) in both studied generations with respect to average weight of fruit.

From the aforementioned results it could be stated that yield characters under investigation were significantly affected by the genotype and some selections surpassed significantly their parental cultivars in this respect. Similar results were also reported by Gabal *et al.* (1985), Martinetti (1985), Abu-Baker and Suwwan (1986), Nassar (1988), Prasad and Singh (1990) and Jasmine *et al.* (1993)

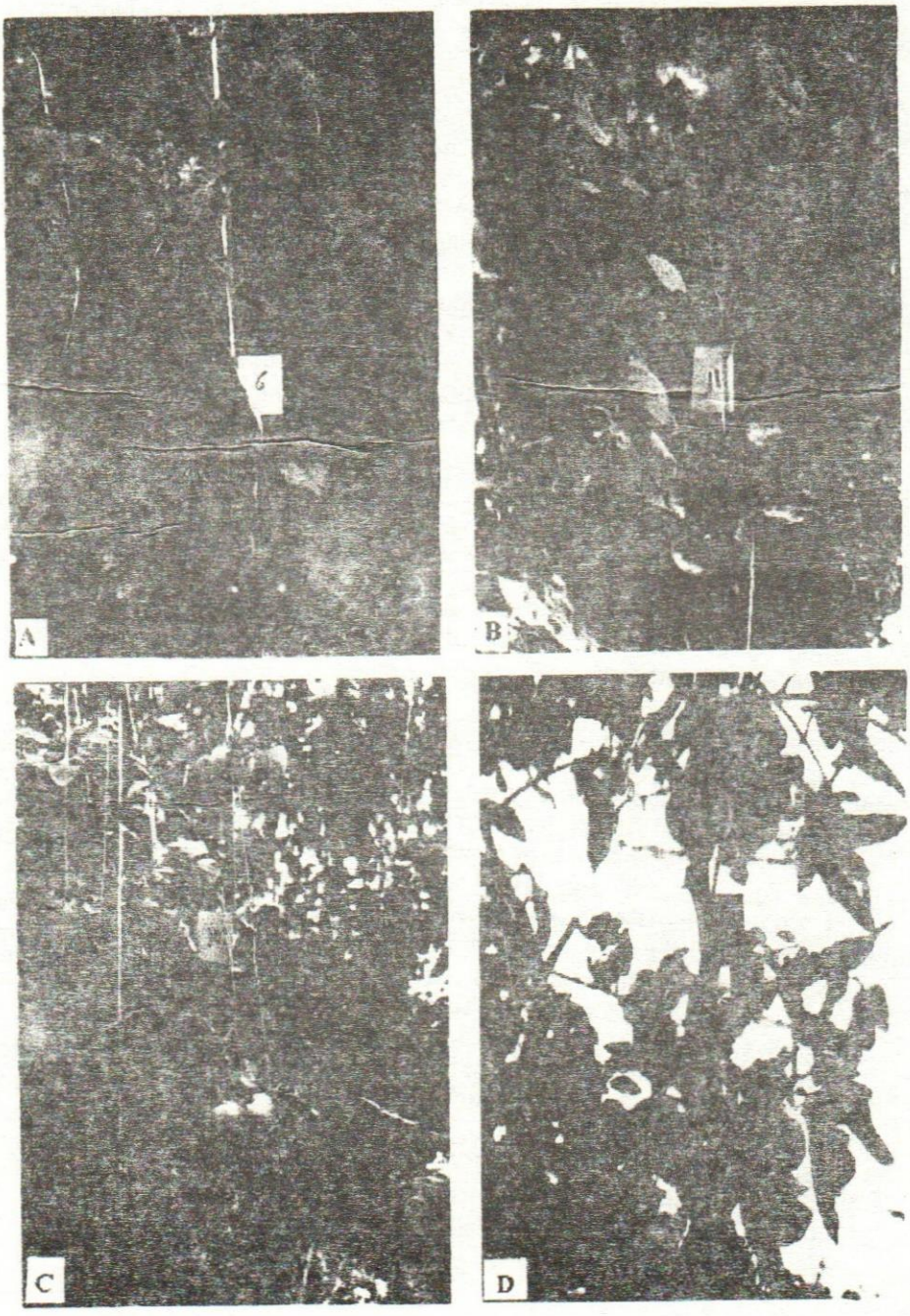
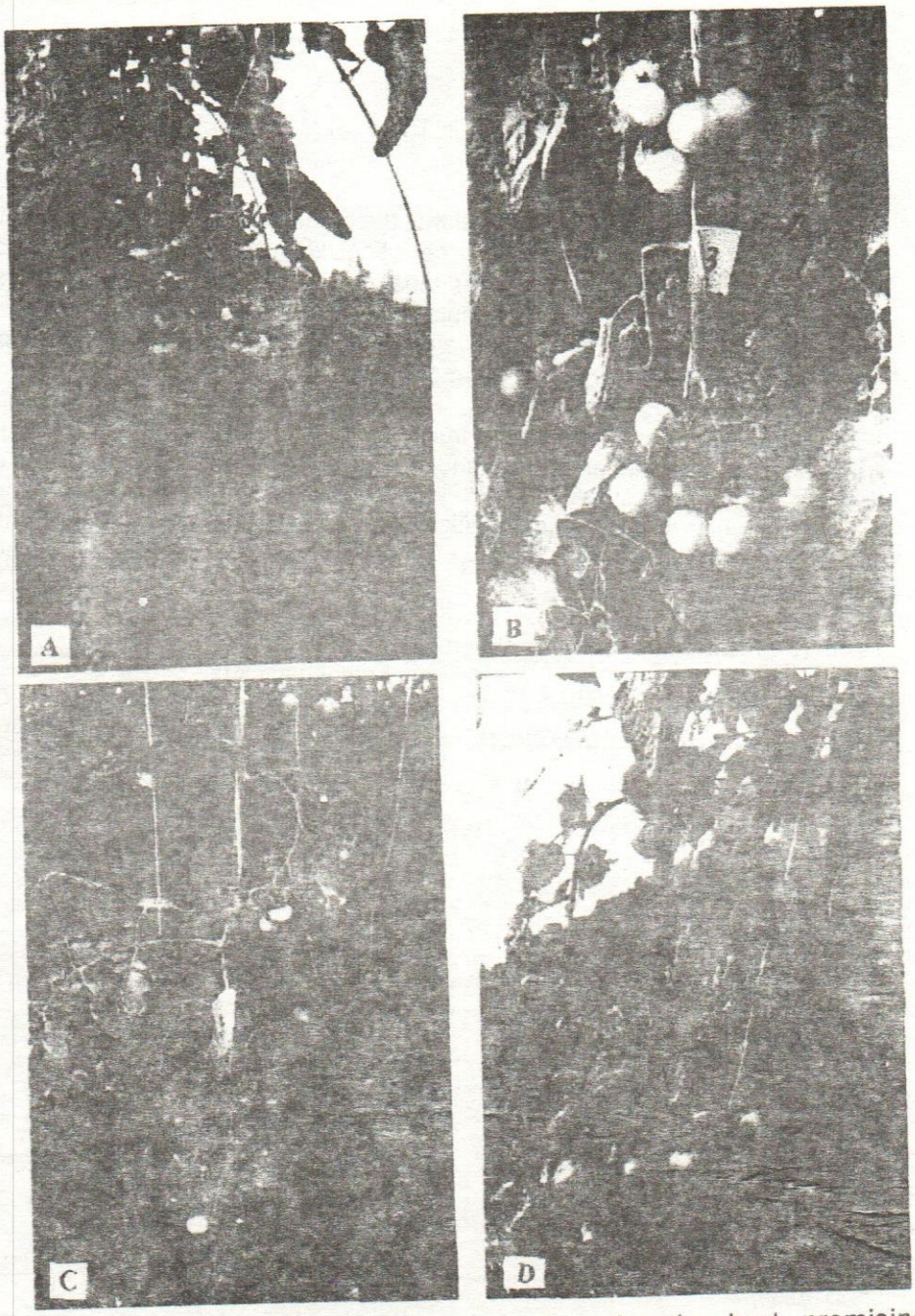


Figure (4): Habit of mature plants for:
A-Tomato cv. UC 97-3. B- Tomato cv. Marmande.
C-Tomato cv. Tamina. D- Tomato imported hybrid Grandure.



Figure(5):Habit of mature tomato plants for the best promising selections.

A-Promising selection M x T 21-2.
B-Promising selection T x M 22-19.
C-Promising selection U x M 20-22.
D-Promising selection T x M 22-7.

IV- Fruit characters:

Data on fruit characters are given in Table (3).

1-Flesh thickness:

Data presented in Table (3) reveal that the highest value of flesh thickness (8.3 mm) was recorded by the selectionUxM 20-22 which exceeded significantly all other entries except those of the parental cultivar UC 97-3 (7.8 mm) and imported hybrid Grandure (8.1 mm) where the differences were insignificant.Whereas, the lowest value of flesh thickness (4.7 mm) was recorded by the parental cultivar Marmande.

2-Firmness:

It is realized from Table (3) that fruits of UC 97-3 were significantly firmer than those of Tamina and Marmande as well as of the imported hybrid Grandure. The highest value (1.35 kg / cm^2) was recorded by the selection U x M 20-1 which in turn being statistically indifferent with the other selections except those of MxT 21-2 and MxT 21-22 where the difference proved significant.

Table (3): Fruit characters for eleven entries of tomato

Entries	Fruit characters			
	Flesh thickness (mm)	Firmness (kg / cm^2)	Total soluble solids (%)	Vitamin C (mg /100g)
Parental cultivars:				
Marmande (M)	4.7	0.92	3.60	30.3
UC 97-3 (U)	7.8	1.28	4.16	23.0
Tamina (T)	6.0	1.17	4.12	29.5
Imported hybrid:				
Grandure (G)	8.1	1.15	4.21	32.7
Promising selections:				
M x U 19-1	6.8	1.33	4.40	40.5
U x M 20-1	7.3	1.35	4.30	54.2
U x M 20-22	8.3	1.31	3.93	43.2
M x T 21-2	6.5	1.24	3.90	29.5
M x T 21-22	7.6	1.21	3.70	28.7
T x M 22-7	6.7	1.32	4.20	29.1
T x M 22-19	6.7	1.31	4.65	28.7
L.S.D. (0.05)	0.63	0.11	0.44	3.9

3-Total soluble solids:

It is clear from Table (3) that the selection T x M 22-19 had the highest percentage of total soluble solids (4.65) which significantly surpassed all parental cultivars and the imported hybrid. The least percentage (3.6) was detected by the parental cultivar Mamande.

4-Vitamin C:

It is obvious from Table (3) that the fruits of the selection U x M 20-1 had the highest value (54.2 mg / 100 g fruits fresh weight) of vitamin C which exceeded significantly all other entries. The lowest value 23 mg was obtained by UC 97-3.

From the above mentioned results it could be stated that fruit characters under investigation were significantly affected by the genotype and some selections surpassed significantly their parental cultivars in this respect. Similar results were also obtained by Gabal *et al.* (1985) and Nassar (1988).

V- Anatomical studies:

Microphotographs illustrating transverse sections through the median internode of the main stem of tomato cultivars Marmande and UC 97-3 as well as of the imported hybrid Grandure and the promising selection U x M 20-22 at flowering stage are shown in figure (6). It is clear that the whole stem diameter was larger in the selection U x M 20-22 due mainly to the increase in cortex and vascular cylinder. The increment in cortex thickness was attributed to the increase in number of cell layers. The larger thickness of vascular cylinder was due to the larger amount of conducting elements especially xylem which was characterized by considerably larger vessels.

Future Prospect

Further investigations are looked forward to study the behavior of MxT 21-2, TxM 22-19, UxM 20-22 and TxM 22-7 as promising selections in advanced generations in order to select high yield strains with high quality to release them as a new improved tomato cultivars in the future. This may save a lot of money used to import hybrid seeds, minimize the extension of viral diseases which often come with the imported seeds and reduce the cost of production per unit area.

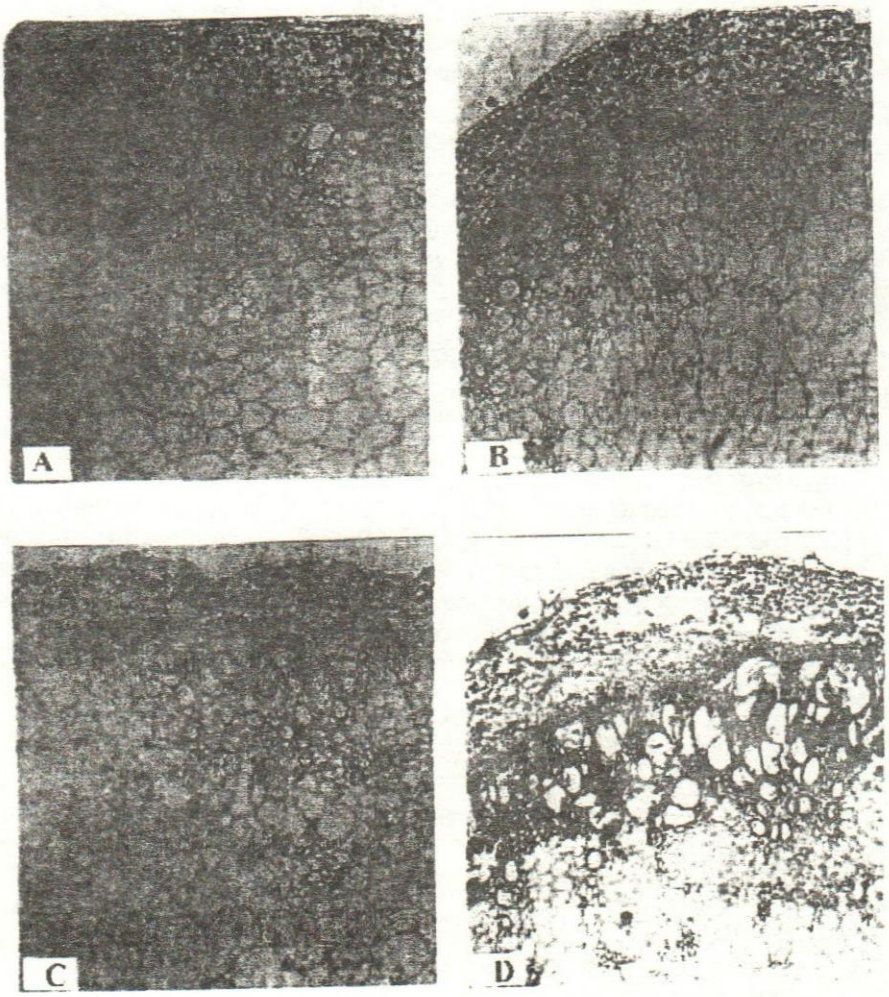


Fig. (6): Transverse sections through the median internode of the main stem for some tomato entries at flowering stage. (X 52)
A-The parental cultivar Marmande.
B-The parental cultivar UC 97-3.
C-The imported hybrid Grandure.
D-The promising selection U x M 20-22.

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استنباط و تقييم سلالات محلية من الطماطم عالية المحصول و الجودة

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من خلال برنامج للتربية بالتهجين و الانتخاب لزيادة المحصول و تحسين صفات الجودة للطماطم و الذى تم تنفيذه بواسطة قسم النبات الزراعى – كلية الزراعة – جامعـــة القـــاهرة (القبيصى ١٩٩٦). تم الحصول على عدد من انعزالات الجيل الثانى المتفوقة و الناتجة من التـــهجين بين اصناف الطماطم مارمند و يوسى و تامينا. تم اختبار حيوية بذور الإنعـــزالات المتفوقـــة للتأكد من حيويتها قبل إجراء التجربة الأساسية حيث تم إنتخاب الإنعـــزالات ذات البـــذور عاليـــة الحيوية و زراعتها فى صوانى من البلاستيك مع بذور الآباء و بذور الهجين المستورد (جراندیور) و ذلك فى بيئة من البيتموس و الفيرموكيولايت بنسبة ١:١ و ذلك فى منتصف شهر فبراير ١٩٩٩, وبعد حوالى شهر و نصف تم نقل الشتلات لزراعتها فى صوبة بلاستيك بمحطة التجارب والبحوث الزراعية التابعة لكلية الزراعة جامعة القاهرة و ذلك فى بداية شـــهر ابريـــل١٩٩٩ فـــى تجربـــة قطاعات عشوائية كاملة من ثلاثة مكررات لمتابعة الجيل الثالث و تقييمة مـــع الآبـــاء و الـــهجين المستورد. و فى أواخر شهر فبراير من العام التالى (٢٠٠٠) تم زراعة البذور المتحصل عليها من نباتات الجيل الثالث للحصول على نباتات الجيل الرابع لتقييمة مع الآباء و الهجين المستورد فـــى تجربة مماثلة لتجربة الجيل الثالث. تم دراسة الصفات المورفولوجية و التبكير و صفات المحصول و الجودة للثمار و دراسة التركيب التشريحى للساق الرئيسية.

أوضحت النتائج المتحصل عليها تفوق الإنعزالات المنتخبة معنويا على الآباء و الـــهجين المستورد فى جميع الصفات المدروسة حيث تفوقت بعض المنتخبات علـــى أفضـــل الآبـــاء فـــى المحصول بنسبة تصل إلى ٧٠% و على الهجين المستورد بنسبة تصل إلـــى ٣١% زيـــادة فـــى محصول النبات من الثمار.

لذا يوصى بتقييم هذه المنتخبات التى ثبت تفوقها على الآباء و الهجين المســـتورد لمـــدة جيلين آخرين للتأكد من ثبات صفات المحصول العالى و الجودة لثمار المنتخبات التى ثبت تفوقها و ذلك قبل أن يوصى بإكثارها و نشرها كأصناف جديدة محلية من الطمـــاطم عاليـــة المحصـــول و الجودة.