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SELECTION OF NEW SWEET POTATO LINES (*Ipomoea batatas* L. Lam) THROUGH TRUE SEEDS UNDER DELTA CONDITIONS

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ABSTRACT: *This study was carried out at the Horticultural Research Station, El-Kanater El-Khiria during the three successive seasons (2006, 2007 and 2008). The field experiments were conducted to develop and evaluate 24 new sweet potato lines from true seeds. Plant vegetative growth characters, yield and its component and tuber root chemical characters were studied. The results could be summarized as follows:*

(1) Significant differences were found among studied breed lines in all experimental seasons in all studied traits.

(2) Significant differences for plant growth characters (number of branches per plant, stem length and number of leaves on main stem), yield and its component (total yield ton/fed., number of tuber roots / plant and average weight of tuber root) were recorded for the selected new lines and the two check cvs. (Min. 6/69 and Mabrouka).

(3) The lines numbers 6, 26 and 29 gave the highest tuber root yield which produced up to 25 ton / feddan. The new lines No. 6 and 29 recorded. The highest number of tuber roots per plant, since they surpassed a the two check cvs. Also, the lines No. 6, 26, 28, 29 and 20 recorded the heaviest root compared to the check cv. Mabrouka, while none of the resulted lines statistically exceeded the check cv. Min. 6.

(4) Dry matter and tuber root chemical contents (such as total carbohydrates, total sugar, vitamin C, carotene and protein). Significantly varied among the new lines under study and two check cvs.

(5) The chemical analysis of NPK showed significant differences among the selected lines and the two check cvs.

Generally, the selected lines number 6, 26, 28 and 29 are recommended for cultivation in Delta Egypt.

Key words: *Sweet potato (Ipomoea batatas), lines, true seeds, selection clones.*

INTRODUCTION

Sweet potato (*Ipomoea batata* L.) is one of the most important vegetable crops in Egypt. It is grown for human consumption and some industrial purposes. In Egypt commercial local cultivars of sweet potato and six hybrids recorded in Hort. Res. Department were planted and evaluated for

yield characteristics by Salem (1999). Tuberous roots are good source of vitamin A. It's deficiency is one of the major health problems facing developing countries in the present time (Woolfe, 1992). Also, sweet potato roots are good source of some minerals.

Therefore, this study was performed to develop new clones of sweet potato, from true seeds, suitable for table consumption or industrial purposes.

Evaluation of some new sweet potato lines was conducted by Salem (1999). She found that the average number of branches in these lines ranged from 6.0 to 21.5 per plant, stem length ranged from 47.04 to 179.58 cm, and No. of leaves on the main stem ranged from 24.84 to 56.50. In a study carried out under Minufiya province conditions by El-Denary (1998), varietal differences in number of branches, being 20.9, 21.4 and 20.4 in the cultivars Mabrouka, Mansoura and 925, respectively. In the same study he found that the number of leaves in sweet potato cultivars Mabrouka, Mansoura and 925 was 392.7, 430.4 and 420.9, respectively.

The study of Ishiguro *et al.* (2004) showed that the yield of sweet potato cultivars Benimasari is considerably greater than of Kokei No. 14 and less than that of Koganesengan cv. Dry matter is slightly more than that of Kokei No. 14 and less than Koganesengan. The storage ability of the roots is sufficient throughout winter.

Lai *et al.* (2003) in a study on breeding of a new sweet potato variety Tainung No. 72 found that CYY 86-01, a sweet potato clone, was selected in China from progenies of a poly cross population through primary and advanced yield trials which were conducted in 1998 and 1999, respectively. The yield of medium sized tubers TNG 72 was higher than that of TNG 57 by 2-fold. TNG 72 also had higher contents of carotenoid, vitamin C and P than TNG 57.

Mwanga *et al.* (2003) found in a study on release of six sweet potato cultivars (NASPT1'to NASPOT 6') in Uganda which were selected from bulk seed of an open pollinated poly cross of 24 parents, showed that they were high good storage root shape, dry matter contents and root yields.

The study of Zhang *et al.* (2003) on breeding of new sweet potato variety Longshu 3. Showed this cv. had high yield, good quality, high contents of beta-carotene and ascorbic acid. In studied on sweet potato. High root yield potential (17 t/ha), and high dry matter (33%) (Carpena *et al.*, 2009). Lee *et al.* (2008) found that the average yield storage root was 15.0 ton/ha for the new sweet potato variety "Morning purple". Number of storage roots over 50 gm per plant was 2.6 and the average weight of storage root was 143.0 gm. They also found in a study on a new sweet potato variety "Morning white" the average yield of storage root was 140 ton/ha. Number of storage roots over 50 gm / plant was 2.5 and the average weight of storage root was 140 gm. Too in a study for breeding of a new sweet potato. Lai *et al.* (2008) found that the

root-tuber yield of Tainung No. 73 was 25.999 kg / ha in 2002 (1.2% higher than the control variety, Tainung No. 57), 29.334 kg/ha in 2003 (21.1% higher than the control variety No. 57) and averaged yield 33.899 kg/ha in 2005 and 2006 (lower than Tainung No. 57). Yang (2006) found that new sweet potato cultivar Longshu 1, had high carotene and vitamin C contents and can be consumed as such or processed into high quality products, such as chips. Wu *et al.* (2008) found that a new sweet potato variety Zheshu 132, a high sugar content (total soluble sugar 5.93% and the average yield could reach 31.72 ton/ha. Moreover, about 75% of the tubers were good enough for the market.

The study of Mwanga *et al.* (2009) showed that (Happymi), the average yield of the storage root in the cv. Happmi is 37.0 ton/ha, which was 52% higher than that of the control cultivar Sinhwangmi. The number of storage roots (over 50 gm per plant) was 4.1 and the average weight storage root was 162.0 gm. They added that, the average yield of storage root of cultivar "Yeonhwangmi" was 25.1 ton/ha, which was 22% higher than that of Yulmi. The number of storage roots over 50 gm/plant was 3.3 and the average weight of storage root was 128 gm.

MATERIALS AND METHODS

The present investigation was carried out at the Experimental Farm of Hort. Res. Station, El-Kanater El-Khyria, during 2006 to 2008 seasons. The plant materials used in this study were true seeds in 2006 as seedlings from an open pollinated poly cross nursery. Seedlings and line selections were carried out from 2007 to 2008 and preliminary and advanced yield trials were carried out from 2007 to 2008 seasons. Only 24 clones were selected from 200 plants and evaluated with the local cultivar (Mabrouka) and new cultivar (Minufiya 6/96) in field experiments during 2007 and 2008 seasons. The evaluated were No. 1, 2, 3, 4, 6, 7, 8, 9, 10, 12, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 28 and 29.

A randomized complete block design with three replicates was used in all evaluation experiments. Each plot contained 18 plants spaced at 70 × 30 cm.

In all seasons, the planting date was 5, May. Usual fertilization and irrigation were practiced as used with commercial production of sweet potato. The harvest was done at full maturity (about 150 days after transplanting).

The studied traits were:

1. Plant characters:

Number of branches / plant, stem length of the main stem cm, (from ground level to the terminal bud of longest vegetative, number of branches / plant and No. of leaves on main stem).

These characters were determined for three plants in each replicate in all seasons (110 days after transplanting).

2. Yield and its component:

Total yield of tuber roots ton / fed., average number of tuber roots / plant, average weight of one storage root (gm), average length and diameter of tuber root (cm) were determined. Dry matter for tuber roots percentage was estimated at time after curing. One hundred gms of shredded fresh weight sample were oven dried at 70°C for 4 days.

3. Chemical analysis:

Total nitrogen, total protein, phosphorus and potassium content in tuber roots were determined using the microkjeldahl apparatus as described by Peach and Tracy (1956), multiplying the nitrogen content by 6.25 as described by Pregl (1954), colorimetric method described by Murphy and Riley (1962) and flame photometer according to Brown and Lilliland (1946), respectively. Total carbohydrate content in tuber roots was determined according to method described by Smith *et al.* (1956). Total sugars content was determined in dry matter material according to Mcilory (1948). Carotenoid and vitamin C according to AOAC (1970).

4. Statistical analysis:

All data obtained during both seasons were subjected to statistical analysis according to Snedecor and Cochran (1972). Mean values representing the various investigated genotypes were subjected combined analysis for data of the two seasons were compared by the Duncan multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

The following Tables (1 – 4) show the combined data of the two experimental seasons (2007 & 2008), for 24 new sweet potato lines and two check cultivars with regard to some foliage traits, tuber roots and some chemical composition of tuber roots characters.

1. Plant characteristics:

1.1. Number of branches per plant:

Significant differences among the studied new lines concerning this trait were observed as shown in Table (1). The average branch number ranged from 8.18 (in the line No. 24) to 34.01 (line the line No. 16). In this respect the line 16 showed the maximum value.

On the other hand, the lines (No. 8, 9) showed lowest values in the number of branches per plant. The remaining new lines were intermediate in this character. Their values ranged from 8.18 to -17.01 (in the lines No. 24 and 14), respectively. These results were in agreement with those obtained by El-Denary (1998), Salem (1999), Salim (2002) and Salem *et al.* (2009).

Table (1). Mean performance of evaluated sweet potato breeding lines and check cultivars for number of branches per plant, stem length, number of leaves on main stem (combined-data) in 2007 & 2008 seasons.

Genotypes	Number of branches/plant	Stem length (cm)	No. of leaves on main stem
1	8.67l	110.0ij	18.00ef
2	13.94h-j	130.7e-g	22.33cd
3	15.37gh	149.7cd	21.03d
4	21.60d	133.3e-g	24.00bc
6	11.36k	140.0d-f	24.67b
7	20.01de	140.1d-f	17.67ef
8	18.47ef	159.3c	18.33e
9	19.93de	195.7b	27.67a
10	13.33ij	129.0f-h	13.67h-j
12	13.08jk	155.7c	15.33gh
14	17.01fg	114.0ij	18.00ef
15	11.44k	102.7jk	18.33e
16	34.01a	142.7de	13.00ij
17	12.82jk	104.0jk	10.00kl
18	19.97de	158.3c	11.67jk
20	17.40f	118.7hi	9.00lm
21	15.00hi	94.00k	8.00m
22	15.00hi	158.3c	13.00ij
23	13.00jk	131.0e-g	22.67cd
24	8.18l	203.3b	19.00e
25	9.63l	125.7gh	22.33cd
26	14.64h-j	200.0b	17.33ef
28	23.34c	199.0b	16.00fg
29	18.00f	156.7c	14.00hi
Minufiya 6/96 check	17.33f	143.0de	12.67ij
Mabroka check	26.67b	293.3a	21.33d

Mean within a column followed by different letters are significantly different at the 0.05 level.

1.2. Stem length (cm):

Data presented in Table (1) indicate significant differences among most studied new lines in this trait. The stem length ranged from 94.0 to 200.0 cm in No. 21 and 26, respectively. The check cv. Mabrouka had the longest stem followed by the new lines No. 24, 26, 28, 9, 8, 18, 29 and 12. All these new lines were higher than the check cultivar Min. 6 in this trait. The shortest line in No. 21, while the remaining lines had intermediate value in this respect. Similar results were obtained by other investigators on other genotypes (El-Denary, 1998; Salem, 1999; Salim, 2002 and Salem *et al.*, 2009).

1.3. Number of leaves on main stem:

As shown in Table (1), the genotypes studied significantly differed in this respect. The average number of leaves on main stem ranged from 8.0 to 27.67 in the lines No. 21 and 9, respectively. The new lines No. 9, 6, 4 and 23 showed the maximum values compared with the low check cultivars and remaining new lines. On the other hand, the new lines No. 21 and 20 had lower values. Number of leaves for remaining lines was intermediate. They ranged from 10.0 to 18.33 in the lines No. 17 and 8, respectively. Similar results were obtained by El-Denary (1998), Salem (1999), Salim (2002) and Salem *et al.* (2009).

2. Total yield and it's components:

2.1. Total yield (ton/fed.):

Significant differences among the evaluated clones were observed in total tuber yield as weight of root ton/fed. (Table 2). The highest total yield was recorded by four line No. 12, 6, 26 and 29, since they produced more than 25 ton/fed. which increased the high check cv. by 15.34 in the line 12 to 62.90% in the line No. 29. On the other hand, the lowest yield values were observed by the three lines 10, 24 and 21. They gave total tuber yield less than the two check cvs. i.e., Min. 6 and Mabrouka. The remaining lines were intermediate in this respect.

Generally most evaluated lines or clones significantly exceeded the check cvs. in total yield. It is easily to observed that 16 lines significantly out yielded the cultivar Mabrouka (the lowest check cv.) in average total yield by percentages ranging from 16.95% in the line No. 1 to 115.77% in the line No. 28. There are six lines insignificantly differed from the check cv. Mabrouka (lines No. 2, 16, 17, 18, 23 and 25). It could be concluded that, these new lines (especially 6, 26 and 29) could be recommended as new cultivars for using in commercial production. Varietal differences in total yield of sweet potato were also found by many authors Mwanga *et al.* (2003), Zhany *et al.* (2003), Lee *et al.* (2008) and Carpena *et al.* (2009).

Table (2). Mean performance of evaluated sweet potato breeding lines and check cultivars for total yield of tuber roots ton/fed., number of roots/plant, average weight of tuber root, root length and diameter (cm) (combined-data) in 2007 & 2008 seasons.

Genotypes	Total yield (ton/fed.)	Number of tuber roots/plant	Average weight of tuber roots/(g)	Root length (cm.)	Root diameter (cm.)
1	12.90jk	4.54f	291.0l	18.80i	4.46mn
2	12.08kl	3.75h-j	366.0gh	17.22kl	4.43n
3	20.67e	4.35fg	452.0ab	22.07bc	5.15h-j
4	15.44gh	3.64ij	342.7h-k	17.53k	5.00jk
6	26.90c	7.59ab	475.0a	23.92a	6.81b
7	23.84d	5.80cd	420.0c-e	24.47a	6.06d
8	16.72g	4.50f	395.3ef	19.88h	3.88o
9	13.59ij	4.20fg	357.0g-i	16.56l	7.46a
10	8.27n	4.10gh	365.0gh	17.87jk	5.75e
12	25.93c	5.54d	317.0k	21.82b-d	5.07i-k
14	18.39f	4.10gh	406.0de	20.77e-g	5.12h-j
15	14.59hi	4.47f	380.0fg	18.50ij	5.23g-j
16	12.09kl	4.42fg	376.7fg	20.52f-h	5.59ef
17	10.25m	3.48ij	252.7m	21.97b-d	4.88kl
18	11.05lm	3.38j	345.3h-j	18.82i	5.33gh
20	23.52d	5.08e	433.3bc	20.63f-h	5.74e
21	10.60lm	3.54ij	345.0h-j	22.62b	5.44fg
22	19.42ef	3.75h-j	327.7jk	21.18d-f	5.20g-j
23	10.62lm	3.67ij	333.7i-k	21.58c-e	4.67lm
24	9.83m	2.93k	272.7lm	17.75jk	3.43p
25	11.30lm	4.07gh	322.7jk	18.97i	5.24g-j
26	34.43b	7.32b	468.3a	24.53a	4.69lm
28	23.82d	5.98c	463.3a	21.48c-e	5.26g-i
29	36.62a	7.74a	451.7ab	20.21gh	5.63ef
Minufiya 6/96 check	22.48d	4.99e	471.7a	21.32c-f	6.58c
Mabroka check	11.03lm	3.77hi	426.7b-d	17.39k	5.44fg

Mean within a column followed by different letters are significantly different at the 0.05 level.

2.2. Number of tuber roots / plant:

Data concerning total tuber root number per plant are shown in Table (2). Average number of tuber roots/plant ranged from 2.93 to 7.74 with a mean of 5.34 roots/plant in the lines, compared with 4.99 to 3.77 with mean 4.38 root / plant in the check cultivars. The lines No. 12, 7, 28, 26, 6 and 29 produced the highest values in total root number. Their means ranged from 5.54 to 7.74 roots / plant. Unlikely, the lowest number of roots/plant (2.93, 3.38, 3,67 and 3.75) was shown by the lines 24, 18, 23 and (2, 22), respectively. The remaining lines were intermediate between the two groups.

Data also showed that the lines 6 and 29 surpassed the two check cvs. Mabrouka and Min. 6 by 205.31 and 155.11% (in the line 29) and 201.33 and 152.10% (in the line 6), respectively.

These results were in agreement with those obtained by Wu *et al.* (2008), Lee *et al.* (2008) and Mawanga *et al.* (2009).

2.3. Average tuber root weight (gm):

Data of the average root weight are listed in Table (2). There were significant differences in average root weight among the studied lines, since the mean values ranged from 272.7 to 475.0 gm. The new lines No. 6, 20, 26, 28 and 29 produced the heaviest roots (mean of 464.58 gm). On the other hand, the lowest root weight (252.7) was recorded in the line No. 17.

Comparing the various breeding studied-new lines with the check cvs., data showed that the lines 6, 20, 26, 28 and 29 were significantly heavier than the check cv. "Mabrouka" (the lowest check cultivar). Meanwhile, the percentage increase in average root weight ranged from 108.51 to 111.32% in the line No. 26 and 6 relative to the check cv. Mabrouka, while there were no significant differences between the new lines and check cv. "Min. 6" in this trait. These results are in harmony with those of El-Denary (1998), Mwanga *et al.* (2009) and Salem *et al.* (2009).

2.4. Tuber root length (cm):

Data of root length are shown in Table (2), significant differences were detected among the lines studied in this character. The root length of the studied lines ranged from 17.53 to 24.53 cm. The lines No. 21, 6, 7 and 26 produced the longest roots. They surpassed the check cv. Min. 6 (the highest check cv.) by 6, 13, 14 and 15%, respectively. On the other hand, the shortest roots, i.e., 17.22, 17.53, 17.75 and 17.87 were given by the lines 2, 4, 24 and 10, respectively.

These results are in harmony with those of El-Denary (1998), Salem (1999), Ishiguro *et al.* (2004) and Salem *et al.* (2009).

2.5. Tuber root diameter (cm):

Data of tuber root diameter are shown in Table (2). The studied new lines

varied greatly in this trait. The highest tuber root diameter values were observed by the lines 6 and 9, while the lowest values were given by the lines No. 2, 3, 23 and 26. Comparing various breeding studied lines with lines with the check cvs. It is shown that the two lines i.e., number 6, and 9 were significantly higher than of Min. 6 and Mabrouka in root diameter.

These results agreed with those of El-Denary (1998), Salem (1999), Ishiguro *et al.* (2004) and Salem *et al.* (2009).

3. Chemical contents of tuber roots:

3.1. Dry matter (%):

Data presented in Table (3) showed that percentage of dry matter allocated to tuber roots, the lines No. 26, 29 and 28 gave high dry weight percentages of tuber roots. Results presented in Table (2) showed that the highest yield of tuber roots were obtained by lines No. 28, 26 and 29. This may suggest that some genotypes which showed a tendency to produce high dry matter proportion to them, can produce high yield at harvesting.

The check cultivars (Min. 6 and Mabrouka) in this study produced the lowest dry matter content compared with five new breeding lines i.e., 16, 9, 26, 29 and 28 in this studied.

Dry matter content varied from 13.6% to 35.1% in a number of sweet potato lines grown in Taiwan (Anon, 1981) and from 22.9% to 48.2% in 18 cultivars grown in Brazil (Cereda *et al.*, 1982).

These results are in agreement with Lai *et al.* (2003), Mwanga *et al.* (2003), Xie *et al.* (2008) and Carpena *et al.* (2009).

3.2. Total carbohydrates (%):

Data of total carbohydrate percentage in tuber root of sweet potato genotypes were presented in Table (3). Significant differences were found among genotypes in this character. Bred lines No. 28, 1, 12, 22 and 20 gave the highest carbohydrate values compared with the check cvs. Min. 6 and Mabrouka. Whereas, new bred lines No. 17, 29, 23 and 21 gave the lowest values. Other genotypes showed intermediate values of carbohydrate content in tuber roots.

These results were in harmony with those obtained by Hassanin *et al.* (2001). They found that carbohydrate percentage in tuber roots ranged from 83.56 to 90.29%.

Approximately 80 – 90% of sweet potato dry matter is made up of carbohydrates, which consist mainly of starch and sugars. Location of growth is apparently an important factor influencing total carbohydrate concentration. When three cultivars were grown at seven production sites using plants from a common source, the total carbohydrate content for any one cultivar varied among production sites more than between cultivars at a particular production site (Hamett, 1974).

Table (3). Effect of sweet potato genotypes on some tuber root chemical contents (dry weight of roots, total carbohydrates, total sugars, carotein, vitamin C and protein) (combined-data) in 2007 & 2008 seasons.

Genotypes	Dry weight of roots (%)	Total carbohydrates (%)	Total sugars (%)	Carotein (mg/100 g f.w)	Vit. C (mg/100 g f.w)	Protein(%)
1	21.30hi	90.89c	3.41f-h	10.77hi	36.83f-i	7.50g-i
2	20.09ij	88.19f	4.26cd	11.33f-i	35.25g-j	7.17hi
3	24.05fg	89.95de	2.92jk	9.55j	45.10ab	5.92ij
4	26.20ef	76.95l	4.80b	14.02d	46.30a	4.94j
6	21.94g-i	89.40e	5.31a	16.67a	39.87de	17.54d
7	18.15j	82.17i	2.68k	11.05g-i	37.31e-h	18.04d
8	21.33hi	70.38n	3.42f-h	9.62j	37.47e-h	35.88a
9	30.38bc	85.25h	3.20hi	7.89k	44.47ab	22.83b
10	28.05de	85.55h	3.37f-i	6.83l	38.17ef	16.40d
12	21.28hi	92.29b	3.64ef	11.46f-h	33.58jk	22.60b
14	27.47de	88.29f	3.17h-j	15.87b	38.13ef	13.92e
15	24.20fg	77.94k	3.09ij	14.85c	35.25g-j	8.31f-h
16	29.04cd	86.06h	3.57e-g	9.99j	41.70cd	5.23j
17	23.38gh	65.83p	4.81b	9.29j	43.71bc	9.85f
18	26.36ef	85.71h	4.52c	7.91k	46.98a	22.75b
20	26.36ef	94.11a	3.72e	11.11g-i	34.58i-k	7.23hi
21	20.73i	73.04m	3.77e	12.78e	40.70d	18.13d
22	23.47gh	93.05b	4.27cd	11.50fg	43.22bc	16.46d
23	27.40de	72.78m	3.30c-i	11.99f	34.42i-k	7.98gh
24	23.52gh	80.59j	3.21hi	12.67e	32.17kl	22.44b
25	20.50i	69.65n	3.79e	6.79l	37.03f-i	17.52d
26	30.94bc	80.43j	5.32a	5.64m	28.97m	20.13c
28	36.41a	90.41cd	2.78k	9.72j	36.25f-j	17.88d
29	31.70b	66.92o	3.17h-j	6.58l	37.87e-g	20.29c
Minufiya 6/96 check	26.00ef	85.88h	4.10d	16.00b	35.07h-j	9.19fg
Mabroka check	26.70e	87.23g	3.25hi	10.72i	30.10lm	7.63g-i

Mean within a column followed by different letters are significantly different at the 0.05 level.

3.3. Total sugars (%):

Soluble sugar percentage in tuber roots of sweet potato genotypes were presented in Table (3). Significant differences were found among genotypes in this trait. The genotypes No. 4, 17, 6 and 26 gave the highest value of sugar percentage comparing with check cvs. (Minf. G and Mabrouka). On the other hand, genotypes 7, 28, 3 and 29 and 14 gave the lowest values. It is well know that soluble sugar content is responsible for sweetness in tuber root.

These results were in harmony with those obtained by Wu *et al.* (2008) and Xie *et al.* (2008).

3.4. Caroten (mg/100 f.w):

Regarding carotene content only one genotype "line 6" gave the highest carotene content compared with highest check cv. Minufiya 6. On the other hand, six new lines, i.e., 22, 23, 24, 21, 15 and 4 exceeded the lowest check cultivar (Mabrouka). The remaining new lines showed intermediate values of carotene content.

It is well know that carotene content affected flesh colour of tuber root, i.e., high carotene content gave yellow or orange flesh colour, whereas the low carotene content gave white flesh. The obtained results were similar to those reported by Zhang *et al.* (2003) and Yang (2006).

3.5. Vitamin C (mg/100 f.w):

Concerning vitamin C content in tuber roots, data presented in Table (3) showed significant differences among genotypes in this trait. New bred lines No. 8, 3, 4 and 18 gave the highest vitamin C content compared with the highest check cv. Min. 6. On the other hand, the lines No. 26, 24 and 12 gave the lowest values. These results agreed with those obtained by Zhang *et al.* (2003), Yang (2006) and Wu *et al.* (2008).

4. N, P, K and protein contents:

Significant differences were found between tested genotypes: tuber roots content of N, P, K and protein were recorded in Table (4). The results showed that the highest value of N and protein contents were recorded in No. 8, 9 and 18 compared with the two check cvs. On the other hand, the lowest values were recorded by No. 16, 3 and 20.

Regarding phosphorus it is obvious from Table (4) that the highest P content was recorded in clones No. 26, 10 and 24. The line No. 25 gave the lowest phosphorus percentage, it is similar to the lowest check cv. (Mabrouka).

Regarding K contents it is clear from Table (4), that all new lines gave higher value than the two check cvs. except the line No. 7 which was similar to the lowest check cv. (Mabrouka). Similar results were recorded by Salem (1999) and Salem *et al.* (2009).

Table (4). Effect of sweet potato genotypes on some tuber root chemical contents (nitrogen, phosphorus and potassium) (combined-data) in 2007 & 2008 seasons.

Genotypes	Nitrogen (%)	Phosphorus (%)	Potassium (%)
1	1.200gh	0.819de	3.73e
2	1.147gh	0.883b	3.55f
3	0.947hi	0.866c	3.29hi
4	0.790i	0.802ef	3.6f
6	2.807d	0.823d	3.24ij
7	2.887d	0.765hi	3.03n
8	5.740a	0.767hi	3.09lm
9	3.653b	0.761i	3.19jk
10	2.623d	0.984a	3.12lm
12	3.617b	0.783gh	3.25i
14	2.227e	0.888b	3.81d
15	1.330fg	0.769g-i	3.15kl
16	0.837i	0.776g-i	3.15kl
17	1.577f	0.822d	3.15kl
18	3.640b	0.776g-i	2.90o
20	1.157gh	0.802ef	2.90o
21	2.900d	0.765hi	2.95o
22	2.633d	0.812de	3.47g
23	1.277f-h	0.778g-i	3.33h
24	3.590b	0.993a	4.06c
25	2.803d	0.683k	4.30a
26	3.220c	0.979a	4.25b
28	2.860d	0.787fg	2.95o
29	3.247c	0.809de	3.08m
Minufiya 6/96 check	1.470fg	0.726j	3.01n
Mabroka check	1.220gh	0.667k	2.55p

Mean within a column followed by different letters are significantly different at the 0.05 level.

REFERENCES

Ahn, Y. S., J. S. Lee, M. N. Chung, H. S. Kim, J. M. Kim, B. C. Jeong, J. K. Bang and S. H. Lee (2006). A new sweet potato variety for raw eating and processing "Happymi". Korean J. of Breeding, 38 (4): 283 – 284.

Anon (1981). AVRDC Progress Report for 1980 AVRDC, Shanhua, Tainan, p. 71.

AOAC (1970). Official Methods of Analysis, Association of Official Analysis Chemists, Washington, p. 767.

Carpena, A. L., P. H. Manguiat, E. E. Rosario, A. G. Lalusin, L. S. Gueco, C. E. Reano, F. M. Rodriguez and R. B. Quilloy (2009). Development and release in the Philippines of sweet potato variety 'NSIC sp.-31'. Philippine Agricultural Scientist, 92 (1): 100 – 105.

Cereda, M. P., F. A. D. Conceicao, A. M. Cagliari, A. M. Heezen and R. P. Fioretto (1982). [Comparative study of sweet potato (*Ipomoea batatas*) varieties to estimate their utilization in the food industry] Portuguese. Turrialba, 32 (4): 365 – 370.

Duncan, D. B. (1955). Multiple range and multiple F-Tests. Biometrics, 11: 1 – 42.

El-Denary, M. E. M. (1998). The performance of sweet potato (*Ipomoea batatas* L.). Plants in response of some cultural treatment. M.Sc. of Hort. Sci., (Vegetable Crops), Fac. of Agric., Minufiya Univ., p. 248.

FAO (1988). Requirements of vitamin A, iron, folate and vitamin B_{12}, report of a joint FAO/ WHO consultation, FAO Food and Nutrition Ser. No. 23, FAO, Rome.

Hammett, H. L. (1974). Total carbohdyate and carotenoid content of sweet potatoes as affected by cultivar and area of production. Hort. Science, 9 (5): 467 – 468.

Hassanein, Manal A., Afaf A. Salem and Azza Zoher (2001). Chemical characteristics of new hybrids sweet potato crosses. 6th Arabic Conference of Home Economics, Minufiya Univ., Faculty of Home Economics, 2 – 4 Sept., 2001.

Ishiguro, K., O. Yamakawa, T. Kumagai, M. Yoshinaga, Y. Kai and M. Hidaka (2004). Benimasari: new sweet potato cultivar for table use. Bulletin of the National Agric. Res. Cent. for Kyushu Okinawa Region, 43: 59 – 85.

Lai, Y. C., Z. T. Li, Y. Chen, Y. H. Cheng and C. Tsai (2003). Breeding of new sweet potato variety tainung No. 72. Journal of Agricultural Research of China, 52 (4): 247 – 257.

Lai, Y. C., Z. T. LI, T. L. Jeng and W. H. Tsai (2008). Breeding of the new sweet potato variety, Tainung No. 73. J. of Taiwan Agirc. Res., 57 (4): 279 – 294.

Lee, J. S., Y. S. Ahn, H. S. Kim, M. N. Chung, J. J. Kim, J. M. Kim, C. Jeong and J. Bang (2006). Korean J. of Breeding, 38 (2): 147 – 150.

Lee, J. S., K. W. Jeong, H. S. Kim, Y. S. Ahn, M. N. Chung, J. J. Kim and J. Bang (2008). A new sweet potato variety for flowering "Morning Purple" Korean Journal of Breeding Science, 40 (2): 201 – 205.

Mcillory, R. J. (1948). The chemistry of the polysaccharides. Edward Annold Co., pp. 77 – 79.

Murphy, J. and J. P. Riley (1962). Amplified single solution method for the determination of phosphate in natural water. Anal Chim. Acta, 27: 31 – 36.

Mwanga, R. O. M., B. Odongo, C. Niringiye, A. Alajo, B. Kigozi, R. Makumbi, E. Lugwana, J. Namukula, I. Mpembe, R. Kapinga, B. Lemaga, J. Hsumba, S. Tumwegamire, C. G. Yencho (2009). Naspot 7, Naspot 8, Naspot, Naspot 100 and Dimbuka Bukulula sweet potato. Hort. Science, 44 (3): 828 – 832.

Mwanga, R. O. M., B. Odongo, G. Turyamureeda, A. Alajo, G. C. Yencho, R. W. Gibson, N. E. J. M. Smit and E. E. Carey (2003). Hort. Science, 38 (3): 475 – 476.

Peach, K. and M. V. Tracey (1956). Modern methods of plant analysis. Shinger-verlag, Berlin, I.

Pregl, F. (1945). Quantitative organic micro analysis. 4th Ed. Churchill, London.

Salem, Afaf A. (1999). Genetical and physiological studies on sweet potato, Ph.D. Thesis of Hor. Sci. (Vegetable Crops), Fac. of Agric., Minufiya Univ., Egypt.

Salem, Afaf A., Sabah M. El-Gamal and M. K. Hatem (2009). Effect of irrigation water salinity levels on growth. Chemical composition and yield of some new sweet potato cultivars which their source is true seeds. Arab Univ., J. of Agric. Sci., 17 (1): 137 – 150.

Salim, A. A., Afaf A. Salem and A. E. Abdel-Fattah (2002). Response of two varieties from sweet potato (*Ipomoea batatas* L.) and the accompanied weeds to various weed control treatments and its residues in roots. The First Conf. of the Central Agric. Pesticide Lab, 3 – 5 Sept., 2002, pp. 943 – 953.

Smith, F., M. A. Gilles, J. K. Hamillon and P. A. Godess (1956). Calorimetric method for determination of sugar related substances. Annal. Chen., 28: 35 – 356.

Snedecor, W. G. and W. G. Cochran (1972). Statistical methods, 6th Ed. Lowastate Univ. Press, Amers, Lowa, U.S.A., p. 393.

Woolfe, J. A. (1992). Sweet potato an untapped food resource. I. Sweet potato products.

Wu, L. H., S. F. Shen, B. Li and G. L. Zhou (2008). The breeding and cultivation techniques of mini-sweet potato variety Zheshu 132. Zhejiang Nongye Kexue, 4: 447 – 448.

Xie, Y., X. Guo, Z. Jia and Q. Yin (2008). Breeding of sweet potato variety ningzishul and study on high yield fertilization practice. Acta Agric. Shanghar, 24 (4): 115 – 117.

Yang, L. M. (2006). Selection and breeding of the new sweet potato cultivar Longshu 1. J. of Yunnan Agirc. Univ., 21 (3): 287 – 292.

Zhang, Z. Y., B. Q. Chen, M. Wuwen, L. M. Yang, J. R. Cai and J. Zeng (2003). Breeding and identification of new sweet potato variety Longshu 3, Acta Agric. Univ. Jiangxiensis, 25 (2): 174 – 177.

انتخاب سلالات جديدة من البطاطا خلال البذور الحقيقية تحت ظروف الدلتا

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الملخص العربى :

أجريت هذه الدراسة فى محطة بحوث البساتين بالقناطر الخيرية خلال ثلاث مواسم متتالية ٢٠٠٦ ، ٢٠٠٧ ، ٢٠٠٨ ، واشتملت التجارب الحقلية على تربية وتقييم ٢٤ سلالة جديدة من البطاطا ناتجة من البذور الحقيقية لبعض الصفات الخضرية والمحصول ومكوناته وبعض المكونات الكيميائية . وأظهرت النتائج ما يلى :

١- وجود اختلافات معنوية بين السلالات الجديدة تحت الدراسة فى جميع المواسم للصفات تحت الدراسة .

٢- أظهرت النتائج وجود اختلافات معنوية فى صفات النمو والمحصول ومكوناته (محصول الفدان بالطن – عدد الجذور / النبات – متوسط وزن الجذر الواحد – طول وقطر الجذر) بين السلالات الجديدة وصنفى المقارنة منوفية ٦ ومبروكة .

٣- سجلت السلالات أرقام ٦ ، ٢٦ ، ٢٩ أعلى محصول للفدان حيث زاد محصول الفدان عن ٢٥ طن / فدان . كما سجلت السلالتين رقمى ٦ ، ٢٩ أعلى عدد للجذور / نبات حيث كانت أعلى من صنفى المقارنة . كما سجلت تلك السلالات بالإضافة إلى رقم ٢٨ ، ٢٦ أثقل وزن للجذر الواحد مقارنةً بالصنف مبروكة الأقل فى وزن الجذر ، بينما لا توجد فروق معنوية بين السلالات الجديدة وصنف المقارنة الثانى منوفية ٦ .

٤- أظهرت النتائج وجود اختلافات معنوية بين السلالات تحت الدراسة وصنفى المقارنة فى نسبة المادة الجافة والمكونات الكيميائية (الكربوهيدرات ، السكريات الكلية ، فيتامين C "حمض الأسكوربيك" ، الكاروتين ، البروتين) .

٥- بالنسبة للتحليل الكيماوى لعناصر الـ NPK وجدت إختلافات معنوية بين السلالات الجديدة وصنفى المقارنة .

بصفة عامة يُوصى بتسجيل السلالات الجديدة أرقام ٦ ، ٢٦ ، ٢٨ ، ٢٩ واعتبارها أصناف جديدة لزراعتها فى منطقة الدلتا .