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# HETEROSIS AND YIELD COMPONENTS OF SOME F1 HYBRIDS OF SWEET POTATO.

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## ABSTRACT

True seeds of twenty sweet potato lines were collected and used for croup production. The six hybrids were evaluated in a randomized complete blocks design with four replicates with best two check cvs (Mabrouka and Abees) for some morphological and root yield characters at Motopous conditions Kaferel Sheikh, Governorate . Differences were found among the F1 hybrids in all studied traits. All the F1 hybrids significantly exceeded the two cheek cvs. The percentage of increase in the hybrids with Mabrouka cv. was ranged from (168%) in the hybrid No (1) to (51.5%) in the No (3). While it ranged from (173%) to (56%) compared with Abees cv. Average tuber root was highly significant in hybrids No (4) compared with the two check cvs. Two degrees of skin colour, i.e., purple and dark purple, were observed in roots of the hybrids, while six degrees of flesh colour from white to purple were noticed in this study. Most of F1 hybrids significantly exceeded the to check cultivar in most studied traits. Hybrid vigor attributed to over dominance was detected in total tuber root yield and the other studied traits. Dominance in complete and partial was also observed.

## INTRODUCTION

Sweet potato tubers are a good source of vitamin C, carotenes, proteins, carbohydrates and some minerals. Sweet potato is a cross pollinated and hexaploid (2n=6x) crop with 90 chromosomes (Jones, 1965).The genetics of sweet potato is little understood and the inheritance pattern is quite complex one. Genetic information on many traits of direct economic importance in Sweet potato are not available and most published information are from the clones of similar genetic back ground Jones, 1966 and Jones *et al*., 1969.

Studies on the entire spectrum of the variability are therefore necessary to acquire knowledge on the inheritance pattern (Vimalan, 1993).On the other hand foliage in terms of leaves and shoots contain high amount of vitamins A and B as well as proteins, so it also used for animal feeding. Sweet potato floor could be mixed with wheat floor in bread manufacturing and it also a good row material for sweet industries cakes and biscuits. It also used as a staple foot-vegetable (both fresh roots and tender leaves and petioles) - snack food animal feed for, industrial starch extraction and fermentation and for various processed products (Chalfant *et al.,* 1990). Sweet potato has long been very important food crops the movgh tropical and sub tropical regions of the world especially in the eastern countries of Asia it is considered the six most important food crops in the world (Marrison *et al* 1993). It produce agreed yield under a wide range of environments, but most countries of the world cultivated it in summer seasons. Mwanga *et al.* (2007) reported that

high dry matter content is an important characteristic of a good sweet potato variety. Recently, the orange fleshed sweet potato varieties with high β-carotene are being promoted to improve vitamin A nutrition of the poor. Therefore, these varieties should carry increased β-carotene and dry matter to promote their adoption and large-scale production (Cervantes-Flores *et al*., 2010 and Mwanga *et al*., 2010). The gene actions need a particular analysis in each case study involving various genotypes and environments through appropriate genetic designs (Acquaah, 2007). Various gene actions have been identified and described in different studies on sweet potato. Miller, (1939) found that white skin, green stem and white flesh are dominant to red skin, red stem and yellow flesh of sweetpotato. Ma.*et al.* (2009) observed that the inheritance of β- carotene is controlled by additive gene effects. Vimalan and Hariprakash (2011) reported that most sweetpotato varieties used in their study were self- and cross-incompatible and therefore these varieties were not able to produce viable seeds when hybridized through both self- and cross-pollinations. The additive gene effects were identified in the inheritance of dry matter and β-carotene content (Chiona, 2009). Heterosis was observed for the size and number of roots per plant, indicating dominance gene action or intra-allelic interaction between alleles of the same gene (Gasura *et al*., 2010).

As soon as in Egypt. This study aims to produce sweet potato under winter season. To give the highest prices of yields and also high yield from some promising genotypes (F1) of sweet potato with high productivity and aurally in winter season. In addition average degree of heterosis and standered heterosis for some characters were study.

## MATERIALS AND METHODS

The present study was carried out at Motopous Kafr El sheikh governorate during two seasons (2012 and 2013) in El Zhraa village. The genetic material used in the study was 20 hybrids which were obtained from the PhD study from A.S.Gendy 2002 Egypt. In July 2012 the seeds were soaked in concentrated sulfuric acid for 30 minutes and washed in water. (Jones *et al.,* 1969) before sowing because sweet potato seeds germination is restricted by a hard seeds coat which delays inhibition and overcane inbreeding programs by mechanical of chemical scarification and sown in nursery. In October (2012), plants were randomly chosen and vegetative propagated by vine cutting to produce the required plants for evaluation traits. The cutting stems were transplanted in an evaluation experimental trial. A randomized complete block design with four replications was used. Each replicate contained six genotypes as well as two sweet potato cultivars Mabrouka and Abees which widely used in Egyptian cultivars as control data were recorded on vegetative traits and tuber root characteristics. Usual fertilization, irrigations, disease and insects control programmers were practical as used with commercial production of sweet potato. The harvest was done at full maturity about 150 days after transplanting.
Data were recorded on the following characters:-

**A. Plant characters**

These characters were determined after 100 days from transplanting.

1- Number of branches/plant.

2- Stem length of the main stem (cm), from ground level to the terminal bud of longest vegetative branch.

3- Number of leaves /plant.

4- Fifth leaf area. This character was determined for the fifth leaf area from the top by using fresh weight method.

5- Dry matter percentage 100g of leaves and stems were determined by drying in an oven at 70˚c for 3 days (until constant weight). These characters were determined for four plants in each genotype in the two seasons.

6-Skin colour.

7- Flesh colour.

8-Tuber root shape.

**B.Yield components**

1- Total yield of tuber roots /plant(kg).

2- Average number of tuber roots/plant.

3- Average tuber root weight (g).It was determined by dividing the weight of tuber roots perplant on the total tuber root number

**C- Tuber root characters.**

1- Average tuber root shape.It was determined by dividing the root length on the diameter (L/D ratio) and the shape was described according to Huaman (1991),where 1= round (circular), 2= round elliptic (slightly circular) and 3= elliptic (oblong).

2- Skin and flesh colour. They were visual determined the skin colour was rated subjectively from 1 (creamy –white) to 9 (dark-purple) where 1 white-cream, 2 yellow.3 orange 4 brownish, 5 pink, 6 red, 7 pur plish-red,8-purple and 9 dark purple for skin colour. The flesh colour was rated subjectively 1-9 from white to deeply orange (dark-orange), where 1 white, 2 cream, 3 pale yellow, 4 yellow, 5 deep yellow, 6 red, 7 violet, 8 purple and 9 other for(flesh colour), according to Human *et al*. (1977).

**D. Statistical analysis**

All data obtained from both experimental seasons were subjected to statistical analysis according to Sendecor and Cochran (1972). Mean values represented the various investigated genotypes were compared by least significant difference value (L.S.D) at both 5% and 1% level of significant. Estimates of genetic parameters were calculated according to Fehr (1987) as follows:

a-Average degree of hetrosis (ADH% ), was expressed as percent increase or decrease of F1 crosses performance above the mid parents (MP) values and the high parent (HP) values as follows :

ADH %( based on SC) =F1- SC/SC×100

Where:F1are means of F1Hybrid and SC are means of stander cultivars respectively.

## RESULTS AND DISCUSSION

Mean performances of resulted six F1hybrid for some characters during two experiments of seasons are presented in Tables (1 to 5).

**A. Plant characters**

**Number of branches/ plant**

As shown in Table (1) number of branches/ plant showed high significant differences among the F1 and check cvs during the two seasons. Number of branches/plant ranged from (26 to 36) with a mean of (31.1) branches in the first season while in the second these values were (24 to 35) with a mean of (29.6) branches. The genotype No( 6) showed the highest branch number per plant (36 branches) in the first season while the genotype No ( 3) and (4) gave the lowest number of branches with values of (24 and 25) in the second season respectively. Regarding check cvs. they showed that the check cultural Mabrouka gave the lowest number of branches /plant in the two season with values of (20 to 21) respectively. Our results are supported by many works so Shalaby *et al.* (1993 a and b). El- Shini (1996) and Salem (1999).

**Table(1).Mean performances of the evaluated sweet potato F1 crosses and check cvs for number of branches/plant and stem length(cm).**

| Genotypes | No of branches/ plant | | Stem length (cm) | |
|---|---|---|---|---|
| | 2010 | 2011 | 2010 | 2011 |
| H .No1 | 34.0 | 32.0 | 125.0 | 119.0 |
| H .No2 | 30.0 | 28.0 | 132.0 | 136.0 |
| H .No3 | 26.0 | 24.0 | 105.0 | 109.0 |
| H .No4 | 28.0 | 25.0 | 109.0 | 111.0 |
| H .No5 | 35.0 | 34.0 | 139.0 | 141.0 |
| H .No6 | 36.0 | 35.0 | 121.0 | 126.0 |
| Mabrouka | 20.0 | 21.0 | 181.0 | 179.0 |
| Abees | 27.0 | 25.0 | 193.0 | 187.0 |

**Stem length**

As shown in Table (1) the studied genotypes significantly differed in this trait during the two seasons, the average stem length ranged from 105 to 139cm with a mean of 121.3 cm in the first season, while ranged from (109 to 141cm ) with a mean of (123.6cm ) in the second season. The line No (5) gave the tallest stem length during the two seasons as showed 139 cm in the first season and to 141cm in the second season. On the other hand the genotype No (3) gave the shortest stem length in the two seasons, with values of (105cm) and 109 respectively. The check cultivars Mabrouka and Abees gave the highest values of stem length Mabrouka recorded 181 to 179 cm while Abees recorded 193 to 187cm in the first and second season respectively. The results are confirmed with those by El- Denary (1998) and Salem (1999) who found significant differences among lines in stem length. Data in Table (1) regarding check cvs, Mabrouka and Abees had high values

of stem length with an average of 180.0 and 190.0 cm respectively. All the six hybrids were found significantly shorter than the check cvs. Mabrouka and Abees in their stem length during the two seasons. These results agree with those by Sozki (1990) Shalaby *et al.* (1993a) and El-Shini (1996) and Gendy (2002).

**Number of leaves/plant**

Significant differences were observed among the studies 6 hybrids concerning this trait during the two seasons were observed as shown in Table (2). The number of leaves per plant ranged from 145 to 295 in first season and ranged from 139 to 305 in second season respectively. The check cv Mabrouka recorded the highest number of leaves/plant in the second season with means of 305.0,the hybrid No (5) gave the better value of 226 in the second season . Data in Table (2) refer to that the 6 hybrids recorded approximately similar behavior in the two seasons. While Mabrouka cv recorded the highest values in the two seasons with values of 295 and 305 respectively. Similar results were obtained from El- Shini 1996, Salem (1999) and Gendy 2002 home found significant differences for this trait among sweet potato hybrids and cultivars.

**The Fifth leaf area**

The Fifth leaf area ranged from 18.9 to 26.5cm$^2$ in first season and from 19.4 to 27.0 in the second season with means values 22.95cm2 and the 6 hybrids gave higher value than the two check cultivars Mabruka and Abees cvs, Mabrouka gave (24.6 and 23.9cm$^2$) in the first and second respectively with means of 24.25cm$^2$ also Abees gave values of 20.1 and 20.2cm$^2$ with means of 20.15cm$^2$.

**Dry matter %**

Data in Table (2) show dry matter % among the hybrids during the two seasons, the hybrids No (6) gave the highest values of49.2 and 48.3% in the first and second season respectively with means of 48.7% and the 6 hybrids gave higher values than the to check cultivars Mabruka and Abees cvs ,Mabrouka gave (30.1 and 29.7%) in the first season with means 29.9 %also Abees gave valuesof 31.8 and 32.0% with mean of 32.0%. However all evaluated hybrids exceeded the two cvs cultivars in the two seasons. These results agree with that recorded by Singh *et al.* (1993) and Gendy (2002).

**Table (2).Mean performances of the evaluated sweet potato F1 crosses and check cvs for number of leaves /plant and fifth leaf area/plant .**

| Genotypes | No of leaves/plant | | Fifth leaf area cm$^2$ | | Dry matter% | |
|---|---|---|---|---|---|---|
| | 2010 | 2011 | 2010 | 2011 | 2010 | 2011 |
| H .No1 | 170.0 | 172.0 | 26.5 | 27.0 | 43.1 | 42.7 |
| H .No2 | 195.0 | 199.0 | 22.6 | 23.5 | 46.5 | 47.1 |
| H .No3 | 205.0 | 222.0 | 25.1 | 23.7 | 44.3 | 45.1 |
| H .No4 | 145.0 | 139.0 | 25.3 | 26.1 | 42.9 | 43.7 |
| H .No5 | 218.0 | 226.0 | 18.9 | 19.4 | 45.2 | 44.9 |
| H .No6 | 195.0 | 190.0 | 23.6 | 24.1 | 49.2 | 48.3 |
| Mabrouka | 295.0 | 305.0 | 24.6 | 23.9 | 30.1 | 29.7 |
| Abees | 200.0 | 207.0 | 20.1 | 20.2 | 31.8 | 32.0 |

**Skin colour**

Data in Table (3) showed that, the studied genotypes did not varied in root skin colour, dark-purple colour was observed in all genotypes as well as the two check cultivars Mabrouka and Abees . These results agree with Gendy (2002) and Vimalan and Hariprakash (2011)**.**

**Table (3). Performances of the evaluated sweet potato F1 crosses and check cvs for skin, flesh colour and root shape.**

| Genotypes | Skin colour | | Flesh colour | | Root shape | |
|---|---|---|---|---|---|---|
| | 2010 | 2011 | 2010 | 2011 | 2010 | 2011 |
| H .No1 | (9)Dark - purple | (9)Dark - purple | 8 violet | 8 violet | Round | Round |
| H .No2 | (9)Dark - purple | (9)Dark - purple | 6 orange | 6 orange | Round - elliptical | Round - elliptical |
| H .No3 | (9)Dark - purple | Dark -purple | 5 deep-yellow | 5 deep-purple | Round - elliptical | Round - elliptical |
| H .No4 | (9)Dark - purple | (9)Dark - purple | 5 deep-purple | 5 deep-purple | Round - elliptical | Round - elliptical |
| H .No5 | (9)Dark - purple | (9)Dark - purple | 1 white | 1 white | Round-elliptical | Round-elliptical |
| H .No6 | (9)Dark - purple | (9)Dark - purple | Deep-yellow | Deep-yellow | Round | Round |
| Mabrouka | (9)Dark - purple | (9)Dark - purple | 1 white | 1 white | elliptical | elliptical |
| Abees | (9)Dark - purple | (9)Dark - purple | 6 orange | 6 orange | elliptical | elliptical |

**Flesh colour**

Data concerning tuber flesh colour in the evaluated genotypes are shown in Table (3). The hybrids varied greatly in root flesh colour, 6 degrees of colour from white to purple were observed as follow 1 white colour such as the hybrids No (5) and Mabrouka cvs. While the hybrid No 2 and the Abees cvs were 6 orange. The hybrid No 3 and 6 were deep yellow –while the hybrid No (1) was 8 violet. Similar results were reported by some investigators the yellow groups of flesh colour was reported by Wanas (1979)and Sozki (1990). The orange flesh colour in sweet potato tubers was also observed in studies conducted by Jones *et al.* (1977). Our results also agree with those of Salem (1999), Gendy 2002 and Vimalan and Hariprakash (2011**),** who selected 52 new bred lines reported that the lines varied from white to purple for Flesh colour.

**Tuber root shape**

According to data listed in Table (3) three types of shape were observed in the tuber roots of the evaluated 6 hybrids and two cheek cultivars.

1- Round such as the hybrids No. 1 and 6.

2- Round elliptic which observed in hybrids No. 2, 3 and 5.

3- Elliptic such as the two check cultivars Mabrouka and Abees they produce tuber roots with elliptic shape. This results agree with these of Gendy 2002 and Vimalan and Hariprakash (2011).

**Yield and its components:**

**Total yield/plant**

The total yield in the evaluated hybrids and check cultivars are listed in Table (4). The evaluated genotypes significantly differed in total yield as weight of roots/plant during the two seasons. The highest total yield values were obtained by the hybrids No (1) and No (4) they produced more than 2 kg/ plant. On the other hand the lowest yield less than 0.5 kg /plant was produced by the two check cultivars Mabrouka and Abees with mean of475 g for Mabrouka while Abees gave 415 and 425g with of 420g.The percentage of increase in the best hybrid compared with the best check cultivare Mabrouka was 462.3%. Accordingly, it is very good result of hybrid regarding the 6 genotypes since they gives yield over than the two check cultivars Mabrouka and Abees. The lowest genotypes No (3) gave (980 g), compared with Mabrouka cv.(the best check cvs.) gave (465.0 g), with 103% increase. Accordingly, it is very good result when genotypes outyielded the commercial cultivars Mabrouka and Abees cvs. These results are confirmed with those of El-denary (1998) and Salem (1999) who found significant differences among sweetpotato lines and cultivars studied. Gasura *et al.* (2008) and Vimalan and Hariprakash (2011), demonstrated the possibility to improve sweet potato for yield and quality using the available germplasm.

**Table (4). Mean performances of the evaluated sweet potato F1 crosses and check cvs for yield per plant, number of roots, plant and average root weight .**

| Genotypes | Yield/plant (Kg) | | Root number/plant | | Average root weight (g) | |
|---|---|---|---|---|---|---|
| | 2010 | 2011 | 2010 | 2011 | 2010 | 2011 |
| H .No1 | 2.150 | 1.900 | 4.0 | 3.9 | 537.5 | 487.2 |
| H .No2 | 1.950 | 1.780 | 2.8 | 2.6 | 870 | 684.6 |
| H .No3 | 0.980 | 1.025 | 2.7 | 2.9 | 362.9 | 353.5 |
| H .No4 | 2.100 | 1.985 | 2.9 | 2.8 | 724.1 | 685.0 |
| H .No5 | 1.350 | 1.300 | 3.1 | 2.9 | 435.4 | 448.2 |
| H .No6 | 1.650 | 1.750 | 3.2 | 3.3 | 515.6 | 530.3 |
| Mabrouka | 465.0 | 485.0 | 3.6 | 3.7 | 129.2 | 131.0 |
| Abees | 415.0 | 425.0 | 3.8 | 3.6 | 110.0 | 118.0 |

**Root number plant**

Significant differences among the evaluated breeding lines were observed in total number of tuber roots per plant during the two seasons as shown in table (4). The hybrid No (1) gave the highest number of roots/ plant (4) while the hybrid No (2) gave the lowest number of roots/plant (2) in the first season in the second season they gave 3.9 and 2.6 number of

roots/plant respectively in contrast Mabrouka gave 3.6 and 3.7 number of roots/plant while Abees gave 3.8 and 3.6. These results were in agreement with those of Sheng and Wang (1992), Reddy *et al* (1996), Salem (1999) and Gendy (2002) who found significant differences among the sweet potato lines and cultivars.

**Average tuber root weight (g)**

Data concerning average tuber root weight are shown in Table (4). Significant differences for this trait were observed among the studied lines. Average tuber root weight showed the highest values of 870.0 and 724.1g in the hybrid No (2) and (4) in the first season while they were 684.6 and 685.0g in the second season . The hybrid No (3) gave the lowest values in the first and second season with means of 362.0 and 352.5 g respectively. These hybrids exceeded the best check cultivar Mabrouka which gave 131.0g in the second season. The percentage of increase in these lines compared with Mabrouka cvs was 169% . However, the tuber roots in this study were significantly heavier than the check cvs. It is very good result when some hybrids outyielded the commercial cultivars Mabrouka and Abees cvs. These similar results were reported by other researchers among of them El-Gazzar (1988),El-Shini (1996),Gendy (2002) and Vimalan and Hariprakash (2011), who found significant differences among the studied sweet potato lines and cultivars for average tuber root weight.

**Heterosis**

**Average degree of heterosis :**

Average degree of heterosis (ADH %) was expressed as percent increase or decrease of each F1 population above the standered cultivars. The average degree of heterosis in relation to the standered cultivars was estimated for all traits.

**Number of branches /plant**

Data presented in Table (5) show significant positive ADH% heterosis values based on the stander cultivars in the all studied crosses suggesting dominance towards the large number of branches /plant. These results are similar to those obtained by Salem (1999) who found over dominance for the large number of branches in sweet potato.

**Table(5).Average degree of stander heterosis (ADHS) based on cultivars Mabrouka and Abees for number of branches /plant, stem length (cm) and Dry matter% of six sweetpotato hybrids.**

| Genotypes | Mabrouka | | | | | | Abees | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of branches/plant | | Stem length (cm.) | | Dry matter (%) | | Number of branches/plant | | Stem length (cm.) | | Dry matter% | |
| | 2010 | 2011 | 2010 | 2011 | 2010 | 2011 | 2010 | 2011 | 2010 | 2011 | 2010 | 2011 |
| H .No1 | 70.0** | 52.3** | -30.90** | -30.90** | 43.19** | 43.77** | 25.0** | 28.0** | -35.2** | -36.3** | 35.53** | 33.44** |
| H .No2 | 50.0** | 33.3** | -27.01** | -27.01** | 54.49** | 58.59** | 11.0* | 12.0* | -31.6** | -27.2** | 46.22** | 47.19** |
| H .No3 | 30.0** | 14.2* | -41.90** | -41.90** | 47.18** | 51.85** | $3.7^{ns}$ | $4.0^{ns}$ | -45.5** | -41.7** | 39.31** | 40.94** |
| H .No4 | 40.0** | 20.0** | -39.70** | -39.70** | 42.52** | 47.14** | 3.7 | 36.0** | -43.5** | -40.6** | 34.91** | 36.56** |
| H .No5 | 75.0** | 61.0** | -23.20** | -23.20** | 50.17** | 51.18** | 29.0** | 0.0 | -27.9** | -24.5** | 42.14** | 40.31** |
| H .No6 | 80.0** | 66.0** | -33.10** | -33.10** | 63.46** | 62.63** | 33.0** | 40.0** | -37.3** | -32.6** | 54.72** | 50.94** |

**Stem length**

Average degree of standered hetrosis (ADHs) based on standered cultivars Mabrouka and Abees for stem length cm /plant of six sweet potato genotypes. This characters recorded that all the values of this trait were negative heterosis values means that stem length( cm) in the two varieties Mabrouka and Abees had longer stems than the hybrids in the two seasons 2010 and 2011 respectively, this results referres to that theres relation between yield/plant and stem length in sweet potato. Data present in Table (5) show significant negative heterosis values in relation to the standered cultivars. These ADH values suggested partial dominance for the short stem length in these crosses. The obtained results are similar to those reported by Gendy (2002) who found that partial dominances was detected for stem length in sweet potato plants.

**Dry matter%**

Data present in Table (5) show significant positive ADH% heterosis values based on the standered cultivars in the all studied crosses suggesting dominance towards the dry matter%.These results are similar to those obtained by Cervantes-Flores *et al.* (2010) and Placide *et al.* (2013).

**Total yield:**

**Total yield/ plant**

Data presented in Table (6) show that the heterosis percentages relative to standered cultivars ranged from 110.0 to362.0% in the first season and ranged from 111 to 309% in the second season. The hybrid No (1) gave the highest yield than the two check cultivars Mabrouka and Abees suggesting dominance towards the high cultivars. Generally, it could be concluded that the F1 crosses in sweet potato had hybrid vigour regarding total tuber root yield. Then the utilization of F1 hybrids in sweet potato cultivations will be lead to increase the yield production these results were agree with those of Salem (1999) and Vimalan and Hariprakash (2011), who found dominance for the high total tuber yield in their studies.

**Table (6).Average degree of standered hetrosis for yield/plant and root weight from some hybrids of sweet potato in 2010 and 2011 seasons.**

| Genotypes | Mabrouka | | | | Abees | | | |
|---|---|---|---|---|---|---|---|---|
| | Yield/ plant | | Root weight | | Yield/ plant | | Root weight | |
| | 2010 | 2011 | 2010 | 2011 | 2010 | 2011 | 2010 | 2011 |
| H .No1 | 362.0** | 292.0** | 316.0** | 271.0** | 418.0** | 347.0** | 388.0** | 312.0** |
| H .No2 | 319.0** | 267.0** | 574.0** | 422.0** | 369.0** | 318.0** | 690.0** | 480.0** |
| H .No3 | 110.0** | 111.0** | 180.0** | 169.2** | 136.0** | 141.0** | 229.0** | 480.0** |
| H .No4 | 352.0** | 309.0** | 461.0** | 422.0** | 406.0** | 367.0** | 558.0** | 480.0** |
| H .No5 | 190.0** | 168.0** | 237.0** | 241.0** | 225.0** | 205.0** | 286.0** | 279.0** |
| H .No6 | 254.0** | 268.0** | 299.0** | 304.0** | 297.0** | 311.0** | 368.0** | 349.1** |

**Root weight**

Estimates of ADH% in relation to standered cultivars show that all the hybrids gave significant positive hetrosis values suggesting domanince towards the high average degree tuber root weight. Obtained hetrosis values in the 6 crosses ranged from 180.0 to 574% in the first season and ranged from 169.2 to 422.0% in second season compared with Mabrouka cv. While

they ranged from 229.0 to 558.0% in the first season and from 279 to480% in the second season compared with Abees cultivar.These significant positive heterosis values suggesting dominance toward the high average tuber root weight and the hybrid vigours verified by the obtained significant positive heterosis values. The obtained results are similar to those reported by Chaurasiya *et al* (2013) found that the gene action studies indicated that there was preponderance of non-additive (dominance) gene action for all the traits under study.

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## قوة الهجين ومكونات المحصول لبعض هجن F1 من البطاطا

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**قسم بحوث الخضر - معهد بحوث البساتين - مركز البحوث الزراعية - الجيزة**

أجريت هذه الدراسة بمركز مطوبس كفر الشيخ خلال الفترة من عام ٢٠١٠ حتى ٢٠١١ حيث تهدف الدراسة إلى إنتاج هجن متفوقة في المحصول ومكوناته عن أهم وأشهر صنفين تجاريين من البطاطا لدى المزارعين مبروكة وابيس وذلك تحت ظروف العروة الشتوية وتم الزراعة الست هجن والصنفين التجاريين المحليين في موسمين في أربعة مكررات وتم تصميم التجربة في قطاعات كاملة العشوائية . ويمكن تلخيص أهم النتائج فيما يلي :-

١-أظهرت النتائج وجود اختلافات معنوية بين الهجن المستخدمة والأصناف التجارية وكذلك مع بعضها البعض .
٢- تفوقت الهجن رقم ١ورقم ٣ عن صنف مبروكة بزيادة ١٦٨% زيادة محصولية و٥١.٥% على التوالي.
٣- وحققت الهجن زيادة محصولية ١٧٣%و٥٦% عن الصنف التجاري ابيس.
٤-الهجين الرابع حقق زيادة معنوية عالية فى وزن الجذر الواحد مقارنة بصنفي المقارنة.
٥- سجلت التراكيب الوراثية درجتان للون اللحم هم القرمزي والقرمزي الداكن.
٦- سجل لون اللحم الداخلي ست درجات مختلفة من الأبيض حتى القرمزي .
٧- كذلك سجلت الدراسة زيادة معنوية في معظم الصفات المدروسة مقارنة بصنفي المقارنة
٨- أثبتت دراسة قوة الهجين وجود سيادة تامة وجزئية تجاه معظم الصفات.