

## تأثير ميعاد الزراعة علي النمو وميعاد التزهير والجمع وجودة الثمار لنبات الموز الويليامز النامي في الأراضي الرملية المستصلحة

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### الملخص العربي

أجريت هذه الدراسة خلال موسمي ٢٠٠٨/٢٠٠٩ و ٢٠٠٩/٢٠١٠ ( نباتات الأمهات ) خلفه أولي علي صنف الموز المويليامز النامي في الأراضي الرملية المستصلحة (مرزعة خاصة بغرب النوبارية - محافظة البحيرة) لدراسة تأثير خمسة مواعيد زراعة علي النمو الخضري والصفات الزهرية والثمارية وقد أوضحت النتائج أن النباتات التي زرعت في ميعاد ١٦ مارس أعطت أعلى القيم لصفات طول ومحيط الساق الكاذبة وعدد الأوراق الكلية للنبات وعدد الأوراق الخضراء عند مرحلة التزهير وكذلك مساحة الورقة .

بينما أعطت النباتات التي زرعت في ميعاد ١٥ فبراير أقل القيم للصفات السابقة في كلا موسمي الدراسة. التزهير المبكر وقصر مدة الجمع وقصر فترة حياة النباتات سجلت في النباتات التي زرعت في ميعاد ١٥ فبراير. كما أن النباتات التي زرعت في ميعاد ١٦ مارس أعطت أكبر السباطات (٢٠٠٣٥ ، ٢٧٠٠٠ كجم ) بالإضافة إلي أكبر عدد من الكفوف / سباطة (١٠٠٧٥ ، ١٣٠٢٥ ) وعدد الأصابع /كف (١٩٠٢٥ ، ٢٢٠٢٥ ) كما أعطت تحسنا في الصفات الطبيعية للثمار ( طول وقطر ووزن الإصبع ) وأعلي نسبة مئوية لللب في الثمار مقارنة بكل مواعيد الزراعة .

ومن خلال هذه الدراسة يمكن التوصية بأن أفضل ميعاد للزراعة للموز الويليامز تحت نفس ظروف الدراسة هو ميعاد ١٦ مارس حيث أعطت أحسن نمو خضري وتفوقا في وزن السباطات وصفات الجودة للثمار .

## EFFECT OF PLANTING TIME ON GROWTH, FLOWERING AND HARVESTING TIME AND FRUIT QUALITY OF WILLIAMS BANANA GROWN IN RECLAIMED SANDY SOILS

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**ABSTRACT:** *This study was carried out during two successive seasons, i.e. 2008/2009 (mother plants) and 2009/2010 (first ratoon) of Williams banana grown in the reclaimed sandy soil (an orchard located at west Nobaria Region, Behera Governorate, Egypt. The experiment was aimed to find out the effect of five planting time on vegetative growth, flowering and fruiting characters. The results revealed that the plants which planted in (March 16<sup>th</sup>) give the highest value of height and girth of pseudostem, total number of green leaves / plant, number of green leaves at bunch shooting and leaf area. While (Feb. 15<sup>th</sup>) gave the lowest ones in this respect in both seasons. Earliest shooting, minimum days for harvesting and cropping cycles were recorded from the plants which planted in (Feb 15<sup>th</sup>). The plants which planted in (March 16<sup>th</sup>) time produced the heavier bunches (20.35 and 27.00 kg.) with more number of hands / bunch (10.75 and 13.25), number of fingers / hand ( 19.25 and 22.25 ), bigger fingers (length, diameter and weight) and the maximum pulp weight % , minimum peel weight % than that of all planting tested. Under this study, it could be say that the best time for planting suckers of Williams banana under the same conditions of this investigation was (March 16<sup>th</sup>) which gave the best vegetative growth and heavier bunches with good quality of fruits .*

**Key words:** *Williams banana cv, planting time. Growth vegetative flowering harvesting and fruit quality .*

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### INTRODUCTION

Banana is a tropical plant and is considered as one of the most popular and favorite fruits in the world since ; it has excellent flavors, nice taste and high nutritional value, in addition to some miscellaneous uses and number of minor edible products (Simmonds, 1966).

The optimum time of planting bananas is dictated by two major factors. i.e. timing the crop harvest to coincide with high most prices and timing the planting date to benefit from, or to avoid, certain climatic conditions. Very often these two factors in tract to severely limit the planting date range.

Timing varied markets is usually only effective for the plant crop and first ratoon cycle (Simmonds, 1966). Time of planting in deferent areas with cold winter. In Israel, winter are very cold and plating occurs in spring (March). The plant crop is small, so the objective here is time for optimum first ratoon paper selection in June. (Three months after planting). This in turn allows flower initiation and flower emergence to occur in the warm weather of spring / summer the following year, and harvest in November / December which is ideal for good quality and high prices (Stover and Simmonds, 1987). In the subtropics of south Africa, Summer planting (Decmber / January) has been identified as the optimum planting time. Winter is too cold for suckers emergence. Spring planting causes winter flower initiation and the subsequent fruit quality problem known as November dump (Robinsin and alberts 1983). However, weather parameters particularly temperature and relative humidity play an important role in banana production. Planting banana in new reclaimed soil in Egypt occurred since 2009 (30089 fed). The area planted for willaims banana cultivated in 2009 was 19995 feddan. (Ministry of agric. A.R.E. 2009). The growers in Noharia planted banana during Feb. to April. Therefore, an experiment was conducted to evaluate the effect of different planting time on yield, fruit quality and vegetative growth under Noharia conditions .

## **MATERIALS AND METHODS**

This experiments was carried out during two successive seasons of 2008/2009 (mother plant) and 2009/2010 (first ratoon) on Williams banana (*Musa Cavendishii* L.) planted in an orchard at west Noharia region. Uniform suckers (produced by tissue culture) of Williams banana planted at 3 x 3.5 m apart in sandy soil (two offshoots per hol. ( mother plant) 800 plants / fed. and its suckers were chosen on the first week of July 2008 (first ratoon). Five time were timed as planting date tested in a randomised complete blocks design. (R.C.B.D. ) with four replicates per treatment, three plants each. The treatment dates were as follows:

1- 15 Feb .	2- 1 March .	3- 16 March .
4- 1 Apr.	5- 16 Apr .	

All plants under investigation were subjected to the same cultural practices .

**The following parameters were studied :**

### **1- Vegetative growth :**

Data on the vegetative growth included : Height and girth of pseudostem (cm), total number of emerged leaves per plant, number of green leaves at bunch shooting and leaf area ( $m^2$ ), using the third full sized leaf ( from the top ) was calculated in square meters according to (Murry, 1960) .

(leaf area = length x width x 0.8)

## **2- Flowering :**

Period to 50 % bunch shooting, period to harvest and cropping cycle ( or life cycle duration ).

## **3- Bunch characteristics and yield**

The bunches were harvested at bunch maturation stage using angulations criterion of finger as reported by abou-Aziz *et al.* (1970) and Abd El-Naby (1988). At harvest, bunch weight (kg.), number of hands per bunch and number of fingers per bunch were determined .

## **4- physical fruit quality**

Included the following measurements : length and diameter of fingers (cm), finger weight (g), pulp weight percentage were determined .

The obtained data were tabulated and statistically analyzed according to Snedecor and Cochran (1990) using New L.S.D. test values at 5% .

# **RESULTS AND DISCUSSION**

## **1- Vegetative characters :**

Data in Table (1) show that vegetative characters (pseudostem height, pseudostem girth, total number of leaves per plant, number of green leaves at bunch shooting and leaf area) of the Williams banana in the two successive seasons significantly varied due to the five planting date planting date ( March 16<sup>th</sup> ) gave the highest values on vegetative growth namely height (234.0 and 279.50 cm ) and girth of pseudostem (75.0 and 85.50 cm), total number of leaves per plant (23.50 and 38.0 leaf), number of green leaves at bunch shooting (13.50 and 14.50 leaf) and leaf area (2.33 and 2.42 m<sup>2</sup>) in mother plant and first ratoon, respectively. The data also show that the suckers planted in (Feb 15<sup>th</sup> ) gave the lowest values in this respect in both seasons. These results are in coincidence with those obtained by Abd-El-Kader *et al* (1993), El-Kholey (1995) and Khodaer (1999) who found under Sohag condition tissue culture plantlets of Williams banana in early March planting at 3.5 x 3.5 m planting distance as one plant / hole to induce the tallest plant (2.95m) and biggest circumference (86.20 cm). Bachdadi *et al* (1959) reported that the number of green leaves on the plant at time of flowering was not constant; being more in the plants which flowered in late summer and is fall and less in those which flowered in spring and early summer. Also, he explained this on the basis that some of the leaves dried out on the letter during the preceding winter, there reducing the leaf surface considerably .

**Effect of planting time on growth, flowering and harvesting time and fruit.....**

**Table 1**

## **2- Flowering and bunch characteristics :**

The data in Table (2) revealed significant variation in number of days taken for 50 % shooting, harvesting and cropping cycle. The suckers which planted in ( Feb. 15<sup>th</sup> ) significantly shortened the period to bunch shooting, harvesting and cropping cycle (days) compared to the suckers which planted in ( April 16<sup>th</sup> ). Cropping cycle (days) of ( Feb. 15<sup>th</sup> ) were (308.75 and 521.75 days ) during mother plant and first ratoon, (340.0 and 538.50 days ) for April 16<sup>th</sup> planting time, respectively, the differences was 20-30 days. These results were in parallel to those obtained by Bgchdadi *et al* (1959), Robinson (1984) and Obiefuna (1986). Found mid December planting enabled 72 % of the plant crop to be harvest during the autumn (March – May) when prices are high ; with mid September planting 94 % of the crop was harvested during the summer (December – Feb.), but mid march planting was unsuitable, with 95% of the crop being harvested in spring. Bauri *et al* (2002) found that the earliest harvesting of banana cv. Marta man was done in February planting (410 days), while the maximum days for harvesting (456 days) was token by June planted suckers.

In addition, the obtained data (Table, 2) indicated that there are significant differences in bunch weight, number of hands per bunch and number of fingers per hand between the treatment in both seasons. The plants were planted in (March 16<sup>th</sup> ) significantly produced heavier bunches (20.35 and 27.00 kg. ) and the largest number of hands per bunch (10.75 and 13.25) and increased number of fingers per hand (19.25 and 22.25) in the mother plant and first ratoon cycle, respectively. Mean- while, the minimum values for the bunch weight, number of hands per bunch and number of fingers per hand were obtained from the plants which planted in (Feb 15<sup>th</sup> ). These results are in agreement with the findings of Robinson and Alberts (1983), Robinson and Net (1986), Ahmed *et al* (1998) and Abd - Allah (2005) found that the suckers were selected in 15-20 July produced the heavier bunches with more number of hands / bunch, and number of fingers/ hand .

## **3- Fruit quality :**

The results presented in Table (3) show the effect of planting date on fruit quality of banana plats ( Williams cv.) in mother plant and first ratoon cycle. Results of the analytical data of the different aspects of fruit properties which included length, diameter and weight of fingers were significantly greater in fruits produced from the plants which planted in (April 16<sup>th</sup>) meanwhile minimum values were presented in fruits harvested from plants which planted in (Feb 15<sup>th</sup>). Also, the obtained data show that fruits harvesting from the plants which planted in (March 16<sup>th</sup> ) recorded maximum pulp weight % (65.25 and 67.50 % ) and minimum peel weight % (34.75 and 32.50 % ) in both seasons. These results are in partial agreement with those reported by Khodaer (1999), Abd Allah and Mohamed (2004) and Bauri *et al* (2002) found that fruit harvesting from June plating recorded maximum pulp weight, peel weight and pulp / peel rates .

**Effect of planting time on growth, flowering and harvesting time and fruit.....**

**Table 2**

**Table 3**



## **Conclusion**

Going back to the present results it could be stated that under the same conditions of the investigation, (March 16<sup>th</sup>) was the suitable time to planted the success of Williams banana which gave the best vegetative growth, heavier bunches with good quality of fruits and suitable period for flowering and harvesting.

## **REFERENCES**

- Abd-Allah, B.M. (2005). Adjusting the suitable time for selecting suckers of William banana under Aswan conditions. *Egypt J. Appl. Sci.* ; 20 (2) 171-181 .
- Abd El-Kader, A.M., F.M.Z. El-BarKouky, F.M.B. El-Makhtown and M.M.M. Saad (1993). Evaluation of two newly introduced banana cultivars *J. Agric. Sci. Mansoura. Univ.* 18 (9) : 2714-2719 .
- Abd El-Naby, S.K.M. (1988). Some studies of growth habits, flowering and fruiting of Poyo Banana. M.Sc. Thesis, Fac. Of Agric., Al-Azhar, Univ. Egypt, P. 71.
- Abd-Allah, B.M. and S.G. Mohamed (2004). Comparative study on growth and fruiting of Williams, Grand Nain and Hinidi cultivars of banana grown under upper Egypt conditions. *Assiut. Of Agric. Sci. Vol. 35 (1):* 269 – 278 .
- Abu-Aziz, A.B., S.M. El-Nabowy and Y.A. Wali (1970). Some changes leading to Maturation and ripening banana fruits, *Res. Bull., No 308, Fac. Agric., Ani Shams, Univ. Egypt.*
- Ahmed, F.F., M.A. Ragab, A.A. Gobara, M.S. Hammam and A.E.M. Mansour (1998). A comparative study on growth and fruiting of Williams and Cavendish banana grown under El-Minia region conditions. *Egypt. J. Hort.* 25, (1) : pp. 29 – 41 .
- Baghdadi, H.; F. Minessy and F. Keleg (1959) : Banana yield in relation to planting distances and depths, time of maturity and flower bud removal. *Alex. J. Agric. Res. Vol. 12 (1) :* 63-75 .
- Bauri, F.K., D.K. Misra and S.K. Sarkar (2002). Effect of planting time on post-harvest performance of banana cv. MArtaman. *Indian. J. Hort.,* 59 (2) : 127 – 129 .
- El-Kholey, L.A.F. (1995). Response of some banana cultivars to different cultural treatments. Ph.D. Thesis, Fac. Agric. Zagazig. Univ. Egypt .
- Khodaer, B.M.A. (1999). Response of Williams banana growth in reclaimed sandy soil to some horticultural practices under shag Governorate environments. Ph. D. Thesis Fac. Agric. Assuit Univ.
- Ministry of Agric. A.R.E. (2009). Acreage and total production of Agric. Crop in A.R.E. *Bull Agric. Econ. And statistics.*
- Murry, D.B. (1960). Deficiency symptoms of the major elements in the banana. *Trop. Agric. Trim.* 36 : 100-107 .

- Obiefuna, J.C. (1986). the effect of monthly planting on yield, patterns and yield cline of plantains (Musa AAB. *Scientia Horticulture* 29 (1/2) : 47 – 54 .
- Rabinson, J.C. (1984). Studies on the phonology and production potential of Williams banana in a sub-tropical. *Climate. Res. Inst.*, (107). 12- 16 (*Hort. Abst.* 52 (3) : 1821) .
- Robinson, J.C. and A.J. Alberts (1983). Influence of plating date on yield and timing of the banana plant crop (W. Williams ) at Burgershall and Levubu. *Subtropica.* 4 (4) : 11 – 16 .
- Robinson, J.C. and D.J. Net (1986). The influence of planting date, sucker selection and density on yield and crop timing of bananas (cultivar Williams) in the Eastern Transvaal. *Scenic Horticulture*, 29 (4) 347-358.
- Simmonds, N.W. (1966). *Bananas*. Longman London.
- Snidecor, C.W. and W.G. Cochran (1990). *Statistical methods* 7<sup>th</sup> Ed. The Iowa state Univ. press Amer. Iowa USA P.593 .
- Stover, R.H. and N.W. Simmonds (1987). *Bananas* Longman. London.

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### الملخص العربي

أجريت هذه الدراسة خلال موسمي ٢٠٠٨/٢٠٠٩ ( نباتات الأمهات) و ٢٠٠٩/٢٠١٠ (خلفة أولي) علي صنف الموز المويليامز النامي في الأراضي الرملية المستصلحة (مرزعة خاصة بغرب النوبارية - محافظة البحيرة) لدراسة تأثير خمسة مواعيد زراعة علي النمو الخضري والصفات الزهرية والثمارية وقد أوضحت النتائج أن النباتات التي زرعت في ميعاد ١٦ مارس أعطت أعلى القيم لصفات طول ومحيط الساق الكاذبة وعدد الأوراق الكلية للنبات وعدد الأوراق الخضراء عند مرحلة التزهير وكذلك مساحة الورقة .

بينما أعطت النباتات التي زرعت في ميعاد ١٥ فبراير أقل القيم للصفات السابقة في كلا موسمي الدراسة. التزهير المبكر وقصر مدة الجمع وقصر فترة حياة النباتات سجلت في النباتات التي زرعت في ميعاد ١٥ فبراير. كما أن النباتات التي زرعت في ميعاد ١٦ مارس أعطت أكبر السباطات (٢٠٠.٣٥ ، ٢٧.٠٠ كجم ) بالإضافة إلي أكبر عدد من الكفوف / سباطة (١٠.٧٥ ، ١٣.٢٥ ) وعدد الأصابع /كف (١٩.٢٥ ، ٢٢.٢٥ ) كما أعطت تحسنا في الصفات الطبيعية للثمار ( طول وقطر ووزن الإصبع ) وأعلي نسبة مئوية لللب في الثمار مقارنة بكل مواعيد الزراعة .

ومن خلال هذه الدراسة يمكن التوصية بأن أفضل ميعاد للزراعة للموز الويليامز تحت نفس ظروف الدراسة هو ميعاد ١٦ مارس حيث أعطت أحسن نمو خضري وتوقفا في وزن السباطات وصفات الجودة للثمار .

**Table (1): Effect of planting time of suckers on vegetative characteristics of Williams banana grown in Sandy soil during 2008/2009 (mother plant) and 2009/2010 (fruit ratoon) seasons .**

Parameters Treatments	Pseudostem height (cm)		Pseudostem girth (cm)		Total number of leaves per plant		Number of green leaves at bunch shooting		Leaf area (m <sup>2</sup> )	
	2008/2009	2009/2010	2008/2009	2009/2010	2008/2009	2009/2010	2008/2009	2009/2010	2008/2009	2009/2010
Planting times										
15 Feb	222.00	274.50	71.00	80.50	22.50	36.50	12.25	13.50	2.20	2.32
1 March	226.00	276.00	73.25	82.25	23.25	37.00	12.75	13.75	2.23	2.36
16 March	234.00	279.50	75.00	85.50	23.50	38.00	13.50	14.50	2.32	2.42
1 Apr.	232.25	277.50	73.50	84.00	23.50	37.25	13.00	13.50	2.30	2.42
16 Apr.	229.00	275.00	74.00	83.50	23.00	37.50	12.50	14.25	2.26	2.38
L.S.D at 0.05 %	1.76	1.49	0.48	2.04	0.29	0.13	0.79	0.70	0.022	0.023

**]Table (2): Effect of planting time of suckers on flowering and bunch characteristics of Williams banana grown in Sandy soil during 2008/2009 (mother plant) and 2009/2010 (fruit ratoon) seasons .**

Parameters Treatments	Period to 50 % bunch shooting (day)		Period to harvest (day)		Cropping cycle (day)		Bunch weight (kg)		Number of hands per bunch		Number of fingers per hand	
	2008/ 2009	2009 / 2010	2008 / 2009	2009 / 2010	2008 / 2009	2009 / 2010	2008 / 2009	2009 / 2010	2008/ 2009	2009 / 2010	2008 / 2009	2009 / 2010
15 Feb	188.25	407.25	120.50	114.50	308.75	521.75	18.50	25.95	9.75	12.25	17.75	20.50
1 March	194.50	415.75	125.00	117.00	319.50	532.75	19.05	26.35	10.25	12.50	18.75	21.00
16 March	192.00	417.00	131.00	118.50	323.00	535.50	20.35	27.00	10.75	13.25	19.25	22.25
1 Apr.	193.50	419.00	134.75	120.00	328.25	539.00	20.20	26.80	10.25	12.75	19.25	21.50
16 Apr.	198.50	417.00	141.50	121.50	340.00	538.50	18.70	26.20	9.75	12.50	18.25	21.00
L.S.D at 0.05 %	1.95	1.40	1.81	1.49	3.22	3.86	0.48	0.47	0.78	0.80	0.24	0.22

**Table (3): Effect of planting time of suckers on physical characteristics of Williams banana fruits grown in Sandy soil during 2008/2009 (mother plant) and 2009/2010 (fruit ratoon) seasons .**

Parameters Treatments	Finger length (cm)		Finger diameter(cm)		Finger weight (g)		Pulp weight %		Peal weight %	
	2008/2009	2009/2010	2008/2009	2009/2010	2008/2009	2009/2010	2008/2009	2009/2010	2008/2009	2009/2010
Planting times										
15 Feb	18.10	20.00	2.90	3.50	80.20	102.25	64.25	66.70	35.75	33.30
1 March	18.25	20.30	3.05	3.55	80.60	103.50	64.75	77.00	35.25	33.00
16 March	18.50	20.70	3.25	3.68	82.20	104.25	65.25	67.50	34.75	32.50
1 Apr.	18.15	20.50	3.10	3.55	81.30	103.75	65.00	66.85	35.00	33.15
16 Apr.	17.95	20.15	2.85	3.42	79.20	102.50	64.25	66.50	35.75	33.50
L.S.D at 0.05 %	0.77	0.67	N.S	N.S	0.86	1.05	0.82	0.38	0.48	0.42

