

EFFECT OF GA₃, UREA AND PINCHING TREATMENTS ON "ZEBDA" MANGO TREES

Samra, N.R.E.; A. Hegazi and M.I. Abdel-Fattah
Pomology Dept., Fac. Agric., Mansoura Univ.

ABSTRACT

The present work was carried out to study the effect of GA₃ at 50 and 100 ppm, urea at (0.5 and 1.5%) and pinching early flowering on growth of Zebda mango trees grown in the experimental orchard of El-Kassasin Horticultural Research Station, Ismailia Governorate, Egypt. The results indicated that different treatments of GA₃ or urea each alone or in combination with pinching both of delayed panicle emergence and full bloom, but increased number of fruits at harvest and yield/tree. Data also revealed that the same treatments promoted shoot length and number of leaves/shoots without pinching. While, these treatments tended to increase the number of healthy panicles and total number of panicle/tree, while obviously depressed number of malformed panicle/tree and malformation percentage.

From this study it could be recommended to spray "Zebda" mango trees once at mid November with GA₃ at 100 ppm with pinching early flowering in the winter. Since, this treatment was the most effective enhanced vegetative growth which in term increased the yield of the trees.

INTRODUCTION

Mango (*Mangifera indica*, L.) has a great importance in the Egyptian fruit production, it comes in the third rank, after citrus and grapes.

Unfortunately, mango trees suffer from colossal losses due to early flowering. Early blooming or flowering during winter considered a problem that can decrease the yield. Warm periods during winter may allow early flowering to occur in all mango cvs. which may be damaged by subsequent cold temperature (Litz, 1997).

Gunjate *et al.* (1983) reported that the percentage of fruit set was greater in late than in early flushes. On the other hand, Singh (1997) found that the maximum number of flower visitors during a minute occurred on late emerged panicles giving maximum fruit set compared with early and very late panicles emergence.

Also, the number of pollinators/panicle during one minute increased as the average temperature increased to 19.5 °C.

Away from the causality of early flowering, different attempts have been made to control this phenomenon. Due to the beneficial effect of GA₃, urea and pinching to induce delayed flowering of "Zebda" mango cultivar. This experiment was carried out for three seasons to evaluate the effects of these treatments.

MATERIALS AND METHODS

The present investigation was carried out during the three consecutive seasons of 2006-2007, 2007-2008 and 2008-2009 on mature "Zebda" mango trees (*Mangifera indica* L.) grown in the experimental orchard

Samra, N.R.E. et al.

of El-Kassassin Hort. Research Station, Ismailia Governorate. The trees were 20 years old, budded on "Sucary" root stock spaced at 7m apart grown in sandy soil under drip irrigation system.

Ninety mature "Zebda" mango trees were selected to be nearly similar size from an orchard receiving the normal management practices concerning irrigation, soil fertilization, pruning, pests and weeds control following the usual management program applied in the region.

The experimental trees received one foliar spray with GA₃ on mid-November (Abou Rawash *et al.*, 1983) at two concentrations (50 and 100 ppm) and two foliar sprays with Urea on mid-Nov. and mid-Dec at two concentrations (0.5% and 1%), and pinching of early flowering at first emergence on trees from mid-Dec. to mid-Feb. The applied treatments were the following :

1. Control (water).
2. Gibberellic acid (GA₃) at 50 ppm.
3. GA₃ 100 ppm.
4. Urea at 0.5 %.
5. Urea at 1 %.
6. Pinching.
7. GA₃ at 50 ppm + pinching.
8. GA₃ 100 ppm + pinching.
9. Urea 0.5 % + pinching.
10. Urea 1 % + pinching.

The following parameters were considered to evaluate the effect of tested treatments :

- 1- Date of first panicle emergence
- 2- Date of full bloom
- 3- Numbers of healthy and malformed panicles and total number of panicles per tree as well as the percentage of malformation.

$$\frac{\text{No. of malformed panicle}}{\text{Total number of panicles}} \times 100$$

- 4- Vegetative growth: in April of each season, twelve new shoots were tagged on each experimental tree. The shoot length and number of leaves per shoot were determined in late September.
5. The yield: harvesting took place on successive pickings beginning with the first week of August. Fifteen fruits were labeled on trees of each replicate. The number and weight of fruits at each picking date was recorded and the total number and weight per tree (the yield/tree) was then calculated. Moreover, the hypothetical yield per fed. was calculated considering that (85 trees are grown per fed. (planting distance 7 x 7).

Statistical analysis:

Data of the three seasons of the study were statistically analyzed according to Snedecor and Cochran (1980) for the experiment in a complete randomized block design. The differences among each treatment were compared using LSD at 5 % level.

RESULTS AND DISCUSSION

1. Date of panicle emergence and full bloom:

Data from Table (1) indicated that GA₃, urea and pinching each alone delayed panicle emergence and full bloom compared with the control. The higher tested GA₃ concentration (100 ppm) was more effective than the lower concentration (50 ppm). However, the most prominent delays were induced by the combined treatment GA3 100 ppm + pinching.

The delay in panicle emergence and full bloom goes in the benefit of mango production under Egyptian condition. With such delays, panicle emergence and flowering occur under warmer weather conditions which improve activity of the pollinating insects, consequently pollination and fruit set. In addition, the processes of pollen tube growth and fertilization would be more active under warmer weather conditions. On the other hand, panicle emergence and flowering (on the control) may enhance the probability of fungal disease infection (powdery mildew & flower blight) under conditions of the more cool and humid weather. Moreover, pollination and fruit set are usually inferior under such cool and humid weather conditions.

Table (1): Effect of GA3, urea and pinching treatments on date of first panicle emergence and Date of full bloom of "Zebda" mango trees.

Treatments	Date of first panicle emergence			Date of full bloom		
	Season 2006	Season 2007	Season 2008	Season 2006	Season 2007	Season 2008
Control	4/3	5/3	5/3	23/3	24/3	25/3
GA3 50 ppm	8/3	9/3	10/3	29/3	28/3	30/3
GA3100ppm	15/3	12/3	16/3	4/4	31/3	5/4
Urea 0.5 %	6/3	8/3	7/3	27/3	22/3	28/3
Urea1 %	11/3	12/3	12/3	31/3	2/4	1/4
Pinching	2/4	2/4	2/4	19/4	20/4	21/4
GA350ppm + Pinching	5/4	7/4	7/4	24/4	26/4	26/4
GA3100ppm + Pinching	15/4	15/4	16/4	3/5	28/4	4/5
Urea 0.5% + Pinching	3/4	4/4	5/4	22/4	25/4	24/4
Urea 1% + Pinching	9/4	9/4	11/4	29/4	24/4	30/4

The delay in panicles emergence and full bloom by GA3 or urea were in agreement with (Sanchez *et al.*, 2004; Vazques and Perez, 2006; Perez-Baraza *et al.*, 2008 and Vazquez-Valdivia *et al.*, 2009) they found that delayed flowering of Ataulfo mango trees was observed only in GA3 treated trees (50 and 100 ppm) compared with no delayed flowering in the control.

2. Number of panicle / tree and percent of malformation / tree:

As shown in Table (2), pinching treatment (alone) induced the highest increments in total number/tree and percentage of malformation, this was clear in the three seasons. The use of GA₃ or urea was effective in depressing percentage of malformation especially at higher concentrations. This is may be due to that GA3 delayed the flowering and increased the level of gibberellin in the tissue. So, Singh & Dhillon (1990) mentioned that

Samra, N.R.E. et al.

endogenous GA was lower in malformed panicles but it was higher in healthy ones at fully swollen buds.

Table (2): Effect of GA₃, urea and pinching treatments on total number of panicle/tree and percentage of malformation of "Zebda" mango trees.

Treatments	Total number of panicle / tree			Percentage of malformation		
	Season 2006	Season 2007	Season 2008	Season 2006	Season 2007	Season 2008
Control	360.2	220.2	398.7	27.4	14.8	25.1
GA3 50 ppm	409.5	197.0	409.8	16.8	21.6	13.1
GA3100ppm	428.5	219.0	446.5	12.3	14.9	12.4
Urea 0.5 %	445.0	227.0	444.2	20.8	23.6	18.0
Urea1.0 %	472.5	283.2	474.3	17.6	18.5	14.8
Pinching	582.8	387.7	607.6	23.7	27.3	24.6
GA350ppm + Pinching	461.5	332.8	413.0	17.2	12.4	11.8
GA3100ppm + Pinching	493.8	367.3	463.2	14.1	6.5	9.6
Urea 0.5% + Pinching	486.2	388.0	423.5	20.4	24.0	15.6
Urea 1.0% + Pinching	529.8	425.5	475.2	19.4	19.6	11.5
L.S.D at 5 %	17.9	42.1	37.6	2.1	6.6	2.3

In this respect, the relation between GA and floral malformation of different mango cvs. was studied by Pandey & Pandey (2000) they found that GA₃ at 25 ppm in combination, with MH at 50 ppm reduced floral malformation in mango trees significantly (32.85% against 57.00% for the control). Also, Kasem (2001) mentioned that sprayed GA₃ at 0, 50, 100 or 200 ppm on Taymour and Hindy Bi-Sinnara mango trees at pre bloom time, the flowering malformation was reduced in the two seasons for both mango cvs.

In this respect, Singh & Dillon, (1990) cleared that malformed panicles of the cv. Dusehri maintained lower endogenous GA levels than healthy ones at the stage of fully swollen buds, while the converse was true with the following stages (i.e. bud inception, fully grown panicles and fully blooming panicles). Similar conclusion was suggested by Raafat *et al.*, (1995 -b).

The depressing, effect of urea on percentage of malformed panicles confirmed the previous reports by Thakure *et al.* (2000) and Baghel & Rajesh (2003) they found that combined application of 4% urea + 150 ppm NAA was superior for increasing healthy panicles/m².

3. Vegetative growth:

Concerning the effect of treatments on vegetative growth parameters expressed as length of new shoots and number of leaves per shoot, data from Table (3) showed that all treatments used significantly increased number of leaves per shoot and length of new shoots compared with the control. Trees sprayed with GA₃ at 100 ppm alone or with pinching gave a higher number of leaves per new shoot and the highest length of new shoots than the other treatments or the control. Whereas, the pinching treatment produced shortest length of new shoots and lower number of leaves per new shoots than the other treatment expect the control.

Generally, the obtained results on vegetative growth cleared significant promotions in shoot length and number of leaves / shoot with the treatments of GA3 and urea foliar spray.

Table (3): Effect of GA3, urea and pinching treatments on length of new shoots (cm) and number of leaves per shoot of "Zebda" mango trees.

Treatments	Length of new shoots (cm)			Number of leaves per shoot		
	Season 2006	Season 2007	Season 2008	Season 2006	Season 2007	Season 2008
Control	17.2	18.7	16.9	8.9	9.3	6.8
GA3 50 ppm	19.7	23.3	23.5	11.3	13.5	10.8
GA3 100 ppm	23.4	25.1	25.3	12.5	15.7	11.6
Urea 0.5 %	18.8	19.6	32.1	10.1	12.8	13.0
Urea 1.0 %	22.6	22.2	20.8	10.9	13.9	10.2
Pinching	17.4	19.5	18.1	8.7	10.5	7.3
GA3 50 ppm + Pinching	21.0	25.8	23.1	11.0	14.7	10.4
GA3 100 ppm + Pinching	24.5	27.4	24.7	11.8	17.4	11.2
Urea 0.5 % + Pinching	19.5	21.9	21.1	9.1	11.9	9.1
Urea 1.0 % + Pinching	22.6	24.6	25.1	10.7	14.0	9.4
L.S.D at 5 %	1.898	1.745	4.566	0.93	1.09	1.76

The promotion in vegetative growth induced by GA3 and urea treatments were in accordance with Das *et al.* (1989) who sprayed GA3 at 50 ppm on limbs of Langra mango trees on mid June; the treatment enhanced shoot length and number of leaves per shoot. Also, Sanchez *et al.* (2004) found that spraying GA3 (50 ppm) on mango trees during Sept. – Nov., Jan and July- Sept.- Jan. recorded the highest percentage of vegetative sprouting (77% and 55% respectively). In addition, El-Shenawy (2005) found that GA3 or KNO₃ treatments either alone or combined with inflorescences thinning stimulated tree growth of mango cv. Kiett. On another treatment he found that GA3 or ZnSO₄ were most effective for enhancing production of new shoots. He concluded that, inflorescence thinning treatments at 75% combined with GA3 or GA3 + CPPU could stimulate new flushes.

Khattab *et al.* (2009) studied the effect of pruning severity after harvest, GA3 at (50 & 100 ppm) and Ethrel at (500 & 1000 ppm). They found that the highest number of vegetative shoots was obtained with removing the intact terminal shoots and spraying GA3 at 100 ppm on Sedik mango trees.

Other literature reports indicated that urea foliar spray enhanced vegetative growth. Banik *et al.* (1997) found that application of 1% urea + 0.4% boron promoted vegetative growth.

The effect of pruning and pinching on vegetative growth of mangoes cultivars indicated variable trends. Thus, Mohan *et al.* (2001) found that pruning of off years Dashehari mango trees increased new shoots production and more vegetative growth, Yeshitela *et al.* (2003) found that the longest shoot of mango Keitt were observed with inflorescence removal together with apical whorl of leaves during full bloom. Similar results were found in Tommy Atkins cultivar. Also, Shaban (2005) found that removing terminal luses or heading back seemed to increase shoot length more than pinching. Removing terminal flushes proved to be the most effective treatment for

increasing the number of leaves per shoot on mango trees. Khattab *et al.* (2009) reported that the removal of terminal flushes with 100 ppm of GA₃ resulted in the highest number of vegetative shoots in Sedik mango. On the other hand Crane (2004) found that pinching decreased the number of emerged shoots.

Shaban, (2009) cleared that promotion in vegetative growth, expressed as shoot and leaf growth, was obtained by all treatments implying GA₃ or Urea alone. The most effective treatment was GA₃ 100ppm without pinching, the considered parameters were shoot length and number of leaves/ shoot.

4. Yield component (number of fruit per tree and the yield per tree and per feddan) :

Generally, the number of fruits per tree at harvest ranged from 67.1 to 140.9; 40.5 to 105.4 and 82.4 to 165.7 in the three seasons respectively according to the tested treatment (Table 4).

The data show significant promotions in number of fruit/tree at harvest and the most significant effect resulted from GA₃ at 100 ppm or urea at 1.0% each with pinching. Similar trend was obtained from the yield per feddan. The increment in yield per tree and per feddan may be due to the increment of number of fruits per tree.

The increase in number of fruits/tree by GA₃ application agreed with Ruby & Brahmachari, 2004 who found that preharvest sprays of GA₃ at 100 ppm and CCC 500 ppm on mango cv. Amrapali gave the highest number of fruits compared with the control and the highest yield was obtained with GA₃ at 100 ppm. The same results were obtained by Sarker and Ghosh (2004) using GA₃ at 30 ppm.

Guillermo *et al.* (2007) found that spraying Kent mango trees with 40 ppm GA₃ plus calcium boron 0.4% increased significantly the fruit set, production and reduced fruit drop. The yield had also significant differences in relation with the concentration of GA₃ and calcium boron.

Singh (2009) found that foliar spray of GA₃ 75 ppm at flower bud differentiation stage onto mango cv. Kensington Pride trees resulted in significantly higher fruit set (84fruit/panicle). In a second experiment, GA₃ sprayed at full bloom resulted in higher fruit set (43 fruit / panicle) at 10 ppm concentration.

Regarding to the use of urea, mango literature reports indicated that urea foliar spray treatments on mango trees increased number of fruits and/or the yield/tree. Yeshitela *et al.* (2005) sprayed Tommy Atkins mango trees with urea and KNO₃. Urea 0.5 g+ KNO₃ 4% produced better results for most of the yield parameters. In this respect, Jain (2006) using foliar applied urea (0 and 4%) + biozym crop (0 and 1000 ppm) on mango trees at pre-flowering and pea-stages, single and double spray treatment with 4% urea alone gave maximum yield and average fruit weight.

On the other hand, the increments in number of fruits/tree and/or the yield / tree by pinching was in agreement with Shaban, (2005) who reported that heading back or pinching Hindi-Bi Sinnara mango trees in December recorded the highest number of fruits per tree in the first season. However, pinching in December or January was the most effective treatment for

increasing this number in the second one, both pinching and heading back treatments increased the number of fruits per tree comparing to the control. Results of pruning treatments indicated that heading back or pinching in December, January and February significantly enhanced tree yield comparing to the control.

Table (4): Effect of GA₃, urea and pinching treatments on number of fruits at harvest/ tree, yield per tree (kg) and yield per feddan (ton) of "Zebda" mango trees.

Treatment	No. of fruits at harvest/ tree			Yield per tree (kg)			Yield per feddan (ton)		
	Season 2006	Season 2007	Season 2008	Season 2006	Season 2007	Season 2008	Season 2006	Season 2007	Season 2008
Control	67.1	42.1	82.4	33.3	21.1	40.7	2.831	1.791	3.457
GA3 50 ppm	100.0	40.5	110.4	47.8	19.6	52.4	4.060	1.669	4.456
GA3100ppm	116.5	52.5	130.5	51.6	24.8	57.5	4.389	2.111	4.885
Urea 0.5 %	91.7	40.6	103.1	44.9	20.0	50.3	3.820	1.700	4.276
Urea 1.0 %	118.0	59.1	130.9	54.5	27.7	60.0	4.633	2.355	5.098
Pinching	121.5	68.4	137.5	53.4	30.4	60.0	4.536	2.587	5.100
GA350ppm + Pinching	123.5	83.9	129.9	52.9	36.4	55.4	4.500	3.086	4.706
GA3100ppm+ Pinching	120.1	105.4	165.7	50.6	45.0	69.3	4.304	3.825	5.888
Urea 0.5% + Pinching	117.3	79.5	117.8	51.9	45.6	51.7	4.414	3.026	4.395
Urea 1.0% + Pinching	140.9	103.6	149.9	59.9	54.3	63.2	5.095	3.851	5.372
L.S.D at 5 %	15.3	16.0	21.7	6.2	7.2	9.1	0.522	0.610	1.168

In conclusion, from the obtained results it could be recommended to use GA₃ at 100 ppm once in November as well as pinching of early flowering in the winter to achieve better vegetative growth and increase the yield of Zebda mango trees but also decreased the malformation percentage under Ismailia conditions.

REFERENCES

- Abou Rawash, M.; A. EL-Hammady; S. EL-Nabawy; A.S. Khalifa and H. EL-Masry (1983). Regulation of flowering and fruiting in mango trees by using some growth regulators. *Annals Agric. Sci., Fac. Agric., Ain Shams Univ., Cairo, Egypt.* 28(1): 227-239.
- Baghel B.C. and Rajesh-Tiwari (2003): individual and integrated effect of urea and NAA on flowering and fruiting of mango (*Mangifera indica* L.) *South Indian Horticulture.* 51 (1/6): 1-6.
- Banik, B.C.; Sen, S.K. and Bose, T.K(1997): Effect of zinc, iron and boron in combination with urea on growth, flowering, fruiting and fruit quality of mango cv. Fazil. *Environment and Ecology.* 15:1.122-125.
- Crane, J.H. (2004): Selected cultural techniques to improve production of some subtropical and tropical fruit crops. *Acta Hort.* 632: 179-187.
- Das, G.C.; Rao, D.P. and Lenka, P.(1989): Studies on mango malformation in the mango clone chiratpudi. *Acta Horticulture.* 231.866-872.
- El-Shenawy, I. E. (2005): Effect of inflorescences thinning spraying of some fertilizers and growth regulators on growth and productivity of Keitt Mango trees. *Egypt. J. Appl. Sci.,* 20 (2): 182-196.

Samra, N.R.E. et al.

- Guillermo-J, P.M:Reyes-C,H: Aguilar,H. and Marienen, G. (2007): Effect of the foliar application of fertilizers and phyto-regulators on the setting and development of "kent" mango fruits. Proceeding of the Interamerican Society for Tropical Horticulture. 51:72-76.
- Gunjate, R.T.; Jorwekar, D. P. and Lad, B.L.(1983): pollination, fruit set and fruit drop in Alphonso mango. Journal of Maharashtra-Agric.Univ.8 (2): 168-170.
- Jain, P.K. (2006): Fruit drop, yield and quality of mango as influenced by biozyme and urea sprays.Indian Journal of Horticultural 63 (4):453-454.
- Kasem, F.S. (2001): Physiological studies on mango trees. Ph. D. Thesis, Fac. Of Agric. Moshtohor, Zagazig Univ.
- Khattab, M.M : Haseeb, G.M. and Elkhishen, M.A. (2009): The effect of post harvest pruning , GA3 and ethrel concentrations on some flowering attributes and yield of some mango cultivars. Bulletin of Faculty of Agriculture, Cairo University . 60:3, 306-314.
- Litz, R.E. (1997): The mango botany, production and uses, first Ed., CAB international Univ. Press. Cambridge. N.Y. Pp. 84-85.
- Mohan, S.; Sant, R.; Singh, C.P. and Shukla, P. (2001): Effect of pruning on growth, flowering and fruiting in mango . Indian Journal of Horticulture . 58 (4): 303-308.
- Pandey, D. and Pandey, S.N. (2000): Effect of growth regulators and zinc sulphate on floral malformation in mango (*Mangifera indica* L.). Annals of Agricultural Research. 21 (1): 129-132.
- Perez-Barraza, M.H.; Vazquez-Valdivia, V. and Osuna-Garcia, J.A. (2008): Gibberellins use to modify vegetative growth and flowering of "Tommy Atkins" and "Ataulfo" mangos. Revista Chapingo. Serie Horticulture. 14: 169-175.
- Ruby-Rani and Brahmachari, V.S. (2004): Effect of growth substances and calcium compounds on fruit retention, growth and yield of Amrapali mango. Orissa Journal of Horticulture. 32 (1): 15-18.
- Sanchez, S.E.; Cabrera, C.F.; Padilla, V.I. Samaniego, R.J.A. and Aboytia, M. R. (2004): Gibberellic acid effect on sprouting and nutritional balance of young trees of Kett Mango at the Mayo Valley, Sonora. Acta Hort. 645 : 447-452.
- Sarker , S. and Ghosh, B. (2004): Effect of growth regulators on fruit morphology, retention and yield of mango cv. Amrapali. Indian. Agriculturist 48 : (3/4) : 185-188.
- Shaban A.E.A. (2005): Effect of pruning on growth, flowering and fruiting of Hindi BiSinnara Mango trees . Jour. Agric. Sci. Mansoura Univ., 30 (3):1541-1551.
- Shaban A.E.A. (2009): Effect of summer pruning and GA3 spraying on inducing flowering and fruiting of Zebda mango trees. World Journal of Agricultural Sciences. 5: 3, 337-344.
- Singh, G. (1997): pollination, pollinators and fruit setting in mango. Acta. Hort. (455): 116-123.
- Singh, Z. (2009): Gibberellin type and time of application influence fruit set and retention in mango. Acta Horticulturae. 820, 407-412 .

- Singh, Z. and B.S. Dhillon (1990). In vivo role of indole-3-acetic acid, gibberellic acid, zeatin abscisic and ethylene in floral malformation of (*Mangifera indica*). *Phytopath*, 128: 3, 235-245.
- Snedecor, G. and W.G. Cochran (1980): *Statistical Methods*, 7th Ed. Iowa State Univ., Press. Amer Iowa, USA; pp. 507.
- Thakur, A.S.; Vaishampayan, S.M. and Shukla, A. (2000): Effect of varieties, nutrients and direction on the incidence of floral and vegetative malformation in grafted mango. *Crop-Research-Hisar*. 20:3 , 494-449.
- Vazques, V. and Perez, M.H. (2006): Doses and application time of gibberellic acid on flowering and harvest of mango "Ataulfo" *Revista Fitotecnia Maxicana*. 29 (3): 197-202.
- Vazquez-Valdivia, V.; Perez-Barraza, M.H. and Osuna-Garcia, J.A. (2009): Effect of gibberellic acid on flowering of "Ataulfo" mangos. *Acts Horticulturae*. 820, 413-417.
- Yeshitela, T.; Robbertse, P. J. and Stassen, P. J. C. (2003): The impact of panicle and shoots pruning on inflorescence and yield related developments in some mango cultivars. *J. APpl. Hort*. 5 (2): 69-75.
- Yeshitela, T.; Robbertse, P.J. and Stassen, P.J.C. (2005): Potassium nitrate and urea sprays affect flowering and yields of "Tommy Atkins" (*Mangifera indica* L.) mango in Ethiopia. *South African Journal of Plant and Soil*. 22 (1): 28-32.

تأثير معاملات الرش بالجبرلين واليوريا والتطويز على أشجار المانجو صنف الزبدة

نبيل رشاد السيد سمرة ، عبد العال حجازى و محمد إبراهيم عبد الفتاح
قسم الفلكهة - كلية الزراعة - جامعة المنصورة

أجريت هذه الدراسة خلال ثلاث مواسم متتالية ٢٠٠٦-٢٠٠٧ و ٢٠٠٧-٢٠٠٨ و ٢٠٠٨-٢٠٠٩ على أشجار مانجو بالغة صنف الزبدة. تم رش الأشجار بالجبرلين بتركيز ٥٠ و ١٠٠ جزء في المليون مرة واحدة في منتصف شهر نوفمبر كما تم رش اليوريا بتركيز ٥٠ و ١٠٠ % مرتين في منتصف نوفمبر ومنتصف ديسمبر ، أما قصف البراعم الزهرية المبكرة كان يجرى في الشتاء بدلية من شهر نوفمبر وديسمبر حتى بدلية شهر فبراير.

أظهرت النتائج أن للمعاملات المختلفة للجبرلين أو اليوريا كلا بمفرده أو مع قصف البراعم أنت لتأخير خروج الشماريخ الزهرية وكذا ميعاد بكتمال التزهير وأنت لزيادة عدد الثمار على الأشجار عند الجمع ومحصول الشجرة بالكيلوجرام. كما أظهرت النتائج أيضاً حدوث تشجيع للنمو الخضري متمثلاً في زيادة طول الأفرخ الخضري الحديثة وعدد الأوراق الخارجة عليها وذلك بدون إجراء معاملة القصف. بينما أنت هذه المعاملات لزيادة عدد الشماريخ السليمة وإنخفاض النسبة المئوية للشماريخ المشوهة.

من خلال هذه الدراسة يمكن للتوصية برش أشجار المانجو صنف الزبدة مرة واحدة في منتصف نوفمبر بالجبرلين بتركيز ١٠٠ جزء في المليون مع قصف البراعم المبكرة خلال فصل لشتاء.

قلم بتحكيم البحث

كلية الزراعة - جامعة المنصورة
كلية زراعة الفيوم

أ.د / محمود إبراهيم القاضي
أ.د / محمد علي إبراهيم سلامة