

BUNCH WEIGHT AND FRUIT QUALITY OF "SAMANI" DATE (*Phoenix dactylifera* L.) AS AFFECTED BY SOME GROWTH REGULATORS.

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ABSTRACT

To obtain further information about the effect of some growth regulating substances upon bunch weight and fruit quality of Samani date cultivar (12-year-old) were assessed for two successive seasons (1997 & 1998), effects of different concentrations of IAA + BA and GA₃ + BA applied twice one week after pollination and two weeks later were compared on different bunches on the same palm. Both bunch and fruit fresh weight were increased by IAA + BA application especially 10 ppm IAA + 10 ppm BA treatment, followed by GA₃ + BA treatments especially 5 ppm GA₃ + 10 ppm BA. Whereas the percentage of seed weight was decreased with (5 ppm IAA + 10 ppm BA) treatment. The IAA + BA treatments increased fruit length and diameter especially with 10 ppm IAA + 10 ppm BA treatment, followed by GA₃ + BA treatments especially 5 ppm GA₃ + 10 ppm BA. Concerning L/D ratio, no significant differences were obtained between treatments with the exception in the first season where the treatment 10 ppm IAA + 10 ppm BA decreased it. TSS, reducing and total sugars were increased by IAA + BA treatments especially (10 ppm IAA + 10 ppm BA) treatments and GA₃ + BA treatments especially 5 ppm GA₃ + 10 ppm BA and were decreased by elevating the rate of GA₃ + BA application.

The results of this experiment suggest the benefits of the application of IAA + BA to improve bunch weight and quality of Samani date fruit.

INTRODUCTION

Samani date is one of the most important cultivars of soft dates in Egypt. The fruit is consumed fresh at both khalal (peak yellow colour) and at rutab stages. Several reports concerning the influence of synthetic growth regulators, especially gibberellic acid (GA₃) on date fruits have been published. Nixon (1959) observed that one application of GA₃ to flowers or young fruits of "Medjool" and "Deglet Noor" dates within 3 to 4 weeks after pollination accelerated fruit elongation during the early part of its period of rapid growth. Hussein and Hassanin (1970) obtained an increase in the fresh weight of fruit and bunches of the dry date cv. "Sakkoti". However, adverse effect on fruit composition and quality occurred. Marei and Bondok (1974) found that GA₃ at 400 ppm increased fruits size of the soft date cv. Samani but delayed fruit ripening. Hussein *et al.* (1976) working on "Barhi" dates pointed out that GA₃ increased the fresh weight of the fruit but had no appreciable effect on the fresh weight of the seed. Both treated fruits and seeds showed a tendency to be longer and narrower than untreated ones. Treatments of 100 and 250 ppm GA₃ increased the average yield per bunch. Untreated fruits coloured and ripened nearly in the same time with fruits treated only with 100 ppm. All concentrations of GA₃ reduced the TSS, reducing sugar and total sugar. These results signify

a reduction in fruit quality from the GA₃ treatments. Hussein *et al.* (1986) reported that GA₃ application improved fruit weight, size and diameter and produced the highest bunch weight of Zaghloul cv., they added that GA₃ treatment gave the lowest value of TSS than the untreated fruits. Maximos *et al.* (1979) pointed that the application of GA₃ at 50 or 100 ppm to seeded fruits, 60 days after full bloom, increased the yield, average fruit weight, fruit length and diameter especially when using GA₃ at 100 ppm for Sewy date fruits. They added that fruit maturation of GA₃ stimulated fruits showed signs of retardation as indicated by a reduction in total soluble solids and total sugars. Bakr *et al.* (1981) indicated that the application of GA₃ at 50 ppm to seeded fruits decreased significantly the total soluble sugars and reducing sugars for Samani date fruits. El-Kassas (1983) revealed that both bunch and fresh weight per fruit were increased with GA₃ application for Zaghloul date cultivar. The percentage of seed was decreased as the concentration of GA₃ increased. The GA₃ treatments increased fruit length more than 2,4,5-T treatments, but the width of the fruit increased with 2,4,5-T than GA₃ treatments. On the other hand, reducing and total sugars were decreased by increasing GA₃ concentration. El-Makhtoun *et al.* (1988) with Samani date found that GA₃ application gave the lowest values of TSS content for seedy fruits; they added that GA₃ decreased the total sugars and reducing sugars content than the untreated fruits. Recently, Hussein *et al.* (1992) found that GA₃ application increased fruit weight and size, compared with untreated fruits for Samani dates but the highest TSS and total sugars content were obtained with no GA₃ + heavy thinning compared with GA₃ sprays + heavy thinning. Kamal (1995) revealed that fruit weight, volume, length, diameter, soluble solids and total sugars of Zaghloul and Samani dates were generally increased by GA₃ treatments at 100-250 ppm.

This investigation was conducted to study the effect of post-pollination application of IAA, GA₃ and BA on bunch weight and fruit characteristics of Samani date cultivar.

MATERIALS AND METHODS

This work was carried out during two successive seasons (1997 and 1998) on five Samani date palm trees, each represents a replicate of about 12-year-old grown at El-Kassasein Research Station, Ismailia Governorate, Egypt. The trees were planted at 7x7 meters apart in sandy soil and irrigated with drip system. The selected palm trees were uniform in size and vigor and subjected to the same cultural practices. During the two seasons, seven bunches were selected per tree by removing excess from the latest small clusters, hence the remaining clusters were nearly equal and chosen at different directions. Pruning was practiced to maintain bunch/mature leaves ratio of 1:7. Pollen grains from the same male tree were used to each female palm during the two seasons.

Six treatments of IAA, GA₃ and BA, in addition to control, were applied twice to comparable bunches on the same palm, one week after pollination and 2 weeks later. One of the seven bunches on each palm was let without

treatment and served as control. The IAA and GA₃ were sprayed at concentrations of 5,10 and 20 ppm, whereas, BA concentration was 10 ppm. During spraying, all bunches apart from the treated one were bagged in polyethelyene bags to prevent contamination from the surrounding treatment. To all growth regulators solution, a wetting agent Triton B was added at 0.1%. This experiment was arranged in a complete randomized design including seven treatments. Every treatment was replicated five times.

All bunches were harvested at the late Khalal stage (full colour stage of maturity) (Figure 1). Bunch weight from each treatment was recorded. Samples of 20 fruits were picked in random from each bunch for determination of physical and chemical fruit characteristics. Total soluble solids percentage determined by a hand refractometer. Sugars were determined according to the method of Lane and Eynon outlined in A.O.A.C. (1975).

Data were statistically analyzed and differences among means were tested using L.S.D. test, (Snedecor and Cochran, 1980).

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RESULTS AND DISCUSSION

Tables 1, 2 and 3 and summarized the effect of both IAA + BA and GA₃ + BA at different concentration on the yield and fruit quality of Samani date cultivar during 1997 and 1998 seasons.

Average yield per bunch:

The data obtained in this present study indicate that IAA + BA treatments increased the bunch weight over control. Such increase was attributed to the increase in fresh weight per fruit. Maximum increase in bunch weight was obtained at concentration of 10 ppm IAA + 10 ppm BA. Such concentration increased bunch weight by 16.04% (average of two seasons). On the other hand, GA₃ +BA treatments slightly increased the average bunch weight than the untreated bunches. The GA₃ + BA (5+10) ppm appreciably increased bunch weight compared with the GA₃ + BA at (20+10) ppm. Similar effects of gibberellic acid on bunch weight were reported by other investigators, Hussein and Hassanin (1970); Maximos *et al.* (1979), El-Kassas (1983) and Hussein *et al.* (1986).

Fruit fresh weight:

The fresh weight of fruit was significantly increased either IAA + BA or GA₃ + BA treatments over control. Such increased were estimated to be 51.69% and 36.44% (average of two seasons with IAA + BA at (10+10) ppm and GA₃ + BA at (5+10) ppm, respectively over control. Comparing both growth regulators, the higher values of fresh weight per fruit were obtained with IAA + BA at (10+10) ppm followed by GA₃ + BA at (5+10) ppm. Thus fruits sprayed with IAA + BA or GA₃ + BA were superior in their weights over the untreated. This result is supported by the findings of many workers who found that gibberellic acid can cause increases in fresh weight per fruit, Nixon (1959), Hussein and Hassanin (1970), Maximos *et al.* (1979), El-Kassas (1983), Hussein *et al.* (1986&1992) and Kamal (1995).

Fruit size and fresh weight of seed:

Similar trends were found as fruit fresh weight. Maximum increase in fruit size was obtained at concentrations of (10+10) ppm and (5+10) ppm for IAA+ BA and GA₃ +BA, respectively.

Table (1): Effect of some growth regulators sprays on the bunch weight of Samani date.

Treatment	Bunch weight (Kg)	
	1997 season	1998 season
5 ppm IAA+10 ppm BA	25.07	24.90
10 ppm IAA+10 ppm BA	25.83	25.23
20 ppm IAA+10 ppm BA	24.43	24.17
5 ppm GA ₃ +10 ppm BA	23.97	23.03
10 ppm GA ₃ +10 ppm BA	22.67	22.20
20 ppm GA ₃ +10 ppm BA	21.80	20.50
(control)	22.20	21.80
LSD (P=0.05)	2.01	1.62

On the other hand, the different treatments of either IAA + BA or GA₃ + BA failed to produce any consistent differences in fresh weight of seeds. However, during the two seasons, the fresh weight per seed was increased by IAA + BA at (5+10ppm) compared to untreated control. The results were in line with those obtained by Nixon (1959), Marei and Bondok (1974), Hussein *et al.* (1976), Hussein *et al.* (1986 and 1992) and Kamal (1995).

Fruit dimensions:

Significant increases in fruit length resulted from IAA + BA and GA₃ + BA application as compared to the untreated dates. The increases were higher with IAA + BA (10+10ppm) than GA₃ + BA (5+10ppm) treatments during both seasons.

Similar trend was obtained with fruit width but the pronounced increases were noticed by IAA + BA than GA₃ + BA applications especially during 1997 season. Accordingly, fruit index was increased by increasing the rate of IAA +BA whereas the value was not clear with GA₃ + BA treatments especially during 1998 season. Such fluctuation might be due to the increase in fruit diameter. Generally, dates tended to be longer and wider by IAA + BA treatment, whereas, they tended to be longer and narrower by GA₃ + BA treatments. These results were in line with those obtained by Hussein *et al.* (1976), Maximos *et al.* (1979), El-Kassas (1983), Hussein *et al.* (1986) and Kamal (1995).

Sugars content:

Application of the three substances, (IAA, GA₃ and BA) showed that IAA + BA treatment increased significantly the total soluble sugars than the control while GA₃ + BA reduced them. These results are in harmony with those of Kamal (1995). On the other hand, Hussein *et al.* (1986) and El-Makhtoun *et al.* (1988) they found that GA₃ treatment gave the lowest value of TSS than the untreated fruits.

The total sugars percentage was significantly during the two seasons than the control. However, the values tended to increase with the moderate rate of IAA + BA (10+10 ppm) and with the lower rate of GA₃ + BA (5+10ppm). During the two seasons total sugars were decreased by GA₃ + BA and increased by IAA + BA applications. These results were similar to those of Kamal (1995). On the other hand, El-Makhtoun *et al.* ((1988) found that GA₃ decreased the total sugars than the untreated fruits.

Reducing sugar it increased in both IAA + BA and GA₃ + BA substance. Where it was significantly higher in IAA + BA than GA₃ + BA, the higher values reducing sugar were obtained with IAA + BA at (10+10 ppm) and GA₃ + BA at (5+10 ppm). Similar results were obtained by Kamal (1995). On the other hand, El-Makhtoun *et al.* (1988) found that GA₃ decreased the reducing sugars content than the untreated fruits.

Table (3): Effect of some growth regulators on chemical constituents of Samani date fruits at harvest time in the two seasons of 1997 and 1998.

Treatment	TSS %		Total sugars %		Reducing sugars %	
	1997	1998	1997	1998	1997	1998
5 ppm IAA+10 ppm BA	25.07	24.90	36.23	35.13	37.80	36.30
10 ppm IAA+10 ppm BA	25.83	25.23	41.17	36.97	42.83	38.13
20 ppm IAA+10 ppm BA	24.43	24.17	35.07	34.10	36.77	35.77
5 ppm GA ₃ +10 ppm BA	23.97	23.03	34.17	35.67	35.83	37.53
10 ppm GA ₃ +10 ppm BA	22.67	22.20	30.83	31.63	33.40	32.40
20 ppm GA ₃ +10 ppm BA	21.80	20.50	29.07	28.23	27.43	28.97
(control)	22.20	21.80	27.97	23.67	29.03	25.13
L.S.D. (P=0.05)	2.01	1.62	3.98	2.82	4.24	0.76

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وزن السبابة وخصائص ثمار البلح السمانى وتأثرها ببعض منظمات النمو

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تم تصميم البحث لمعرفة تأثير اندول حمض الخليك (IAA) بتركيزات ٥، ١٠، ٢٠ جزء فى المليون اضافة إلى البنزويل أدنينين (BA) بتركيز ١٠ جزء فى المليون وكذلك حمض الجبرلين (GA₃) بتركيزات ٥، ١٠، ٢٠ جزء فى المليون اضافة إلى البنزويل أدنينين بتركيز ١٠ جزء فى المليون حيث وزن السبابة، خصائص الثمار للبلح السمانى خلال موسم النمو ١٩٩٧، ١٩٩٨ بمحطة الأبحاث الزراعية بالقصاصين – وزارة الزراعة.

وقد أدت هذه الدراسة إلى الحصول على النتائج التالية:

1. زاد وزن كل من السبابة والثمار بمعاملات اندول حمض الخليك اضافة الى البنزويل ادنينين وبلغت الزيادة اقصاها فى التركيز (١٠ اندول حمض الخليك + ١٠ بنزويل ادنينين) جزء فى المليون مقارنة بالتي لم ترش. يليها معاملات حمض الجبريليك اضافة الى البنزويل ادنينين وبلغت الزيادة اقصاها فى التركيز (٥ حمض جبريليك + ١٠ بنزويل ادنينين) جزء فى المليون فى حين أن وزن البذور نقص مع المعاملة اندول حمض الخليك اضافة الى البنزويل ادنينين عند التركيز (١٠ اندول حمض الخليك + ١٠ بنزويل ادنينين) جزء فى المليون.
 2. زيادة أطوال الثمار المعاملة وعرضها بمعاملات اندول حمض الخليك اضافة الى البنزويل ادنينين وكان التأثير واضح عند التركيز (١٠ اندول حمض الخليك + بنزويل ادنينين) جزء فى المليون يليها معاملات حمض الجبريليك اضافة الى البنزويل ادنينين عند التركيز (٥ حمض جبريليك + ١٠ بنزويل ادنينين) جزء فى المليون. فيما يتعلق بنسبة الطول للعرض لا يوجد اختلافات معنوية بين المعاملات باستثناء موسم النمو الأول حيث المعاملة اندول حمض الخليك اضافة الى البنزويل ادنينين عند تركيز (١٠ اندول حمض الخليك + ١٠ بنزويل ادنينين) جزء فى المليون أدت الى نقص هذه النسبة.
 3. زاد محتوى الثمار من المواد الصلبة الذائبة والسكريات المختزلة والكلية نتيجة الرش باندول حمض الخليك اضافة الى البنزويل ادنينين خصوصا المعاملة (١٠ اندول حمض الخليك + ١٠ بنزويل ادنينين) جزء فى المليون ونتيجة الرش بحمض الجبريليك اضافة الى البنزويل ادنينين خصوصا المعاملة (٥ حمض جبريليك + ١٠ بنزويل ادنينين) جزء فى المليون وينقص بزيادة تركيزات حمض الجبريليك اضافة الى البنزويل ادنينين.
- من هذه الدراسة يتضح أن الفائدة قد عادت من استعمال اندول حمض الخليك اضافة الى البنزويل ادنينين فى تحسين وزن السبابة ونوعية الثمار.

Table (2): Effect of some growth regulators on physical characteristics of Samani date fruits at harvest time in the two seasons of 1997 and 1998

Treatment	Fruit weight (gm)		Fruit size (ml)		Seed weight (gm)		Fruit length (cm)		Fruit diameter (cm)		Length/diameter Ratio	
	1997	1998	1997	1998	1997	1998	1997	1998	1997	1998	1997	1998
5 ppm IAA+10 ppm BA	36.23	35.13	37.80	36.30	2.03	2.03	5.83	5.93	3.33	3.43	1.77	1.75
10 ppm IAA+10 ppm BA	41.17	36.97	42.83	38.13	2.53	2.30	6.23	6.13	5.33	3.53	1.17	1.75
20 ppm IAA+10 ppm BA	35.07	34.10	36.77	35.77	2.53	2.43	5.73	5.73	3.53	3.33	1.64	1.71
5 ppm GA ₃ +10 ppm BA	34.17	35.67	35.83	37.53	2.33	2.33	5.63	5.83	3.33	3.43	1.69	1.70
10 ppm GA ₃ +10 ppm BA	30.83	31.63	33.40	32.40	2.33	2.23	5.43	5.63	3.33	3.33	1.63	1.70
20 ppm GA ₃ +10 ppm BA	29.07	28.23	27.43	28.97	2.53	2.53	5.43	5.33	3.13	3.13	1.72	1.70
(control)	27.97	23.67	29.03	25.13	2.23	2.43	5.43	5.03	3.10	2.93	1.75	1.72
LSD (P = 0.05)	3.98	2.82	4.24	0.76	0.34	0.28	0.78	0.87	0.62	0.53	0.25	N.S.