

## Response of Sakkoti Date Palms to Spraying Salicylic Acid

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**Abstract:** During 2012 & 2013 seasons , Sakkoti date palms grown under Aswan region conditions received one, two, three or four sprays of salicylic acid at 0.05 to 0.2%. Growth, palm nutritional status, yield and fruit quality in response to salicylic acid treatments were investigated. Using salicylic acid once, twice, thrice or four times at 0.05 to 0.2% had an announced promotion on all growth characters , plant pigments , nutrients, yield as well as physical and chemical characteristics of the fruits relative to the control treatment . No variations on these parameters were observed when salicylic acid was used at concentrations above 0.05 % and frequencies higher than twice. Yield per palm tended to reduce with increasing concentrations. Carrying out two sprays of salicylic acid before pollination and just after fruit setting at 0.05 % gave the best results with regard to yield and fruit quality of Sakkoti date palms grown under Aswan region conditions.

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### 1. Introduction

Low yield of Sakkoti date palms grown under Aswan region is considered a major problem faces date palm growers. Finding out of compounds capable on reducing the sensitivity of fruit crops to different stresses are of great importance from the practical point of view. Salicylic acid plays a role in response to abiotic stress effects. It may cause a temporary low level of oxidative stress in plants which acts as a hardening process, improving the antioxidative capacity of the plants and helping to induce the synthesis of protective compounds such as polymines (**Janda *et al.*, 2007**).

Using salicylic acid at various concentrations and frequencies had an announced promotion on yield and fruit of evergreen fruit crops (**Gobara, 2004; Ragab, 2004; Eshmawy, 2010 ; Joseph *et al.*, 2010; Ahmed , 2011; Abd El- Rahman and El-Masry, 2012; Abdelaal and Oraby- Mona, 2013; Ahmed *et al.*, 2013 and Mohamed, 2014**).

The target of this study was examining the effect of different concentrations and frequencies of salicylic acid on fruiting of Sakkoti date palms growing under Aswan region conditions.

### 2. Material and Methods

This investigation was conducted in public orchard located at Kom Ombo district, Aswan Governorate during 2012 and 2013 seasons in which 48 Sakkoti date palms were selected for achieving of this study. The selected palms (48) were uniform in vigour and 20- years old at the start of this study, good physical conditions, free from insects, damage and

diseases. Planting distance was 7 x 7 meters apart. Soil texture is silty clay.

The selected palms were hand pollinated by inserting ten male strands into one female bunch using known high activity pollen source, two days after female spathe cracking (**Hussein *et al.*, 1987**). The other horticultural practices were carried out as usual. Number of bunches per palm for all palms was adjusted to ten bunches.

This experiment included the following thirteen treatments:

1. Control palms (unsprayed with salicylic acid).
2. Spraying salicylic acid at 0.05% once before pollination.
3. Spraying salicylic acid at 0.05% twice before pollination and just after fruit setting.
4. Spraying salicylic acid at 0.05% three times before pollination, just after fruit setting, and at one month later.
5. Spraying salicylic acid at 0.05% four times before pollination, just after fruit setting and at one month intervals.
6. Spraying salicylic acid at 0.1 % once before pollination.
7. Spraying salicylic acid at 0.1 % twice before pollination and just after fruit setting.
8. Spraying salicylic acid at 0.1 % three times before pollination, just after fruit setting, and at one month later.
9. Spraying salicylic acid at 0.1 % four times before pollination, just after fruit setting and at one month intervals.
10. Spraying salicylic acid at 0.2 % once before pollination.

11. Spraying salicylic acid at 0.2 % twice before pollination and just after fruit setting.
12. Spraying salicylic acid at 0.2 % three times before pollination, just after fruit setting, and at one month later.
13. Spraying salicylic acid at 0.2 % four times before pollination, just after fruit setting and at one month intervals.
14. Each treatment was replicated here times one palm per each.

This experiment was laid out in randomized complete block design. Each treatment was replicated three times, one palm per each.

During both seasons, the following parameters were measured, length & width and area of leaf and leaflet (Ahmed and Morsy, 1999); number of leaflets / leaf, number of spines / leaf, spine length, total surface area/ palm, chlorophylls a & b, total chlorophylls (Von – Wettstein, 1957), percentages of N, P and K (Wilde *et al.*, 1985); initial fruit setting %, fruit retention%, yield / palm, bunch weight, fruit weight and dimensions (length & width), T.S.S. %, total, reducing and non reducing sugars, total acidity, total fibres (A.O.A.C.,2000) and total soluble tannins (Balbaa, 1981).

Statistical analysis was done and treatment means were compared using new L.S.D. at 5% (Mead *et al.*, 1993).

### 3. Results

#### 1-Effect of different concentrations and frequencies of salicylic acid on some vegetative growth characters.

It is clear from the obtained data in Tables (1, 2, 3 & 4) that foliar application of salicylic acid at 0.05 to 0.2% once, twice, thrice or four times significantly was accompanied with stimulating the ten growth characters namely the length, width and area of leaflet and leaf, number of leaflet / leaf, total surface area/ palm, number of spines/ leaf and spine length relative to the check treatment. There was a gradual stimulation on these growth characters with increasing concentrations from 0.0 to 0.2% and frequencies of salicylic acid from once to four times. Significant differences on these growth characters were observed with increasing salicylic acid concentration from 0.05 to 0.1% and frequencies from once to twice. Using salicylic acid at concentration above 0.1% and frequencies above twice failed significantly to show any promotion on these growth characters. Therefore, the maximum values of these growth characters were observed with using salicylic acid at 0.1% twice. The minimum values were recorded on untreated palms. These results were true during both seasons.

#### 2-Effect of different concentrations and frequencies of salicylic acid on the plant pigments:

Data in Tables (4 & 5) clearly show that spraying salicylic acid at 0.05 to 0.2% once, twice, thrice or four times significantly was followed by enhancing chlorophylls a, b and total chlorophylls rather than non-application. Significant differences on the plant pigments were observed with increasing concentrations from 0.05 to 0.1% and frequencies from once to twice. Using salicylic acid at concentrations above 0.1% and frequencies above twice failed significantly to show promotion on these plant pigments. Using salicylic acid at higher concentrations 0.2% and frequencies (four times) gave the maximum values. The untreated palms produced the minimum values. These results were true during both seasons.

#### 3- Effect of different concentrations and frequencies of salicylic acid on the percentages of N, P and K in the leaves.

It is noticed from the data in Tables (5 & 6) that percentages of N, P and K in the leaves significantly stimulated in response to spraying salicylic acid once, twice, thrice or four times at 0.05 to 0.2% rather than non-application. Increasing concentrations from 0.1 to 0.2% as well as frequencies from twice to four times had no significant promotion on these nutrients. The maximum values were recorded on the palms that treated four times with 0.2%. The minimum values were recorded on untreated palms. These results were true during both seasons.

#### 4-Effect of different concentrations and frequencies of salicylic acid on the percentages of initial fruit setting and fruit retention.

Foliar application of salicylic acid at 0.05 % to 0.2% applied once, twice, thrice or four times significantly was accompanied with improving the percentages of initial fruit setting and fruit retention rather than non-application. The promotion was associated with increasing concentrations of salicylic acid from 0.0 to 0.05% and frequencies from once to twice. Using salicylic acid above 0.05% significantly reduced both percentages of initial fruit setting and fruit retention. Using salicylic acid at frequencies above twice had a slight effect on such two parameters. A significant reduction on such two parameters was observed due to using salicylic acid at 0.2% comparing with using salicylic acid at 0.05 to 0.1%. The maximum values were recorded on the palms that received salicylic acid at 0.05% four times. The minimum values were recorded on untreated palms. These results were true during both seasons (Table 6).

#### 5-Effect of different concentrations and frequencies of salicylic acid on the yield per palm.

It is clear from the obtained data that spraying salicylic acid at 0.05 to 0.2% once, twice, thrice or four times significantly improved the yield per palm comparing to control treatment. There was a gradual reduction on the yield with increasing salicylic acid

frequencies from twice to four times. A significant promotion on the yield was observed due to increasing salicylic acid frequencies from once to twice at all concentrations used. The maximum yield per palm (122.5 and 123.3 kg/ palm) was recorded on the palms that received two sprays of salicylic acid at 0.05%. The lowest values (71.1 and 70.0 kg /palm) were recorded on untreated palms. The percentage of increase on the yield due to using salicylic acid twice at 0.05 % over the check treatment reached 72.3 and 76.1% during both seasons, respectively. These results were true during both seasons (Table 7).

#### 6-Effect of different concentrations and frequencies of salicylic acid on the bunch weight

It is obvious from the obtained data in Table (7) that spraying salicylic acid once, twice, thrice or four times at 0.05 to 0.2% significantly improved bunch weight rather than non- application. However, there was a gradual reduction on bunch weight with increasing concentrations from 0.05 to 0.2 % and frequencies of salicylic acid from twice to four times. The maximum values of bunch weight were presented on the palms that received two sprays of salicylic acid

at 0.05%. The lowest values were recorded on untreated palms. These results were true during both seasons.

#### 7-Effect of different concentrations and frequencies of salicylic acid on both physical and chemical characteristics of the fruits.

It is clear from the obtained data in Tables ( 7 to 10) that spraying salicylic acid once, twice, thrice or four times at 0.05 to 0.2% significantly was responsible for improving fruit quality in terms of increasing fruit weight and dimensions (length & width), T.S.S. %, total, reducing and non- reducing sugars % and decreasing total acidity, total soluble tannins and crude fibre rather than non- application. The promotion on fruit quality was associated with increasing concentrations of salicylic acid from 0.05 to 0.1% and frequencies form once to four times. Unsignificant effect on fruit quality was observed due to increasing concentrations of salicylic acid from 0.1 to 0.2% . Two sprays of salicylic acid at 0.1% gave the best results with regard to fruit quality. Unfavourable effects on fruit quality were observed on untreated palms. These results were true during both seasons.

Table (1): Effect of different concentrations and frequencies of salicylic acid on the length and width of leaf (cm.) and

Salicylic acid treatments	Leaf length (cm)		Leaf width (cm.)		No. of leaflet / leaf	
	2012	2013	2012	2013	2012	2013
Control	2.5	2.4	21.6	21.9	141.0	142.5
Salicylic acid at 0.05 % once	2.7	2.6	22.2	22.5	146.3	147.3
Salicylic acid at 0.05 % twice	2.9	2.9	23.0	23.5	151.0	152.0
Salicylic acid at 0.05 % thrice	3.0	3.0	23.2	23.6	151.5	152.5
Salicylic acid at 0.05 % four times	3.0	3.0	23.3	23.7	152.0	153.0
Salicylic acid at 0.1 % once	3.0	3.1	24.5	23.9	151.0	152.3
Salicylic acid at 0.1 % twice	3.2	3.3	26.5	25.0	156.0	157.0
Salicylic acid at 0.1 % thrice	3.2	3.3	26.7	25.1	157.0	158.0
Salicylic acid at 0.1 % four times	3.2	3.3	26.7	25.2	158.0	159.0
Salicylic acid at 0.2 % once	3.0	3.2	24.6	24.0	152.5	153.0
Salicylic acid at 0.2 % twice	3.2	3.3	26.6	25.0	157.0	157.0
Salicylic acid at 0.2 % thrice	3.2	3.3	26.8	25.1	157.5	159.0
Salicylic acid at 0.2 % four times	3.2	3.3	26.8	25.2	158.6	159.6
New L.S.D. at 5%	0.2	0.2	0.6	0.6	3.1	3.3

Table (2): Effect of different concentrations and frequencies of salicylic acid on the length, width and area of leaflet of Sakkoti date palms during 2012 and 2013 seasons.

Salicylic acid treatments	Leaflet length (cm.)		Leaflet width (cm.)		Leaf area (m) <sup>2</sup>	
	2012	2013	2012	2013	2012	2013
Control	39.5	39.0	2.81	2.80	51.4	50.7
Salicylic acid at 0.05 % once	40.9	41.0	2.92	2.95	54.5	55.0
Salicylic acid at 0.05 % twice	42.9	43.0	3.04	3.07	58.5	59.1
Salicylic acid at 0.05 % thrice	43.0	43.1	3.05	3.08	58.8	59.4
Salicylic acid at 0.05 % four times	43.1	43.2	3.06	3.09	59.1	60.6
Salicylic acid at 0.1 % once	43.0	43.3	3.12	3.15	59.9	60.8
Salicylic acid at 0.1 % twice	44.0	44.1	3.22	3.25	62.7	63.3
Salicylic acid at 0.1 % thrice	44.1	44.2	3.23	3.25	63.0	63.4
Salicylic acid at 0.1 % four times	44.2	44.3	3.24	3.26	63.3	63.7
Salicylic acid at 0.2 % once	43.1	43.4	3.13	3.16	60.2	61.0
Salicylic acid at 0.2 % twice	44.1	44.2	3.25	3.26	63.0	63.6
Salicylic acid at 0.2 % thrice	44.2	44.3	3.25	3.27	63.4	63.9
Salicylic acid at 0.2 % four times	44.3	44.4	3.26	3.27	63.7	64.0
New L.S.D. at 5%	0.5	0.4	0.07	0.06	1.9	1.8

Table (3): Effect of different concentrations and frequencies of salicylic acid on the leaf area, total surface area per palm and number of spines per leaf of Sakkoti date palms during 2012 and 2013 seasons.

Salicylic acid treatments	Leaf area (cm) <sup>2</sup>		Total surface area /plant (m)		No. of spines / leaf	
	2012	2013	2012	2013	2012	2013
Control	0.72	0.72	57.6	57.6	37.3	37.0
Salicylic acid at 0.05 % once	0.80	0.81	64.0	64.8	38.9	39.9
Salicylic acid at 0.05 % twice	0.88	0.90	70.4	72.0	40.0	41.0
Salicylic acid at 0.05 % thrice	0.89	0.91	71.2	72.8	40.2	41.2
Salicylic acid at 0.05 % four times	0.90	0.93	72.0	74.4	40.3	41.4
Salicylic acid at 0.1 % once	0.90	0.93	72.0	74.4	41.9	43.0
Salicylic acid at 0.1 % twice	0.98	0.99	78.4	79.2	43.0	44.0
Salicylic acid at 0.1 % thrice	0.99	1.00	79.2	80.0	43.1	44.1
Salicylic acid at 0.1 % four times	1.00	1.01	80.0	80.8	43.2	44.2
Salicylic acid at 0.2 % once	0.92	0.93	73.6	74.4	42.0	43.0
Salicylic acid at 0.2 % twice	0.99	1.00	77.2	80.0	43.1	44.1
Salicylic acid at 0.2 % thrice	1.00	1.02	80.0	81.6	43.2	44.2
Salicylic acid at 0.2 % four times	1.01	1.02	80.8	81.6	43.3	44.3
New L.S.D. at 5%	0.07	0.08	2.9	2.7	0.9	1.0

Table (4): Effect of different concentrations and frequencies of salicylic acid on the spine length (cm.) as well a chlorophyll a and b ( mg/ 100 g F.W.) in the leaves of Sakkoti date palms during 2012 and 2013 seasons.

Salicylic acid treatments	Spine length (cm.)		Chlorophyll a (mg/ 100 g F.W.)		Chlorophyll b (mg/ 100 g F.W.)	
	2012	2013	2012	2013	2012	2013
Control	7.1	6.9	6.55	6.64	3.31	3.40
Salicylic acid at 0.05 % once	7.6	7.8	7.11	7.14	3.64	3.80
Salicylic acid at 0.05 % twice	8.0	8.2	7.64	7.69	3.99	4.20
Salicylic acid at 0.05 % thrice	8.1	8.3	7.65	7.69	4.00	4.22
Salicylic acid at 0.05 % four times	8.1	8.3	7.66	7.70	4.00	4.23
Salicylic acid at 0.1 % once	8.6	9.0	8.11	8.61	4.40	4.71
Salicylic acid at 0.1 % twice	8.9	9.4	8.69	9.14	4.80	5.20
Salicylic acid at 0.1 % thrice	9.0	9.5	8.70	9.15	4.82	5.22
Salicylic acid at 0.1 % four times	9.1	9.6	8.71	9.16	4.83	5.23
Salicylic acid at 0.2 % once	8.7	9.1	8.13	8.62	4.41	4.72
Salicylic acid at 0.2 % twice	8.9	9.5	8.70	9.15	4.81	5.23
Salicylic acid at 0.2 % thrice	9.1	9.6	8.71	9.16	4.83	5.25
Salicylic acid at 0.2 % four times	9.2	9.7	8.72	9.17	4.85	5.26
New L.S.D. at 5%	0.3	0.3	0.41	0.39	0.30	0.32

Table (5): Effect of different concentrations and frequencies of salicylic acid on the total chlorophylls as well as percentages of N and P in the leaves of Sakkoti date palms during 2012 and 2013 seasons.

Salicylic acid treatments	Total chlorophylls (mg/ 100 g F.W.)		Leaf N %		Leaf P %	
	2012	2013	2012	2013	2012	2013
Control	9.86	10.04	1.64	1.71	0.16	0.17
Salicylic acid at 0.05 % once	10.75	10.94	1.75	1.87	0.19	0.19
Salicylic acid at 0.05 % twice	11.63	11.89	1.86	1.99	0.22	0.23
Salicylic acid at 0.05 % thrice	11.65	11.91	1.87	2.00	0.23	0.23
Salicylic acid at 0.05 % four times	11.66	11.93	1.88	2.01	0.24	0.24
Salicylic acid at 0.1 % once	12.51	13.32	1.91	2.01	0.23	0.24
Salicylic acid at 0.1 % twice	13.49	14.34	2.01	2.11	0.26	0.27
Salicylic acid at 0.1 % thrice	13.52	14.37	2.02	2.12	0.27	0.28
Salicylic acid at 0.1 % four times	13.54	14.39	2.03	2.13	0.28	0.28
Salicylic acid at 0.2 % once	12.54	13.34	1.95	2.02	0.24	0.25
Salicylic acid at 0.2 % twice	13.51	14.38	2.02	2.12	0.27	0.28
Salicylic acid at 0.2 % thrice	13.54	14.41	2.03	2.13	0.28	0.28
Salicylic acid at 0.2 % four times	13.57	14.43	2.04	2.14	0.29	0.28
New L.S.D. at 5%	0.60	0.65	0.07	0.06	0.02	0.02

Table (6): Effect of different concentrations and frequencies of salicylic acid on the percentage of K in the leaf and initial fruit setting and fruit retention of Sakkoti date palms during 2012 and 2013 seasons.

Salicylic acid treatments	Leaf K %		Initial fruit setting %		Fruit retention %	
	2012	2013	2012	2013	2012	2013
Control	1.41	1.39	59.9	60.0	28.3	27.9
Salicylic acid at 0.05 % once	1.52	1.53	71.9	71.0	37.9	38.0
Salicylic acid at 0.05 % twice	1.60	1.62	74.0	74.0	39.9	40.0
Salicylic acid at 0.05 % thrice	1.61	1.63	74.1	74.1	40.0	40.1
Salicylic acid at 0.05 % four times	1.62	1.64	74.2	74.3	40.3	41.4
Salicylic acid at 0.1 % once	1.64	1.66	66.5	66.6	34.0	34.1
Salicylic acid at 0.1 % twice	1.74	1.76	68.9	69.0	36.0	36.1
Salicylic acid at 0.1 % thrice	1.75	1.76	69.0	69.0	36.1	36.2
Salicylic acid at 0.1 % four times	1.76	1.77	69.1	69.1	36.2	63.2
Salicylic acid at 0.2 % once	1.65	1.67	62.0	62.0	30.0	30.0
Salicylic acid at 0.2 % twice	1.75	1.77	63.8	64.0	31.8	31.9
Salicylic acid at 0.2 % thrice	1.76	1.78	63.9	64.0	31.9	32.0
Salicylic acid at 0.2 % four times	1.77	1.78	64.0	64.1	32.0	32.1
New L.S.D. at 5%	0.05	0.05	1.1	1.2	0.9	1.0

Table (7): Effect of different concentrations and frequencies of salicylic acid on the yield /palm (kg.), bunch weight (kg.) and fruit weight (g.) of Sakkoti date palms during 2012 and 2013 seasons.

Salicylic acid treatments	Yield / Palm (kg.)		Bunch weight (kg.)		Fruit weight (g.)	
	2012	2013	2012	2013	2012	2013
Control	71.1	70.0	7.11	7.00	9.11	9.20
Salicylic acid at 0.05 % once	112.5	113.2	11.25	11.32	9.25	9.34
Salicylic acid at 0.05 % twice	122.5	123.3	12.25	12.33	9.40	9.50
Salicylic acid at 0.05 % thrice	121.8	122.0	12.18	12.20	9.41	9.50
Salicylic acid at 0.05 % four times	121.1	120.9	12.11	12.09	9.42	9.51
Salicylic acid at 0.1 % once	92.0	93.0	9.20	9.30	10.11	10.20
Salicylic acid at 0.1 % twice	102.1	103.1	10.21	10.31	10.29	10.40
Salicylic acid at 0.1 % thrice	101.1	102.0	10.11	10.20	10.30	10.40
Salicylic acid at 0.1 % four times	100.5	100.8	10.05	10.08	10.31	10.41
Salicylic acid at 0.2 % once	81.1	82.1	8.11	8.21	10.00	10.10
Salicylic acid at 0.2 % twice	91.1	92.2	9.11	9.22	10.15	10.25
Salicylic acid at 0.2 % thrice	90.5	91.0	9.05	9.10	10.16	10.26
Salicylic acid at 0.2 % four times	90.0	90.2	9.00	9.02	10.17	10.27
New L.S.D. at 5%	2.0	2.3	1.0	1.0	0.10	0.10

Table (8): Effect of different concentrations and frequencies of salicylic acid on some physical and chemical characteristics of the fruits of Sakkoti date palms during 2012 and 2013 seasons.

Salicylic acid treatments	Fruit length (cm)		Fruit width (cm)		T.S.S. %	
	2012	2013	2012	2013	2012	2013
Control	5.11	5.10	2.11	2.07	62.5	63.0
Salicylic acid at 0.05 % once	5.33	5.26	2.21	2.18	63.6	64.7
Salicylic acid at 0.05 % twice	5.60	5.53	2.28	2.30	64.9	65.8
Salicylic acid at 0.05 % thrice	5.63	5.57	2.29	2.31	65.0	65.9
Salicylic acid at 0.05 % four times	5.63	5.58	2.30	2.32	65.1	66.0
Salicylic acid at 0.1 % once	6.11	6.04	2.42	2.41	66.9	65.9
Salicylic acid at 0.1 % twice	6.51	6.43	2.53	2.55	68.3	68.0
Salicylic acid at 0.1 % thrice	6.52	6.44	2.54	2.56	68.4	68.2
Salicylic acid at 0.1 % four times	6.53	6.43	2.55	2.57	68.5	68.3
Salicylic acid at 0.2 % once	5.90	5.83	2.30	2.21	67.0	66.0
Salicylic acid at 0.2 % twice	5.99	5.92	2.38	2.31	68.4	68.1
Salicylic acid at 0.2 % thrice	6.00	5.93	2.39	2.32	68.5	68.3
Salicylic acid at 0.2 % four times	6.01	5.94	2.40	2.33	68.6	68.5
New L.S.D. at 5%	0.18	0.19	0.07	0.06	1.0	0.9



Table (9): Effect of different concentrations and frequencies of salicylic acid on some chemical characteristics of the fruits of Sakkoti date palms during 2012 and 2013 seasons.

Salicylic acid treatments	Total sugars %		Reducing sugars %		Non- reducing sugars %	
	2012	2013	2012	2013	2012	2013
Control	62.0	61.9	13.0	12.9	41.0	49.0
Salicylic acid at 0.05 % once	63.1	63.3	13.6	13.8	49.5	49.5
Salicylic acid at 0.05 % twice	64.3	64.5	14.2	14.3	50.1	50.2
Salicylic acid at 0.05 % thrice	64.4	64.5	14.3	14.4	50.1	50.1
Salicylic acid at 0.05 % four times	64.5	64.6	14.4	14.5	50.1	50.1
Salicylic acid at 0.1 % once	66.0	66.7	15.9	16.0	50.1	50.7
Salicylic acid at 0.1 % twice	67.1	68.9	16.8	16.8	50.3	52.1
Salicylic acid at 0.1 % thrice	67.2	69.0	16.9	16.9	50.3	52.1
Salicylic acid at 0.1 % four times	67.3	69.1	17.0	17.0	50.3	52.1
Salicylic acid at 0.2 % once	66.1	66.8	16.0	16.0	50.1	50.8
Salicylic acid at 0.2 % twice	67.2	69.0	16.9	16.9	50.3	52.1
Salicylic acid at 0.2 % thrice	67.3	69.1	17.0	17.0	50.3	52.1
Salicylic acid at 0.2 % four times	67.4	69.2	17.1	17.1	50.3	52.1
New L.S.D. at 5%	1.0	1.0	0.5	0.5	0.4	0.4

Table (10): Effect of different concentrations and frequencies of salicylic acid on some chemical characteristics of the fruits of Sakkoti date palms during 2012 and 2013 seasons.

Salicylic acid treatments	Total acidity %		Soluble tannins %		Crude fibre %	
	2012	2013	2012	2013	2012	2013
Control	0.379	0.375	1.30	1.37	1.62	1.66
Salicylic acid at 0.05 % once	0.340	0.340	1.09	1.07	1.55	1.54
Salicylic acid at 0.05 % twice	0.303	0.305	0.91	0.89	1.47	1.46
Salicylic acid at 0.05 % thrice	0.300	0.303	0.90	0.88	1.46	1.45
Salicylic acid at 0.05 % four times	0.297	0.271	0.87	0.85	1.43	1.44
Salicylic acid at 0.1 % once	0.257	0.240	0.71	0.69	1.32	1.31
Salicylic acid at 0.1 % twice	0.210	0.239	0.62	0.60	1.25	1.24
Salicylic acid at 0.1 % thrice	0.207	0.238	0.61	0.59	1.24	1.23
Salicylic acid at 0.1 % four times	0.206	0.270	0.60	0.58	1.23	1.22
Salicylic acid at 0.2 % once	0.256	0.239	0.70	0.68	1.31	1.30
Salicylic acid at 0.2 % twice	0.209	0.239	0.61	0.59	1.24	1.23
Salicylic acid at 0.2 % thrice	0.206	0.237	0.60	0.58	1.23	1.22
Salicylic acid at 0.2 % four times	0.205	0.029	0.59	0.57	1.22	1.21
New L.S.D. at 5%	0.031	0.029	0.05	0.06	0.03	0.04

#### 4. Discussion:

The positive action of salicylic acid on fruiting of Sakkoti date palms might be attributed to its essential role on enhancing cell division as well as the biosynthesis of sugars and plant pigments and the tolerance of plants to all stresses (Hayat and Ahmed, 2007 and Joseph *et al.*, 2010).

These results are in agreement with those obtained by Gobara, 2004; Ragab, 2004; Eshrawy, 2010 ; Joseph *et al.*, 2010; Ahmed , 2011; Abd El-Rahman and El- Masry, 2012; Abdelaal and Oraby-Mona, 2013; Ahmed *et al.*, 2013 and Mohamed, 2014).

#### Conclusion:

Carrying out two sprays of salicylic acid before hand pollination and just after fruit setting at 0.05% proved to be very effective in improving yield and fruit quality of Sakkoti date palms grown under Aswan region conditions.

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