J. Agric. Sci. Mansoura Univ., 28 (8): 6321 - 6334, 2003

RESPONSE OF THOMPSON SEEDLESS AND ROUMI RED GRAPE CULTIVARS TO FOLIAR SPRAYS WITH YEAST EXTRACT AND GA_3

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ABSTRACT

Yeast extract (100 and 200 ml/L) and GA_3 (20 and 40 ppm) were foliar sprayed on Thompson Seedless and Roumi Red grape cultivars. The treatments were done before flowering (2nd week of April) and at full bloom (1st week of May). Fruit set (%) and number of clusters/vine of both cultivars were increased significantly. In addition, yield was increased as a result of cluster weight, length and berries weight. Number of berries/cluster also improved significantly by yeast extract + GA_3 and yeast extract treatment alone for "Thompson Seedless" and "Roumi Red", respectively.

All treatments increased juice percentage of "Thompson Seedless" berries, however, juice content of "Roumi Red", soluble solids content (SSC), SSC/acid ratio and total sugars were increased while acidity decreased significantly for both cultivars. The combination of yeast extract at 100 ml/L and GA_3 at 40 ppm is recommended for improving yield and fruit quality of Thompson Seedless and Roumi Red grape cultivars.

INTRODUCTION

Grapes (*Vitis vinifera* L.) are considered one of most popular and favorable fruits in the world. In Egypt, they occupy about 148406 fed. are cultivated with total production of 1078912 tons (Ministry of Agriculture 2001). Grapes ranked second after citrus. The main cultivar grown in Egypt is Thompson Seedless (Banati) followed by Roumi Red. The application of yeast extract to improve grapevine growth and cluster quality is of great importance. The various positive effects of applying yeast extract as a newly used biofertilizer were attributed to its content of different nutrients, higher percentage of proteins, larger amount of vitamin B and the natural plant growth regulator as cytokinin (Larson *et. al.* 1962,Wareing and Phillips, 1973, Moor, 1979, Ferguson *et. al.* 1987andMahmoud, 2001).

Ahmed *et al.,* (1997) and Abd El-Ghany *et al.*, (2001) reported that active dry yeast extract at 0.1 % improved yield and quality of "Roumi Red" berries. On "Thompson Seedless", El-Mogy *et al.*, (1998) found that yield, berry weight and size, bunch weight, SSC and SSC/acidity were increased significantly, while, acidity decreased with yeast extract application. Abd-El-Ghany *et al.,* (2001) also found an increment in cluster length and width but the data failed to show significant differences.

El-Khoreiby *et. al.*, (1988 a, b) reported that application of GA_{4+7} on Roumi Red grapevines greatly increased vines yield , cluster weight and size compared with the untreated ones. They also added that GA_{4+7} at 5 ppm was more effective in increasing cluster compactness.

Concerning GA_3, Surasak and Choopang (1988) pointed out that application of 25-100 ppm GA_3 increased berry size in both Cardinal and Loose Perlette cultivars. All GA_3 concentrations decreased SSC, SSC /TA and increased TA in Cardinal cultivar and decreased SSC, TA and SSC/TA in

Loose Perlette cultivar. Goday and Gustavo (1993) found that GA_3 application on "Muscat of Alexandria" decreased the number of berries per cluster, shot berries and increased SSC, however cluster weight was not effect.

Lu *et al.*, (1997) reported that GA_3 at 100, 200 and 300 ppm on "Muscadine" grape produced more than 20 % seedless berries and size of seedy berries was significantly increased.

The present work aims to investigate the response of Thompson Seedless and Roumi Red grape cultivars, to foliar spray with yeast extract and GA_3 solutions, each at two concentrations either alone or in combinations.

MATERIALS AND METHODS

This study was carried out through 2001 and 2002 seasons on 15 years old "Thompson Seedless" and "Roumi Red" grape vines grown at the Experimental Station of the Faculty of Agriculture, Moshtohor, Qalubia Governorate.

Twenty-seven grapevines of each cultivar, at approximately the same vigor, were selected for this study. The vines were planted at 2 x 3 meters apart in clay loamy soil, cane trained (Thompson Seedless) or head trained (Roumi Red), and had the same number of eyes (60 for each vine) and subjected to the recommended vineyard management (Ministry of Agriculture).

The treatments, which applied in a complete randomized block design, were as follows: Control (water spray), Yeast extract at 100 ml/L., Yeast extract at 200 ml/L., GA_3 at 20 ppm., GA_3 at 40 ppm., Yeast extract at 100 ml/L.+ GA_3 at 20 ppm., Yeast extract at 200 ml/L.+GA_3 at 20 ppm., Yeast extract at 100 ml/L.+GA_3 at 40 ppm and Yeast extract at 200 ml/L.+GA_3 at 40 ppm.

Each treatment was replicated three times (one vine per each). Devoted vines for each treatment was sprayed twice during each season (the first one was before flowering (2nd week of April), while the second spray was at full bloom (1st week of May).

Preparation of Yeast extract:

The dry pure yeast powder was activated by using sources of carbon and nitrogen with the ratio of 6:1 (Barnett *et al.*, 1990 and EL-Desouky *et al.*, 1998). This ratio is suitable to get the highest vegetative production of yeast (each ml yeast contained about 12000 of yeast cells). Then the media was frozen and thawed directly before usage. Tween- 20 was added as a spreading agent for all treatments.

The yeast extract used in the present study was analyzed for phytohormones, mineral elements" macro and micro", amino acids, total carbohydrates, reducing sugars as glucose, enzymes and Vitamins by Mahmoud (2001) as shown in Table (1) and Fig. (1).

The following parameters were evaluated:

1- Berry set percentage:

It was estimated by bagging ten flower clusters per vine using perforated paper bags after the second treatment.

Table (1): Chemical analysis of yeast extract.

Minerals				Amino acids (mg/100g dry weight)		Carbohydrates (mg/100g dry weight)		Enzymes (mg/100g dry weight)		Vitamins (mg/100g dry weight)	
Macro (g/100g dry weight		Micro (ug/100g dry weight									
Total N	7.23	Al	650.2	Arginine	1.99	Carbohydrates	23.2	Cytochrome oxidase	0.35	Vitamin B1	2.23
P_2O_4	51.68	Ba	175.6	Histidine	2.63	Glucose	13.33	Cytochrome peroxidase	0.29	Vitamin B2	1.31
K_2O	34.39	Co	67.8	Isoleiucine	2.31			catalase	0.063	Riboflavin	4.96
NaO	0.35	Pb	438.6	Leucine	3.09					Nicotinic acid	39.88
MgO	5.76	Mn	81.3	Lysine	2.95					Panthothenic acid	19.56
CaO	3.05	Sn	223.9	Methionine	0.72					Biotin	0.09
SiO_2	1.55	Zn	335.6	Pheylalanine	2.01					P-amino benzoic acid	9.23
SO_2	0.49			Threonine	2.09					Vitamin B6	1.25
Cl	0.06			Tryptophan	0.45					Folic acid	4.36
FeO	0.92			Valine	2.19					Thiamin	2.71
NaCl	0.30			Glutamic acid	2.00					Pyridoxine	2.90
				Serine	1.59					Vitamin B12	153 (µg/100g
				Aspartic acid	1.33					Inositol	263 13 (µg/100g)
				Cystine	0.23						
				Proline	1.53						
				Tyrosine	1.49						

At the end of berry set stage, bags were removed and the dropped flowers and berries were counted. Percentage of berry set was calculated by dividing the number of developing berries by the total number of flowers and berries in the selected clusters.

2- Seedless berry percentage = $\frac{\text{No. of seedless berries per cluster} \times 100}{\text{Total No. of berries per cluster}}$

3- Yield indicators:

Clusters were collected at the 2nd week of June for Thompson Seedless and 3rd week of August for Roumi Red cultivar. The yield was expressed by the number of clusters per vine and by weight (Kg).

4- Physical properties:

Cluster weight (gm.), cluster length and width (cm.), number of berries per cluster, 100-berry weight, juice volume (cm^3) per 100 berries and shot berries (%) in Roumi Red cv. only were recorded.

5- Chemical properties:

SSC (%), acidity (%), SSC / acid ratio, total sugars, reducing and non reducing sugar contents were determined according to A.O.A.C (1985).

Statistical analysis:

Data obtained during both seasons were subjected to analysis of variance according to the method described by Snedecor and Cochran (1980). Means were differentiated using Duncan' s multiple testes (Duncan, 1955).

RESULTS AND DISCUSSION

1- Berry set percentage:

Data in Tables 2 and 3 revealed that spraying "Thompson Seedless" vines with yeast extract at 100 and 200 ml/L, GA_3 at 20 and 40 ppm either alone or in combinations increased berry set significantly over the control. The best results were obtained when the combinations of yeast extract at 200 ml/L + GA_3 at 40 ppm was applied. Similarly, Loony (1974) enhanced berry set of Himrod and Chaunac grapes by GA_3 at 40 ppm.

Table (2): Effect of yeast extract and GA_3 foliar sprays on ?hompson Seedless_ berry set (%), yield (Kg) / vine, and number of clusters / vine during 2001 and 2002 seasons.

Treatments	Berries set (%)		Yield/vine (Kg.)		No. of clusters/vine	
	2001	2002	2001	2002	2001	2002
Control	26.10 ^{h}	26.20 ^{g}	6.20 ^{g}	6.50 ^{f}	16.75 ^{d}	16.88 ^{h}
Yeast at 100 ml/L	26.20 ^{h}	26.40 ^{f}	7.50 ^{f}	8.80 ^{e}	16.30 ^{e}	21.46 ^{g}
Yeast at 200 ml/L	26.40 ^{g}	26.50 ^{f}	8.20 ^{e}	9.50 ^{d}	15.47 ^{h}	21.83 ^{f}
GA_3 at 20 *ppm*	27.00 ^{f}	27.10 ^{e}	9.50 ^{d}	10.80 ^{c}	17.75 ^{a}	24.54 ^{ab}
Ga_3 at 40 *ppm*	27.20 ^{e}	27.40 ^{d}	9.67 ^{cd}	11.00 ^{bc}	17.77 ^{a}	24.55 ^{b}
Yeast at 100 ml/L+GA_3 at 20 *ppm*	27.80 ^{d}	27.80 ^{c}	10.00 ^{c}	11.10 ^{bc}	17.24 ^{b}	24.66 ^{a}
Yeast at 200 ml/L+GA_3 at 20 *ppm*	28.50 ^{c}	28.60 ^{b}	10.50 ^{b}	11.30 ^{b}	16.93 ^{c}	23.54 ^{d}
Yeast at 100 ml/L+GA_3 at 40 *ppm*	29.40 ^{b}	29.60 ^{b}	11.00 ^{a}	12.20 ^{a}	15.71 ^{f}	23.42 ^{c}
Yeast at 200 ml/L+GA_3 at 40 *ppm*	30.70 ^{a}	30.80 ^{a}	11.40 ^{a}	12.50 ^{a}	15.61 ^{g}	23.14 ^{e}

Means within each column have different letter (s) are significantly different using Duncan's multiple range test at the 5(%) level.

Table (3): Effect of yeast extract and GA_3 foliar sprays on ?oumi Red_ berry set ((%)), seedless berries ((%)), yield (Kg) / vine, and number of clusters / vine during 2001 and 2002 seasons.

Treatments	Berries set (%)		Seedless berries (%)		Yield/vine (%)		No. of cluster s/ vine	
	2001	2002	2001	2002	2001	2002	2001	2002
Control	8.06 cd	8.28 d	0.00 f	0.00 f	6.15 bc	6.59 d	12.33 a	13.00 a
Yeast at 100 ml/L	7.46 e	7.63 ef	38.00 e	38.40 e	6.34 b	7.25 c	12.00 a	13.66 de
Yeast at 200 ml/L	7.10 f	7.58 f	39.00 e	41.30 e	6.98 a	7.19 c	12.66 a	13.66 de
GA_3 at 20 *ppm*	6.94 f	6.79 g	44.00 de	42.00 e	6.81 a	7.19 c	12.33 a	13.66 de
Ga_3 at 40 *ppm*	7.76 de	7.81 e	49.00 d	55.00 d	5.28 f	7.65 a	12.66 a	14.00 cd
Yeast at 100 ml/L+GA_3 at 20 *ppm*	7.82 d	8.30 d	74.00 c	68.00 c	5.59 e	7.23 c	12.00 a	14.66 bc
Yeast at 200 ml/L+GA_3 at 20 *ppm*	8.24 c	8.93 c	79.00 c	82.00 b	6.23 bc	6.98 d	12.33 a	14.66 bc
Yeast at 100 ml/L+GA_3 at 40 *ppm*	8.84 b	9.41 b	89.00 b	92.00 a	5.78 de	6.93 d	13.66 a	15.00 b
Yeast at 200 ml/L+GA_3 at 40 *ppm*	9.24 a	10.14 a	96.00 a	96.00 a	6.01 cd	7.45 b	12.66 a	16.00 a

Means within each column have different letter (s) are significantly different using uncan's multiple range test at the 5(%) level.

Application of yeast extract or GA_3 alone on "Roumi Red" reduced fruit set percentage in 2002 and 2003 seasons. However, all combinations of yeast extract and GA_3 increased fruit set (%). In this respect, Hifny *et al.*, (1980) found that GA_3 decreased Thompson Seedless fruit set. In contrast, El-Khoreiby *et al.*, (1988-a) using GA_{4+7} at 10 ppm increased fruit set percentage in Roumi Red grape. The conflicting effect of GA_3 may be due to the concentration, time of application and / or growth habit. In addition, the response of both seedless (Thompson Seedless) and seeded (Roumi Red) grapes to GA_3 was different.

2- Seedless berry percentage:

Regarding percentage of seedless berries in Roumi Red grape, data in Table 3 indicated that, all treatments of yeast extract and GA_3 each alone or in combination significantly increased percentage of seedless berries. The increases ranged between 38 % with GA_3 at 20 ppm to 96 % with yeast extract at 200 ml/L + GA_3 at 40 ppm compared with control in both seasons. Similarly, El-Khoreiby *et al.*, (1988-b) reported that GA_{4+7} at 5 – 20ppm tended to decrease seed number/berry on Roumi Red grape. Lu *et al.*, (1997) reported that "Triumph" Muscadine grape sprayed with GA_3 at 100, 200 and 300 ppm produced more than 20 % seedless berries. Also, Omran (2000) found that soil drench of yeast extract application significantly decreased seed number per berry on Roumi Red grape.

3- Yield indicators:

As for the response of "Thompson Seedless" grape to yeast extract and GA_3, data in Table 2 illustrate that all treatments of yeast extract and GA_3 either alone or in combinations significantly increased the yield expressed as (Kg/vine). The highest yields were obtained from the combination of yeast extract at 200 ml/L.+ GA_3 at 40 ppm (11.4 and 12.5 Kg/vine) compared with control (6.20 and 6.50 Kg/vine) in both seasons, respectively. These results are in agreement with El-Koreiby *et al.*,(1988-a) reported that spraying GA_{4+7} or GA_3 increased the harvested yield. In addition, Ahmed *et al.*, (1997), El-Mogy *et al.*, (1998) and Kamelia *et al.*, (2000) indicated that application of yeast extract or soil drensh increased the harvest yield. It is evident from data in Table (3) that yeast extract at 100 and 200 ml/L and GA_3 at 20 and 40 ppm

treatments, in the first season, increased significantly the yield (Kg/vine) over the control and other treatments. In the second season, all treatments of yeast extract and GA_3 either alone or combined together significantly increased the yield Kg/vine compared with control except the application of yeast extract at 200 ml/L + GA_3 at 20ppm and yeast extract at 100 ml/L + GA_3 at 40 ppm. The yeast extract at 200 ml/L achieved the maximum yield (6.98Kg/vine) in the first season and GA_3 at 40ppm achieved the maximum yield (7.65 Kg./ vine) in the second season of Roumi Red grape.

Number of cluster per Thompson Seedless vine improved significantly when sprayed with yeast extract and GA_3.Data in (Table 2) show that, in the first season, the highest values were obtained with yeast extract at 200 ml/L (17.77): In contrast, the lowest value (15.47) was obtained with GA_3 at 40 ppm. In the second season, all treatments of yeast extract and GA_3 significantly improved number of cluster/vine compared with control.

Concerning the response of Roumi Red grape to yeast extract and GA_3, data in Table 3 show that, in the first season, no significant differences between the effect of all treatments and control on the number of cluster/vine. On the other hand, all tested treatments of yeast extract, GA_3 and their combinations significantly increased the number of cluster/vine, in the second season. The highest result (16.0) was obtained when yeast extract at 200 ml/L combined GA_3 at 40 ppm compared with control (13.00): These results are in harmony with those of Ahmed *et al.*, (1997) and Omran, (2000) when applied yeast extract to Roumi Red grape.

4- Physical properties:

Yeast extract, GA_3 and their combinations significantly improved cluster weight, cluster length and cluster width of Thompson Seedless grape Table (4). The highest results were obtained with yeast extract at 200 ml/L + GA_3 at 40 ppm in both seasons. On the other hand, applications of the same treatments to Roumi Red grape show that yeast extract and GA_3 alone increased cluster weight in both seasons. In contrast, the combinations of yeast extract and GA_3 reduced significantly cluster weight compared with control in both seasons. Data also reveal that all treatments increased cluster length especially, yeast extract at 200 ml/L+ GA_3 at 40 ppm (30.60 and 32.00 cm) compared with check treatment (23.0 and 22.0 cm) in both seasons, respectively. Concerning, cluster width of Roumi Red grape, there was no response to yeast extract and GA_3, each alone in both seasons, but the combinations of yeast extract and GA_3 reduced cluster width, specially yeast extract at 200 ml/L + GA_3 at 40 ppm in both seasons Table (5). These results are in line with those obtained by El-Mogy *et al.*, (1998) on Thompson Seedless grapevine and Ahmed *et al.*, (1997), Omran, (2000) and Abd El-Ghany *et al.*, (2001) on Roumi Red grape vines.

As shown in Tables 4 and 5 all treatments of yeast extract and GA_3 either alone or combined together significantly increased number of berries per cluster, average weight 100 berries (except GA_3 at 20 ppm) and juice volumes of 100 berries in Thompson Seedless grape vines compared with control in both seasons.

Table (4): Effect of yeast extract and GA_3 foliar sprays on some physical properties of ?hompson Seedless_ grapes during 2001 and 2002 seasons.

Treatments	Cluster weight (gm)		Cluster length (cm)		Cluster width (cm)		No. of berries/cluster		Average weight (100 berries gm)		Juice volume (100 berries cm^3)		Shot berries (%)	
	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002
Control	370^{f}	385^{f}	18.50^{f}	19.30^{f}	10.60^{g}	11.00^{f}	160.90^{g}	163.80^{g}	230^{e}	235^{f}	150^{h}	154^{f}	7.60^{a}	7.40^{a}
Yeast at 100 ml/L	460^{e}	450^{e}	19.80^{ef}	20.00^{ef}	11.50^{fg}	11.90^{ef}	184.00^{d}	174.00^{f}	250^{ce}	250^{e}	152^{ef}	155^{ef}	7.4 0^{a}	6.80^{b}
Yeast at 200 ml/L	530^{d}	535^{d}	21.00^{d}	21.50^{Def}	12.30^{ef}	13.00^{de}	200.00^{cd}	210.60^{d}	265^{cd}	270^{d}	153^{fg}	157^{def}	6.20^{b}	6.10^{c}
GA_3 at 20 *ppm*	535^{d}	540^{d}	21.60^{d}	22.20^{cde}	13.00^{de}	13.50^{cd}	199.60^{cd}	208.00^{e}	268^{bcd}	275^{d}	154^{ef}	158^{def}	6.00^{b}	5.80^{c}
Ga_3 at 40 *ppm*	540^{d}	550^{cd}	22.30^{d}	23.00^{bcd}	13.60^{d}	14.20^{cd}	200.00^{cd}	215.00^{d}	270^{bcd}	277^{cd}	155^{e}	159^{cde}	5.30^{bc}	5.20^{d}
Yeast at 100ml/L+GA_3 at 20 *pm*	580^{c}	583^{c}	24.00^{c}	24.50^{abc}	14.00^{cd}	15.00^{bc}	207.60^{bc}	210.00^{d}	275^{bc}	280^{bcd}	158^{d}	161^{bcd}	4.80^{c}	4.70^{e}
Yeast at 200ml/L+GA_3 at 20 *pm*	620^{b}	640^{b}	24.60^{bc}	25.00^{ab}	14.40^{bc}	16.50^{ab}	217.50^{b}	225.30^{c}	285^{abc}	287^{bc}	160^{c}	163^{abc}	3.50^{d}	3.20^{f}
Yeast at 100ml/L+GA_3 at 40 *pm*	700^{a}	710^{a}	26.00^{ab}	26.80^{a}	15.80^{ab}	16.90^{a}	241.50^{a}	250.00^{b}	290^{ab}	293^{b}	163^{b}	165^{ab}	2.40^{d}	2.70^{g}
Yeast at200ml/L+GA_3 at 40 *pm*	730^{a}	750^{a}	26.30^{a}	27.00^{a}	16.00^{a}	17.20^{a}	243.40^{a}	265.50^{e}	300^{a}	310^{a}	156^{a}	167^{a}	2.80^{d}	2.50^{g}

Means within each column have different letter (s) are significantly different using Duncan's multiple range test at the 5(%) level.

Table (5): Effect of yeast extract andGA_3 foliar sprays on some physical properties of ?oumi Red_ grapes during 2001 and 2002 seasons.

Treatments	Cluster weight (gm)		Cluster length (cm)		Cluster width (cm)		No. of berries/cluster		Average weight (100 berries gm)		Juice volume 100 berries (cm^3)		Shot berries (%)	
	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002
Control	521.0 ^{c}	548.0 ^{g}	23.00 ^{f}	22.00 ^{f}	13.00 ^{abc}	13.60 ^{ab}	117.00 ^{b}	118.60 ^{c}	428.30 ^{b}	426.40 ^{d}	198.60 ^{a}	201.80 ^{a}	6.70 ^{a}	6.30 ^{a}
Yeast at 100 ml/L	536.0 ^{bc}	559.40 ^{e}	24.50 ^{e}	24.30 ^{e}	13.30 ^{ab}	13.50 ^{ab}	115.00 ^{bc}	110.40 ^{d}	431.00 ^{ab}	441.00 ^{bc}	192.40 ^{bc}	198.60 ^{b}	6.20 ^{ab}	6.00 ^{a}
Yeast at 200 ml/L	543.0 ^{ab}	568.0 ^{b}	25.00 ^{de}	25.50 ^{de}	13.50 ^{ab}	13.50 ^{ab}	109.80 ^{cd}	107.60 ^{de}	436.00 ^{ab}	445.00 ^{b}	195.20 ^{ab}	197.90 ^{b}	5.60 ^{b}	5.50 ^{ab}
GA_3 at 20 *ppm*	556.0 ^{a}	577.30 ^{a}	25.30 ^{de}	26.30 ^{de}	14.00 ^{ab}	14.20 ^{a}	102.80 ^{e}	104.40 ^{e}	438.00 ^{a}	456.00 ^{a}	192.00 ^{bc}	194.70 ^{c}	5.20 ^{bc}	5.00 ^{bc}
Ga_3 at 40 *ppm*	554.0 ^{a}	580.0 ^{a}	26.00 ^{d}	27.00 ^{cd}	14.30 ^{a}	14.50 ^{a}	105.60 ^{de}	111.60 ^{d}	435.80 ^{ab}	436.00 ^{c}	185.40 ^{d}	189.30 ^{d}	4.50 ^{cd}	4.40 ^{cd}
Yeast at 100 l/L+GA_3 at 20 *ppm*	490.8 ^{d}	531.0 ^{a}	28.30 ^{c}	28.60 ^{bc}	12.60 ^{abc}	12.80 ^{bc}	113.40 ^{bc}	120.60 ^{bc}	418.40 ^{c}	422.40 ^{d}	187.20 ^{cd}	187.00 ^{d}	4.00 ^{de}	3.80 ^{d}
Yeast at 200ml/L+GA_3 at 20 *ppm*	484.0 ^{d}	511.80 ^{f}	29.00 ^{bc}	30.50 ^{ab}	12.00 ^{bc}	12.50 ^{bc}	116.80 ^{b}	119.40 ^{bc}	410.40 ^{d}	413.40 ^{e}	184.00 ^{d}	181.40 ^{e}	3.00 ^{ef}	2.80 ^{e}
Yeast at 100ml/L+GA_3 at 40 *ppm*	486.0 ^{d}	508.30 ^{f}	30.20 ^{ab}	31.00 ^{a}	11.50 ^{c}	12.00 ^{c}	118.40 ^{ab}	124.20 ^{ab}	409.00 ^{d}	405.20 ^{f}	185.80 ^{d}	183.90 ^{e}	2.60 ^{ef}	2.20 ^{e}
Yeast at 2 00ml/L+GA_3 at 40 *ppm*	468.0 ^{e}	498.70 ^{g}	30.60 ^{a}	32.00 ^{a}	11.30 ^{c}	11.80 ^{c}	124.60 ^{a}	129.00 ^{a}	397.00 ^{e}	392.00 ^{g}	179.80 ^{e}	181.70 ^{e}	2.20 ^{f}	1.90 ^{e}

Means within each column have different letter (s) are significantly different using Duncan's multiple range test at the 5(%) level.

On the other hand, Roumi Red grape showed opposite response to yeast extract and GA_3 where berries number per cluster had significantly decreased with the applications of yeast extract or GA_3 alone but significant increased with combinations of yeast extract at 200 ml/L and GA_3 at 40 ppm in the first season or yeast extract at 100 or 200 ml/L + GA_3 at 40 ppm in the second season. The lowest numbers of berries / cluster (102.8 and 104.0) resulted from the applications of yeast extract at 100 ml/L. However, the same treatment resulted in the highest values of average weight 100 berries (438 and 456 gm) in both seasons, respectively. All treatments significantly reduced juiciness of berries compared with control in both seasons. On Thompson Seedless and Roumi Red grapevines the application of yeast extract and GA_3 either alone or in combinations, significantly reduced percentage of shot berries in both seasons compared with untreated control. The positive effect of yeast extract applications on physical characteristics of grape berries cloud be due to enhancing the formation and movement of natural hormones specially cytokinins and GA_3 and improving cell division and cell enlargement in meristematic tissues (Nijjar, 1985 and Shulman *et al.*, 1986). Vilsmeier and Amberger. (1988) added that the positive effect of yeast extract on physical characteristics of berries could be due to encouraging the uptake of various nutrients, or to active photosynthesis process through enhancing releasing carbon dioxide (Larson *et al.*, 1962). Moreover, yeast extract contains natural plant growth promoters specially IAA (Wareing and Phillips, 1973 and Moor, 1979) and cytokinins (Ferguson *et al.*, 1987). These results were similar to those reported by Mohsen *et al.*, (1986) and Abd El-Ghany *et al.*, (2001) on Thompson Seedless grapes, and Ahamed *et al.*, (1997) and El-Mogy *et al.*, (1988) on Roumi Red grapes and Kamelia *et al.*, (2000) on King Ruby grapes.

Chemical characteristics of grape berries are illustrated in Tables 6 and 7, it was noticed that spraying the vine with the combinations of yeast extract and GA_3 induced a significant increase in soluble solids content (SSC) compared with control, on both Thompson Seedless and Roumi Red grapes in both seasons.

As for total acidity, both yeast extract and GA_3 or their combinations induced a reduction in total acidity of Thompson Seedless grape juice, while SSC/acid ratio as shown in Tables 6 and 7 was greatly affected by the experimental treatments. The marked increases in SSC/acid ratio was not only due to the increase in SSC %, but also due to the decrease acid contents in grape juice specially with the combinations of yeast extract at (100 or 200 ml/L) + GA_3 at 40 ppm, in both tested cultivars, in both seasons. No significant variances obtained between different treatments except yeast extract at 200 ml/L+ GA_3 at 40 ppm in the second season only

It is evident from the data in Tables 6 and 7 that spraying the vine of both tested cultivars with yeast extract, GA_3 or their combination, increased total sugar contents in grape specially the combinations of yeast extract and GA_3 in the second season.

Table (6): Effect of yeast extract and GA_3 foliar sprays on some chemical properties of ? hompson Seedless_ grapes during 2001 and 2002 seasons.

Treatments	SSC (%)		Acidity (%)		SSC / Acidity ratio		Total sugars (%)		Reducing sugars (%)		Non reducing sugars (%)	
	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002
Control	17.00^{d}	17.07^{e}	0.70^{a}	0.69^{a}	24.63^{a}	24.73^{g}	14.50^{b}	14.63^{d}	13.00^{b}	13.20^{d}	1.50^{a}	1.3[illegible]4^{bc}
Yeast at 100 ml/L	17.10^{d}	17.20^{de}	0.68^{ab}	0.68^{ab}	25.14^{a}	25.29^{f}	14.51^{b}	14.53^{d}	13.30^{ab}	13.40^{d}	1.20^{a}	1.[illegible]4^{e}
Yeast at 200 ml/L	17.15^{d}	17.20^{de}	0.68^{ab}	0.68^{ab}	25.22^{d}	25.29^{f}	14.53^{b}	14.57^{d}	13.40^{ab}	13.40^{d}	1.17^{a}	1.[illegible]6de
GA_3 at 20 *ppm*	17.18^{d}	17.25^{de}	0.65^{ab}	0.65^{abc}	26.43^{c}	26.53^{e}	14.60^{b}	14.65^{d}	13.50^{ab}	13.48^{cd}	1.10^{a}	1.2[illegible]0^{cde}
Ga_3 at 40 *ppm*	17.23^{cd}	17.30^{d}	0.64^{ab}	0.62^{bc}	26.92^{c}	27.90^{d}	14.90^{ab}	14.80^{cd}	13.60^{ab}	13.50^{cd}	1.30^{a}	
Yeast at 100 l/L+GA_3 at 20 *ppm*	17.49^{c}	17.60^{c}	0.62^{ab}	0.60^{c}	29.15^{b}	29.33^{c}	15.20^{ab}	15.30^{bcd}	13.90^{ab}	13.80^{bcd}	1.30^{a}	1.30[illegible]^{bcde}
Yeast at 200ml/L+GA_3 at 20 *pm*	18.00^{b}	18.00^{b}	0.60^{ab}	0.60^{c}	30.00^{ab}	30.00^{b}	15.40^{ab}	15.50^{abc}	14.20^{ab}	14.20^{abc}	1.20^{a}	1.5[illegible]^{a}
Yeast at 100ml/L+GA_3 at 40 *pm*	18.20^{a}	18.20^{a}	0.58^{b}	0.60^{c}	31.37^{a}	30.33^{b}	15.47^{ab}	15.70^{ab}	14.40^{ab}	14.50^{ab}	1.40^{a}	1.3 1^{bcd}
Yeast at 200ml/L+GA_3 at 40 *pm*	18.32^{a}	18.25^{a}	0.58^{b}	0.60^{c}	31.58^{a}	31.08^{a}	16.00^{a}	16.20^{a}	14.70^{a}	14.80^{a}	1.30^{a}	1.2[illegible]0^{cde}
												1.4 0^{ab}

Means within each column have different letter (s) are significantly different using Duncan's multiple range test at the 5(%) level.

Table (7): Effect of yeast extract and GA_3 foliar sprays on some chemical properties of ?oumi Red_ grapes during 2001 and 2002 seasons.

Treatments	SSC (%)		Acidity (%)		SSC / Acidity ratio		Total sugars (%)		Reducing sugars (%)		Non reducing sugars (%)	
	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002
Control	16.38^{e}	16.37^{e}	0.63^{a}	0.62^{ab}	26.00^{c}	26.40^{c}	14.50^{bc}	14.52^{bc}	9.50^{a}	9.46^{a}	5.00^{f}	5.06^{ef}
Yeast at 100 ml/L	16.38^{e}	16.39^{de}	0.64^{a}	0.63^{ab}	25.60^{c}	26.02^{c}	14.48^{cd}	14.50^{c}	9.39^{b}	9.40^{b}	5.09^{e}	5.10^{e}
Yeast at 200 ml/L	16.39^{e}	16.39^{de}	0.66^{a}	0.65^{ab}	24.83^{d}	25.22^{de}	14.45^{d}	14.45^{d}	9.38^{b}	9.40^{b}	5.07^{e}	5.05^{f}
GA_3 at 20 *ppm*	16.41^{de}	16.40^{de}	0.66^{a}	0.66^{a}	24.99^{d}	24.85^{e}	14.46^{cd}	14.48^{cd}	9.15^{c}	9.30^{c}	5.31^{d}	5.18^{d}
Ga_3 at 40 *ppm*	16.45^{d}	16.43^{d}	0.64^{a}	0.63^{ab}	25.72^{c}	26.08^{c}	14.53^{ab}	14.52^{bc}	9.13^{c}	9.25^{d}	5.40^{c}	5.27^{c}
Yeast at 100 l/L+GA_3 at 20 *ppm*	16.50^{c}	16.55^{c}	0.64^{a}	0.64^{ab}	25.78^{c}	25.86^{cd}	14.55^{a}	14.56^{ab}	8.76^{c}	8.76^{e}	5.80^{b}	5.80^{b}
Yeast at 200ml/L+GA_3 at 20 *ppm*	17.00^{b}	17.01^{b}	0.63^{a}	0.62^{ab}	26.98^{b}	27.36^{b}	14.55^{a}	14.56^{ab}	8.75^{c}	8.76^{e}	5.80^{b}	5.80^{b}
Yeast at 100ml/L+GA_3 at 40 *ppm*	17.16^{a}	17.20^{a}	0.62^{a}	0.62^{ab}	27.67^{a}	28.39^{a}	14.56^{a}	14.58^{a}	8.73^{de}	8.74^{e}	5.83^{ab}	5.74^{b}
Yeast at 200ml/L+GA_3 at 40 *ppm*	17.16^{a}	17.21^{a}	0.62^{a}	0.61^{b}	27.69^{a}	28.39^{a}	14.56^{a}	14.59^{a}	8.70^{e}	8.73^{e}	5.86^{a}	5.86^{a}

Means within each column have different letter (s) are significantly different using Duncan's multiple range test at the 5(%) level.

Similar results were obtained by Mohsen *et al.*, (1986) and El-Mogy *et al.*, (1998) on Thompson Seedless and all treatments showed a slight increase in reducing sugars except the treatment of yeast extract at 200 ml/L + GA_3 at 40 ppm in the first season and almost combined treatments in the second season which gave significant increase compared to control. Moreover, all treatments on Thompson Seedless grape gave insignificant effect in respect of non-reducing sugars in the first season, while no clear response in the second season was detected. On Roumi Red grapes all treatments significant by decreased reducing sugars, in contrast increased non-reducing sugars significantly in both seasons.

These results are in line with those obtained by Ahmed *et al.*, (1997), Omran, (2000) on Roumi Red grapes, Kamelia *et al.*, (2000) on King Ruby grape and Abd El-Ghany *et al.*, (2001) on Thompson Seedless.

Accordingly, it could be concluded that spraying Thompson Seedless and Roumi Red grapevines with the combinations of yeast extract at 100 ml/L + GA_3 at 40 ppm twice before flowering (2^{nd} week of April) and at full bloom (1^{st} week of May) is recommended to improving yield and fruit quality.

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استجابة صنفى العنب البناتى و الرومى الأحمـــر للـــرش بمســـتخلص الخمـــيرة والجبرالين

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أجريت هذه التجربة على كرمات عنب طومسون ســيدلس "البنـــاتى الأبيـــض" مربـــاه بالطريقة القصبية و الرومى الأحمر مرباه بالطريقة الرأسية عمر ١٥ سنة مثمرة ومنزرعة بمحطة التجارب بكلية الزراعة بمشتهر بالقليوبية و ذلك لدراسة تأثير الرش بكل من مستخلص الخمـــيرة بتركيز ١٠٠، ٢٠٠ مل/لتر وحمض الجبريليك بتركيز ٢٠ و ٤٠ جزء فى المليون و خليط منـــهما و ذلك مرتين الأولى قبل التزهير فى الأسبوع الثانى من ابريل (طول الفرخ ١٠ سم) و الثانيـــة عند الازهار الكامل فى الأسبوع الأول من مايو.

و قد أظهرت النتائج المتحصل عليها أن عقد الثمار و عدد العنـــاقيد / كرمـــة و كذلـــك المحصول / كرمة قد زاد زيادة معنوية فى الموسمين فى كلا الصنفين مع معظم المعاملات.

كذلك أظهرت النتائج وجود تحسن جوهرى فى صفات العنقود (الوزن و الطول و العرض و عـــدد الحبات لكل عنقود) و وزن ١٠٠ حبة خصوصا فى المعاملات المشتركة (١٠٠ مل/لتر مستخلص خميرة + ٤٠ جزء فى المليون حمض الجبريليك) مع صنف البناتى و فى معاملات الخميرة فقـــط مع صنف الرومى الأحمر بالنسبة لصفات وزن العنقود و عرض (اتساع العنقود) و وزن المائـــة حبة.

أما بالنسبة لعصير الحبات فقد أدت جميع المعاملات إلى زيادتها معنوياً فـــى الصنـــف البناتى و انخفاضها معنوياً فى صنف الرومى الاحمر و بالنسبة للمواد الصلبة الذائبة الكليـــة فقـــد زادت معنوياً مع كل المعاملات فى الموسمين لكلا الصنفين كما كانت هناك زيادة فى نسبة المـــواد الصلبة الذائبة إلى الحموضة نتيجة لتأثير المعاملات المختلفة فى حين تنـــاقصت النســـبة المئويـــة للحموضة بسبب المعاملات كما أدت المعاملات المختلفة إلى زيادة السكريات الكلية فـــى عصـــير حبات الصنفين فى كلا الموسمين.

هذا و قد كانت أفضل المعاملات بصفة عامة هى الـــرش بمســـتخلص الخمـــيرة ١٠٠ مل/لتر + حمض الجبريليك تركيز ٤٠ جزء فى المليون لكلا الصنفين.

لذلك يمكن التوصية برش صنفى العنب البناتى والرومى الاحمر مرتين الأولى قبل التزهير والثانية عند الازهار الكامل بمستخلص الخميرة بتركيز ١٠٠ مل/لتر + حمض الجبريليك بتركيز ٤٠ جزء فى المليون لزيادة الانتاجية وتحسين صفات جودة الثمار.