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EFFECT OF SOME SITOFEX AND CULTAR TREATMENTS ON YIELD AND QUALITY OF ROUMI RED GRAPES .

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ABSTRACT : In 1998 and 1999, bunches on 30 – years - old Roumi Red grapevines were sprayed at full bloom or at fruit set with 1 , 3 or 5 ppm Sitofex to relieve the heavy flower and fruitlets shedding from the bunches. The traditional application of Cultar (250 ppm at pre – bloom stage) and untreated control bunches were also involved .

The bunches showed clear response to all tested treatments; obvious increments were obtained in bunch weight, yield per vine, number of berries / bunch, bunch width, bunch compactness, 100 - berry weight, berry length and berry diameter by most Sitofex and Cultar treatments in comparison with the control in the two experimental seasons . The most promising treatments were Sitofex 3 and 5 ppm at fruit set.

Key words : Roumi Red grapevines, full bloom, fruit set, number of berries / bunch, bunch weight, yield per vine couleur

INTRODUCTION

Grapes (*Vitis vinifera* L.) are among the most important and popular fruit crops in the world and Egypt. The Egyptian production of grapes in 2000 attained 1,075,105 tons from 129,694 feddans with an average of 8.29 tons / feddan *.

* Statistic of Ministry of Agriculture, 2000 Egypt.

The Roumi Red grape cultivar is the most important seeded table grape variety in Egypt. The main defect of this cultivar is the very loose bunches due to heavy flower and berry shedding ; i. e., the couleur disorder. Cycocel (chlormequat) was used to reduce the heavy flower and berry drop from bunches (El-Morsy and Mansour, 1998) but it was

excluded due to its carcinogenic effect. Cultar (paclobutrazol) is currently used to control heavy flower and berry shedding from Roumi Red bunches (El-Morasy and Mansour, 1998 ; Kumar *et al.*, 1998 ; Sehrawat *et al.*, 1998) .

Sitofex (forchlorfenuron or N-(2-chloro– 4 – pyridyl)–N'-phenylu-rea) CPPU, a regulator of the cytokinin type, showed marked physiological effects at relatively low application levels (2-5 ppm) in a number of plants. It increased fruit set in grapes and other plants when applied at pre-bloom (Nickell, 1985). When Sitofex was applied on Sultanina (Thompson Seedless) grape, it increased bunch compactness (Retamales *et al.*, 1995; El-Hamady *et al.*, 2000 ; Aly *et al.*, 2001) .

The present investigation aimed mainly to control heavy flower and fruit shedding from Roumi Red bunches using three Sitofex concentrations (1 , 3 and 5 ppm) applied at full bloom or at fruit set. Those treatments were compared with the pre-bloom Cultar treatment at 250 ppm which is commercially practiced in Roumi Red vineyards. Untreated bunches were used as control.

MATERIALS AND METHODS

The present investigation has been conducted during the two successive seasons of 1998 and 1999 on 30 – year – old grapevines of the seeded grape cultivar Roumi Red. (*Vitis vinifera* L.) The experimental 48 vines (8 treatments x 6 replicates) are grown in a private vineyard at Kafer Saker, Sharkia Governorate. The vineyard soil was clayey and the vines were trained according to the head system, spaced at 2 × 2 m apart and winter pruned leaving a uniform bud-load of 60 buds / vine (12 spurs × 5 buds / spur).

The cluster load was uniformly fixed to 15 clusters / vine in the first season and 20 clusters / vine in the second season. The clusters of 18 vines (3 treatments × 6 replicates) were sprayed at full bloom (May 1st) with Sitofex at 1 , 3 or 5 ppm. Clusters of the other 18 vines (3 treatments × 6 replicates) were sprayed at fruit set with Sitofex at the same concentrations. The pre bloom Cultar treatment at 250 ppm was sprayed when the first bloom was observed in the vineyard. Untreated vines were used as a control. The commercial growth regulator Sitofex of the SKW company was used as a source of CPPU.

Harvesting took place on 4 Sept. in both seasons. Bunches of each

vine were picked and the yield / vine(kg) was recorded and the average bunch weight (g) was calculated. Samples of three bunches were taken from each vine and the following parameters were assessed : bunch characteristics ; i.e., number of berries / bunch, weight of rachis (g), bunch length (cm), bunch width (cm) and total length (cm) of rachis main axis and its laterals. Bunch compactness was estimated according to the following equation : Bunch compactness = number of berries per cluster / total length of rachis main axis and its laterals, (cm) according to Huglin (1958). Berry physical characteristics ; i.e., 100-berry weight (g), berry length (cm), berry diameter (cm) and berry shape index = berry length / berry diameter. In addition, berry color (mg/g fresh weight) (anthocyanin content in the berry skin) was determined using a spectrophotometer at 520 nm wave length. The molar concentration of anthocyanin was calculated using the following equation :

$C = A / a\,b$; where :

C = molar concentration of anthocyanin sample.

A = value obtained from the spekol,

a = Absorptivity or exticion (ε =3800),b = thickness of sample cup according to Geza *et al.*(1983). Moreover, the number of seeds / berry, berry firmness (g / cm^2) and berry attaching force (g) were also determined. The main constituents of berry juice ; i.e., total soluble solids (TSS %) was determined using a hand refractometer, while the total titratable acidity (as tartaric acid) was estimated according to the A.O.A.C. (1980); the TSS / acid ratio was calculated. Total and reducing sugars percentages were estimated in fresh fruits according to Loomis and Shull (1937). Non-reducing sugar percentage was calculated by the difference between the total and reducing sugars .

The obtained data were statistically analysed according to the complete randomized block design with six replicates (Snedecor and Cochran, 1980). The LSD method at 5 % was used to compare the means.

RESULTS AND DISCUSSION

1.Yield per vine

From Table 1, it is clear that yield per vine, generally, ranged from 5.843 to 12.008 kg in the first season and from 7.728 to 15.213 kg in the second season according to treatment. The greatest yields per vine came from the treatments : Sitofex 5 ppm at fruit set (12.008

Table 1 : Effect of some Sitofex and Cultar treatments on yield and bunch characteristics of Roumi Red grapes

Treatments	Yield / vine (kg)		Bunch weight (g)		No. of berries/bunch		Wight of rachis (g)		Bunch length (cm)		Bunch width (cm)		Total length of rachis main axis and its laterals (cm)		Bunch compactness	
	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
Control (untreated)	5.843	7.728	353.6	386.4	61.5	75.0	11.8	13.2	28.3	34.5	09.2	13.2	67.5	68.5	0.9	1.1
Sitofex 1 ppm at full bloom	6.883	8.802	430.2	440.1	78.3	80.5	15.0	16.7	31.0	38.2	10.7	17.4	89.9	88.6	0.9	0.9
Sitofex 3 ppm at full bloom	11.087	14.570	687.2	728.5	113.5	125.8	18.2	19.3	31.7	36.2	14.7	20.6	81.9	84.3	1.3	1.5
Sitofex 5 ppm at full bloom	11.162	14.165	620.1	708.2	245.9	239.8	17.0	17.9	31.5	36.4	14.2	19.1	88.7	83.2	2.8	2.9
Sitofex 1 ppm at fruit set	7.375	9.930	471.9	496.5	87.3	89.5	13.7	16.2	28.0	36.2	11.8	16.7	73.5	76.2	1.2	1.2
Sitofex 3 ppm at fruit set	11.365	14.648	679.2	732.4	123.6	127.7	16.8	18.8	29.8	35.6	13.8	20.5	66.3	68.1	1.9	1.9
Sitofex 5 ppm at fruit set	12.008	15.213	740.2	760.7	133.2	132.7	21.2	19.6	29.3	34.6	14.2	16.8	62.6	69.9	2.1	1.9
Cultar 250ppm Pre-bloom	8.427	11.510	544.7	575.5	91.1	98.4	14.8	14.2	28.0	33.4	12.2	17.7	70.1	76.8	1.3	1.3
LSD at (5%)	1.042	1.383	90.8	69.2	22.6	19.3	3.5	2.2	NS	NS	1.45	3.3	14.3	11.2	0.3	0.3

and15.213 kg), Sitofex 3 ppm at fruit set (11.365 and 14.648 kg), Sitofex 5 ppm at full bloom (11.162 and 14.165kg) and Sitofex 3 ppm at full bloom (11.087 and 14.570 kg), in the 1st and 2nd seasons, respectively, without significant differences among them in each season. In the second rank came the treatments : Cultar treatment (8.427 and 11.510 kg) and Sitofex 1 ppm at fruit set (7.375 and 9.930 kg) in the 1st and 2nd seasons, respectively without significant differences between them in each season. However, the lowest yields per vine were recorded by the control (5.843 and 7.728 kg) in the 1st and 2nd seasons, respectively.

The obtained results are in line with many previous studies which indicated that Sitofex treatments significantly increased yield / vine of different grape *cvs* [Rizk, 1998 on Thompson Seedless *cv*; Feng *et al*., 1999 on Kyoho *cv*; AL-Ashkar, 2000 on Ruby Seedless *cv*; El-Hammady *et al.*, 2000 on King's Ruby *cv*; Ezzahouani, 2000 on Perlette Seedless *cv*; Omar and El-Morsy, 2000 on Ruby Seedless *cv*; Aly *et al*., 2001 on Thompson Seedless grapes; Navarro *et al*., 2001 on Sultanina *cv*; Rizk *et al*., 2003 on Roumi Red *cv*] The yield increments with Cultar treatment were in line with Shaltout *et al.* (1988) on Roumi Red *cv*, El-Morsy and Mansour (1998) on Roumi Red *cv* and Sehrawat *et al.* (1998) on Thompson Seedless *cv* On the other hand , Williams *et al.* (1989) on Thompson Seedless *cv* found that Cultar treatment decreased the yield per vine.

2.Bunch weight

The bunch weight, generally, ranged from 353.6 to 740.2 g in the first season and from 386.4 to 760.7 g in the second season according to treatment (Table1 and photo1). The heaviest bunches came from the treatments : Sitofex 5 ppm at fruit set (740.2 and 760.7 g), Sitofex 3 ppm at fruit set (679.2 and 732.4 g) and Sitofex 3 ppm at full bloom (687.2 and 728.5 g) in the 1st and 2nd seasons, respectively, as well as Sitofex 5 ppm at full bloom in the second season (708.2 g). Differences between those treatments in each season were insignificant. In the second rank came three treatments without significant differences among them in each season; i .e , Sitofex 1 ppm at fruit set (471.9 and 96.5 g), Cultar treatment (544.7 and 575.5 g), in the two seasons, and Sitofex 5 ppm at full bloom, in the first season (620.1 g). On the other hand, the lowest bunch weights

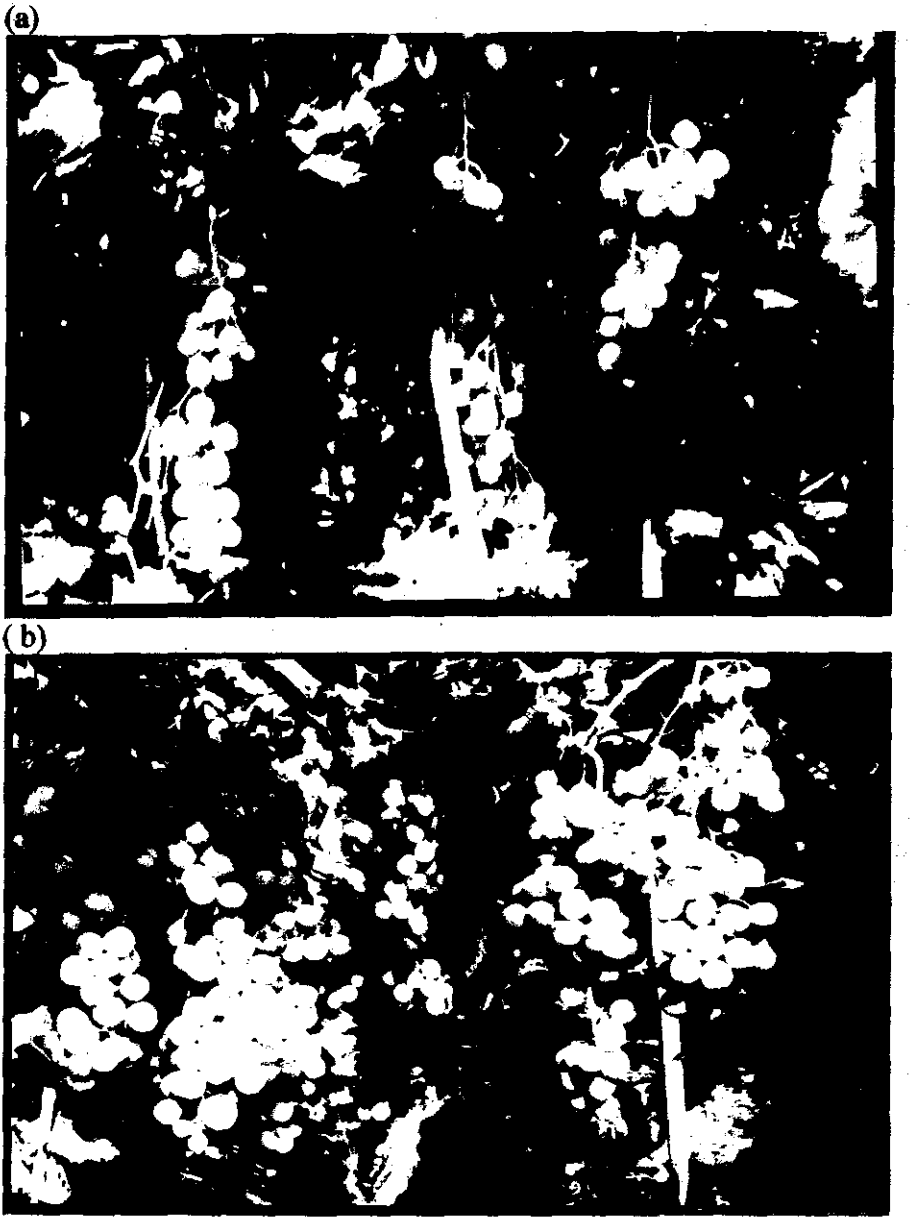

Photo1 Effect of some tested treatments on bunches and berries of Roumi Red grapes : (a) control ; (b) Cultar

(c)

Photo 1 Continued . (c) Sitofex 5 ppm at fruit set

were recorded by the control (353.6 and 386.4 g) and Sitofex 1ppm at full bloom (430.2 and 440.1 g) in the 1st and 2nd seasons, respectively.

The increments in bunch weight with Sitofex treatments were in line with Rizk (1998) on Thompson Seedless, AL-Ashkar (2000) on Ruby Seedless *cv*, El-Hammady *et al.* (2000) on King Ruby grapes, Omar and El- Morsy (2000) on Ruby Seedless *cv*, Zabadal and Bukovac (2000) on the seedless *cvs* : Himrod, Vanessa and lakemont and seeded *cvs* Concord and Niagara, EL-Morsy (2001) on Ruby Seedless *cv*, Aly *et al.* (2001) on Thompson Seedless *cv*, Navarro *et al.* (2001) on Sultanina *cv*, Bhujbal *et al.* (2002) on Tas-A-Ganesh *cv*, Ishikawa *et al.* (2003) on Fujiminori *cv*, Pires *et al.* (2003) on Centennial Seedless table grape and Rizk *et al.* (2003) on Roumi Red *cv* In addition, the bunch weight increment with Cultar treatment was in line with Shaltout *et al* (1988) on Roumi Red *cv*, El-Morsy and Mansour (1998) on Roumi Red *cv* and Kumar *et al.* (1998) on Arkavati cultivar .

3.Number of berries per bunch

The number of berries per bunch, generally, ranged from 61.5 to 245.9 in the first season and from 75.0 to 239.8 in the second season according to treatment (Table 1) . The greatest numbers of berries per bunch came from the treatment : Sitofex 5ppm at full bloom (245.9 and 239.8 berries / bunch in the two seasons). Three treatments without significant differences among them; i.e., Sitofex 5 ppm at fruit set (133.2 and 132.7), Sitofex 3 ppm at fruit set (123.6 and 127.7) and Sitofex 3 ppm at full bloom (113.5 and 125.8 berries / bunch) in the 1st and 2nd seasons, respectively came in the second rank. Cultar treatment came in the third rank (91.1 and 98.4) berries / bunch, in the two seasons. On the other hand, The lowest numbers of berries per bunch were recorded by the control (61.5 and 75.0) and Sitofex 1 ppm at full bloom (78.3 and 80.4 berries / bunch), in the two seasons, without significant differences between them in each of the two seasons .

The increments in number of berries per bunch with Sitofex treatments were in line with Nickell (1985) on Thompson Seedless *cv*, Dokoozlian *et al.* (1994) on Thompson Seedless *cv* , Kim *et al.* (2002) on Campbell Early (*Vitis labruscana*) grapes and Rizk *et al.* (2003) on Roumi Red *cv* In addition, the increment in number of berries per bunch with

Cultar treatment was in line with Shaltout *et al.* (1988) on Roumi Red *cv*, Wolf *et al.* (1991) on Riesling *cv*, Shehata and Aly (1996) on Roumi Red *cv*, El-Morsy and Mansour (1998) on Roumi Red *cv*, Kumar *et al.* (1998) on Arkavati *cv* and Sehrawat *et al.* (1998) on Thompson Seedless cultivar .

4.Rachis weight

The weight of rachis, generally, ranged from 11.8 to 21.2 gm, in the first season, and from 13.2 to 19.6 g in the second season according to treatment (Table 1). The heaviest rachises came from the treatments : Sitofex 3 ppm at full bloom (18.2 and 19.3 g) and Sitofex 5 ppm at fruit set (21.2 and 19.6 g) in the 1st and 2nd seasons, respectively, without significant differences between them in each season. On the other hand, the lightest rachises were recorded by the control (11.8 and 13.2 g) and Cultar treatment (14.8 and 14.2 g) in the 1st and 2nd seasons, respectively, without significant differences between them in each season.

The increments in weight of rachis with Sitofex treatments were in line with Retamales *et al.* (1995) on Sultanina *cv* Thompson Seedless, AL-Ashkar (2000) on Ruby Seedless *cv*, Aly *et al.* (2001) on Thompson Seedless *cv* and Ramteke *et al.* (2002) on Tas-A-Ganesh cultivar .

5.Bunch length

The bunch length, generally, ranged from 28.3 to 31.7 cm in the first season and from 33.4 to 38.2 cm in the second season according to treatment (Table 1). However, the differences among all tested treatments and control were insignificant in the two seasons. In this concern, Aly *et al.* (2001) on Thompson Seedless *cv* reported that Sitofex faild to affect the bunch length significantly. On the other hand, Lee-ChangHoo *et al.* (1996) found that Sitofex treatments increased bunch length of Kyoho cultivar .

6.Bunch width

The bunch width, generally, ranged from 9.2 to 14.7 cm in the first season and from 13.2 to 20.6 cm in the second season according to treatment (Table 1). The widest bunches came from the treatments : Sitofex 3 ppm at full bloom (14.7 and 20.6 cm), Sitofex 5 ppm at full bloom (14.2 and 19.1 cm) and Sitofex 3 ppm at fruit set (13.8 and 20.5 cm) in the 1st and 2nd seasons, respectively, without significant differences among them in each season. The treatments : Sitofex 1 ppm at fruit set (11.8 and 16.7 cm) in the 1st and 2nd seasons,

respectively, Sitofex 1 ppm at full bloom (10.7 cm) Cultar treatment (12.2 cm) in the 1st season as well as Sitofex 5 ppm at fruit set (16.8 cm) in the 2nd season), came in the second rank without significant differences among them in each season. On the other hand, the narrowest bunches came from the control (09.2 and 13.2 cm) in the two seasons.

The increments in bunch width with Sitofex treatments were in line with Lee-ChangHoo *et al.* (1996) on Kyoho *cv* The increment in bunch width with Cultar treatment was in line with Shaltout *et al.* (1988) on Roumi Red cultivar.

7. Total length of rachis main axis and its laterals

The values in Table1, generally, ranged from 67.5 to 89.9 cm in the first season and from 68.5 to 88.6 cm in the second season according to treatment. The highest values came from the treatments : Sitofex 1ppm at full bloom (89.9 and 88.6 cm), Sitofex 3 ppm at full bloom (81.9 and 84.3 cm) and Sitofex 5 ppm at full bloom (88.7 and 83.2 cm) in the 1st and 2nd seasons, respectively, without significant differences among them in each season. On the other hand, the least values were recorded by the control (67.5 and 68.5 cm), Sitofex 1 ppm at fruit set (73.5 and 76.2 cm), Sitofex 3 ppm at fruit set (66.3 and 68.1 cm), Sitofex 5 ppm at fruit set (62.6 and 69.9 cm) and Cultar treatment (70.1 and 76.8 cm) in the 1st and 2nd seasons, respectively, without significant differences among them in each season. It seems that early Sitofex treatments (full bloom) were more capable to increase length of rachis and its branches than later treatments (at fruit set).

8. Bunch compactness

The bunch compactness generally, ranged from 0.9 to 2.8 in the first season and from 0.9 to 2.9 in the second season according to treatment (Table 1). The most compact bunches came from the treatment Sitofex 5 ppm at full bloom (2.8 and 2.9) in the 1st and 2nd seasons, respectively. Two treatments without significant differences between them; i.e., Sitofex 3 ppm at fruit set (1.9 in both seasons) and Sitofex 5 ppm at fruit set (2.1 and 1.9 in the 1st and 2nd seasons, respectively) came in the second rank and two treatments : Sitofex 3 ppm at full bloom (1.3 and 1.5) and Cultar treatment (1.3 in both seasons) came in the third rank. The least bunch compactness was observed with the control (0.9

and 1.1) , Sitofex 1 ppm at full bloom (0.9 in both seasons) and Sitofex 1 ppm at fruit set (1.2 in both seasons) without significant differences among them .

The obtained results concerning bunch compactness are in line with those reported by Wolf *et al.* (1994) on Muscat Seedless, Retamales *et al.* (1995) on Sultanina (Thompson Seedless) *cv*, Rizk (1998) on Thompson Seedless *cv*, El-Hammady *et al.* (2000) on King Ruby grapes, Zabadal and Bukovac (2000) on the Seedless *cvs*: Himrod, Vanessa and Lakemont and the Seeded *cvs* Concord and Niagara, Aly *et al.* (2001) on Thompson Seedless *cv* and Rizk *et al.* (2003) on Roumi Red cultivar.

9.100 - berry weight

From Table 2, it is clear that the 100 - berry weight, generally, ranged from 308.4 to 597.2 g in the first season and from 303.7 to 612.3 g in the second season according to treatment. The heaviest berries came from seven treatments : Sitofex 3 ppm at fruit set (597.2 and 612.3 g), Sitofex 3 ppm at full bloom (595.2 and 608.7 g), Sitofex 5 ppm at fruit set (595.9 and 590.3 g), Sitofex 1 ppm at fruit set (569.1 and 572.0 g), Sitofex 1 ppm at full bloom (550.1 and 576.0 g), Cultar treatment (551.3 and 584.7 g) and Control (548.3 and 567.7 g) in the 1st and 2nd seasons, respectively, without significant differences among them in each season. However, the lightest berries came from the treatment Sitofex 5 ppm at full bloom (308.4 and 303.7 g in the two seasons). This was apparently due to the obvious increase in number of berries /bunch with this treatment as discussed before.

The increments in 100-berry weight with Sitofex treatments were in line with Dokoozlian *et al.* (1994) on Thompson Seedless *cv*, Wolf *et al.* (1994) on Muscat Seedless, Lee-ChangHoo, *et al.* (1996) on Kyoho *cv*, Rizk (1998) on Thompson Seedless *cv*, AL-Ashkar (2000) on Ruby Seedless *cv*, El-Hammady *et al.* (2000) on King Ruby *cv*, Ezzahouani (2000) on Perlette Seedless *cv*, Miele *et al.* (2000) on Italia *cv*, Omar and El-Morsy (2000) on Ruby Seedless *cv*, Zabadal and Bukovac (2000) on seedless *cvs* (Himrod, Vanessa and Lakemont) and the seeded *cvs* (Concord and Niagara), Bikash *et al.* (2001) on Pusa Seedless *cv*, Aly *et al.* (2001) on Thompson Seedless *cv*, Bhujbal *et al.* (2002) on Tas-A-Ganesh *cv*, Ishikawa *et al.* (2003) on Fujiminori *cv*, Pires *et al.* (2003) on Centennial Seedless *cv*, and Rizk *et al.* (2003) on Roumi

Table 2 : Effect of some Sitofex and Cultar treatments on some berry characteristics of Roumi Red grapes .

Treatments	100- berry weight (g)		Berry length (cm)		Berry diameter(cm)		Berry shape index		Berry skin color mg/g FW		No. of seeds /berry		Berry firmness (g/cm^2)		Berry attaching force (g)	
	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
Control (untreated)	548.3	567.7	2.18	2.24	1.97	2.04	1.11	1.09	1.01	1.09	3.10	3.17	439.17	735.00	455.00	753.33
Sitofex 1 ppm at full bloom	550.1	576.0	2.20	2.30	1.99	2.11	1.11	1.09	1.13	0.72	3.20	3.20	583.33	765.00	679.17	965.00
Sitofex 3 ppm at full bloom	595.2	608.7	2.30	2.36	2.00	2.17	1.14	1.09	0.99	0.93	3.27	3.23	651.67	806.67	769.17	1001.67
Sitofex 5 ppm at full bloom	308.4	303.7	1.66	1.73	1.60	1.61	1.04	1.07	0.58	0.58	0.03	0.10	257.50	598.33	214.17	500.00
Sitofex 1 ppm at fruit set	569.1	572.0	2.22	2.25	1.98	2.11	1.12	1.06	1.05	0.86	3.13	3.23	587.50	713.33	675.83	891.67
Sitofex 3 ppm at fruit set	597.2	612.3	2.27	2.39	1.99	2.21	1.14	1.07	0.99	0.86	3.23	3.17	614.17	745.00	668.33	976.67
Sitofex 5 ppm at fruit set	595.9	590.3	2.25	2.31	2.00	2.14	1.12	1.08	1.00	1.00	3.17	3.17	692.50	691.67	725.50	760.17
Cultar 250 ppm prebloom	551.3	584.7	2.20	2.25	2.00	2.103	1.10	1.07	1.05	1.02	3.17	3.23	544.17	570.00	589.17	756.67
L S D at (5%)	61.04	55.42	0.06	0.06	0.05	0.05	0.04	0.02	0.097	0.107	0.30	0.31	45.91	143.09	108.24	260.80

Red *cv* On the other hand, Wolf *et al.* (1991) on Riesling *cv* and El-Morsy and Mansour (1998) on Roumi Red *cv* found that Cultar treatment decreased berry weight. However, Kim *et al.* (2002) on Campbell Early (*Vitis labruscana*) declared that Cultar failed to affect berry weight.

10.Berry length

The berry length, generally, ranged from 1.66 to 2.30 cm, in the first season, and from 1.73 to 2.39 cm, in the second season, according to treatment (Table 2). The longest berries came from the treatments : Sitofex 3 ppm at fruit set (2.27 and 2.39 cm) and Sitofex 3 ppm at full bloom (2.30 and 2.36 cm) in the 1st and 2nd seasons, respectively, without significant differences between them in each season. The treatments : Sitofex 1 ppm at full bloom (2.20 and 2.30 cm) and pre bloom Cultar treatment at 250 ppm (2.20 and 2.25 cm) in the 1st and 2nd seasons, respectively, came in the second rank without significant differences between them in each season. On the other hand, the shortest berries came from the treatment Sitofex 5 ppm at full bloom (1.66 and 1.73 cm).

The increments in berry length with Sitofex treatments were in line with Dokoozlian *et al.* (1994) on Thompson Seedless *cv*, Wolf *et al.* (1994) on Muscat Seedless *cv*, Rizk (1998) on Thompson Seedless *cv*, AL-Ashkar (2000) on Ruby Seedless and Flame Seedless *cvs*, El-Hammady *et al.* (2000) on King Ruby *cv*, Omar and El-Morsy (2000) on Ruby Seedless *cv*, EL-Morsy (2001) on Ruby Seedless *cv*, Aly *et al.* (2001) on Thompson Seedless *cv* and Pires *et al.* (2003) on Centennial Seedless *cv* On the other hand, Bhujbal *et al.* (2002) on Tas-A-Ganesh *cv* found that Sitofex treatments decreased berry length.

11.Berry diameter

The berry diameter, generally, ranged from 1.60 to 2.00 cm, in the first season, and from 1.61 to 2.21 cm, in the second season, according to treatment (Table 2). The widest berries came from the treatments Sitofex 3 ppm at fruit set (1.99 and 2.21 cm) and Sitofex 3 ppm at full bloom (2.00 and 2.17 cm) in the 1st and 2nd seasons, respectively. However, the least berry diameter was recorded by the treatment Sitofex 5 ppm at full bloom (1.60 and 1.61 cm) in 1st and 2nd seasons.

The increments in berry diameter with Sitofex treatments were in line with Dokoozlian *et al.* (1994) on Thompson Seedless *cv*, Rizk (1998) on Thompson Seedless

cv, AL-Ashkar (2000) on Ruby Seedless and Flame Seedless *cvs*, El-Hammady *et al.* (2000) on King Ruby *cv*, Omar and El-Morsy (2000) on Ruby Seedless *cv*, Zabadal and Bukovac (2000) on the Seedless *cvs*: Himrod, Vanessa and Lakemont and the Seeded *cvs* : Concord and Niagara, EL-Morsy (2001) on Ruby Seedless *cv*, Aly *et al.* (2001) on Thompson Seedless *cv*, Bhujbal *et al.* (2002) on Tas-A-Ganesh *cv* and Pires *et al.* (2003) on Centennial Seedless cultivar.

12.Berry shape index

The berry shape index, generally, ranged from 1.04 to 1.14. in the first season and from 1.06 to 1.09 in the second season according to treatment (Table 2). However, most of the tested treatments in the 1st and 2nd seasons indicated close values without significant differences among them. The only exceptions were : Sitofex 5 ppm at full bloom in the first season (1.04) and Sitofex 1 ppm at fruit set in the 2nd season (1.06) which indicated more roundish berries .

The decrease in berry shape index with Sitofex treatments was in line with Dokoozlian *et al.*(1994) on Thompson Seedless, Retamales *et al.* (1995) on Sultanina (Thompson Seedless) *cv*, Rizk (1998) on Thompson Seedless *cv*, and Aly *et al.* (2001) on Thompson Seedless *cv* The decrease in berry shape index with Cultar treatment was in line with Shaltout *et al.* (1988) on Roumi Red cultivar.

13.Berry color

The numerical evaluation of berry color, generally, ranged from 0.58 to 1.13 mg/g FW in the first season and from 0.58 to 1.20 mg/g FW in the second season according to treatment (Table 2). The most colored berries came from the treatments : Cultar treatment (1.05 and 1.20 mg/g FW in the 1st and 2nd seasons), Sitofex 1 ppm at full bloom (1.13 mg/g FW) and Sitofex 1 ppm at fruit set (1.05 mg/g FW) in 1st season without significant differences among them. The control (1.01 and 1.09 mg/g FW) and Sitofex 5 ppm at fruit set (1.00 mg/g FW in both season) came in the second rank without significant differences between them in each season. Meanwhile, the most pale berries resulted from Sitofex 5 ppm at full bloom (0.58 mg/g FW in both seasons).

The decrease in berry color with Sitofex treatments was in line with Wolf *et al.* (1994) on Flame Seedless, Muscat Seedless and Sultanina *cvs*, Joublan *et al.* (1995) on Moscatel Rosada *cv*, Retamales *et al.* (1995) on Sultanina

(Thompson Seedless) *cv*, Lee-ChangHoo, *et al.* (1996) on Kyoho *cv*, AL-Ashkar (2000) on Ruby Seedless and Flame Seedless *cvs*, El-Hammady *et al.* (2000) on King Ruby *cv* and Omar and El-Morsy (2000) on Ruby Seedless *cv* On the other hand , Zoecklein *et al.* (1991) on Riesling *cv* reported that Cultar faild to affect significantly the berry color.

14.Number of seeds / berry

The number of seeds / berry, generally, ranged from 0.03 to 3.23 in the first season and from 0.10 to 3.23 in the second season according to treatment (Table 2). However, the number of seeds / berry gave close values with all tested treatments, in the two seasons, without significant differences among them, except for the treatment of Sitofex 5 ppm at full bloom (0.03 and 0.10 seeds / berry in the 1st and 2nd seasons, respectively). This treatment was found to obviously increase number of berries / bunch while depressed berry weight, dimensions, shape index and berry color as discussed before .

15.Berry firmness

It is clear from data in Table 2 that, berry firmness, generally, ranged from 257.50 to 692.50 g / cm^2 in the first season and from 598.33 to 806.67 g / cm^2 in the second season according to treatment. The treatments that indicated high and stable degrees of firmness in the two seasons were : Sitofex 3 ppm at full bloom (651.67 and 806.67 g / cm^2) and Sitofex 5 ppm at fruit set (692.50 and 691.67 g/ cm^2) without significant differences between them in each season. On the other hand, Cultar treatment indicated lower berry firmness in the two seasons (544.17 and 570.00 g / cm^2).

The increments in berry firmness with some Sitofex treatments were in line with Sarig *et al.* (1998) on Thompson Seedless *cv*, AL-Ashkar (2000) on Ruby Seedless *cv*, El-Hammady *et al.* (2000) on King Ruby *cv*, Omar and El-Morsy (2000) on Ruby Seedless *cv*, Zabadal and Bukovac (2000) on the seedless *cvs*: Himrod, Vanessa and lakemont and the seeded *cvs* : Concord and Niagara and EL-Morsy (2001) on Ruby Seedless cultivar.

16.Berry attaching force

The berry attaching force, generally, ranged from 214.17 to 769.17 g in the first season and from 500.00 to 1001.67 g in the second season according to treatment (Table 2). The greatest values came from the treatments :

Sitofex 3 ppm at full bloom (769.17 and 1001.67 g), Sitofex 1 ppm at full bloom (679.17 and 965.00 g), Sitofex 1 ppm at fruit set (675.83 and 891.67 g), Sitofex 3 ppm at fruit set (668.33 and 976.67 g) and Sitofex 5 ppm at fruit set (725.50 and 760.17 g) in the 1st and 2nd seasons, respectively, without significant differences among them, in each season. However, the lowest berry attaching force resulted from Sitofex 5 ppm at full bloom (214.17 and 500.00 g) in the two seasons.

The obtained results are in harmony with EL-Morsy (2001) on Ruby Seedless cultivar.

17. Total soluble solids content (TSS)

It is clear from Table 3 that, juice TSS, generally, ranged from 13.00 to 14.00%, in the first season, and from 14.33 to 14.98%, in the second season. In the first season, the highest TSS (%) came from five treatments without significant differences among them; i.e., Sitofex 1 ppm at full bloom (14.00%), Sitofex 1 ppm at fruit set (13.83%), Sitofex 3 ppm at full bloom (13.75%) , Sitofex 5 ppm at fruit set (13.58%) and the control (13.50%). On the other hand, the lowest juice TSS values in the first season were recorded by Sitofex 5 ppm at full bloom (13.00%), Sitofex 3 ppm at fruit set (13.33%) and Cultar treatment (13.25%) without significant differences among them. In the second season, however, no significant differences were noticed among all tested treatments and the control.

The reduction in juice TSS with some Sitofex treatments was in line with Retamales *et al.* (1995) on Sultanina (Thompson Seedless) *cv*, Lee-ChangHoo, *et al.* (1996) on Kyoho *cv*, Rizk (1998) on Thompson Seedless *cv*, El-Hammady *et al.* (2000) on King Ruby *cv*, Ezzahouani (2000) on Perlette Seedless *cv*, Omar and El-Morsy (2000) on Ruby Seedless *cv*, Zabadal and Bukovac (2000) on the seedless *cvs* : Himrod, Vanessa and lakemont and the seeded *cvs* : Concord and Niagara, EL-Morsy (2001) on Ruby Seedless *cv*, Aly *et al* (2001) on Thompson Seedless *cv* , Bhujbal *et al.* (2002) on Tas-A-Ganesh *cv* and Rizk *et al.* (2003) on Roumi Red *cv* who found that Sitofex treatments decreased juice TSS. However Bikash *et al.* (2001) on Pusa Seedless *cv* reported that Sitofex treatments failed to affect TSS percentage .

The reduction in juice TSS with Cultar treatments were in line with Shaltout *et al.* (1988) and El-Morsy and Mansour (1998) both on Roumi

Table 3 : Effect of some Sitofex and Cultar treatments on juice TSS , acidity , TSS / acid ratio , and sugars contents of Roumi Red grapes at time of harvesting.

Treatments	T.S.S(%)		Acidity(%)		TSS /acid ratio		Reducing sugars(%)		Non-reducing sugars(%)		Total sugars (%)	
	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
Control (untreated)	13.50	14.33	0.408	0.418	33.28	34.65	7.79	10.35	1.49	1.84	9.28	12.19
Sitofex 1 ppm at full bloom	14.00	14.83	0.399	0.408	35.48	36.62	7.74	10.79	1.82	1.29	9.56	12.08
Sitofex 3 ppm at full bloom	13.75	14.98	0.389	0.399	35.37	38.04	7.21	10.83	1.81	0.98	9.02	11.81
Sitofex 5 ppm at full bloom	13.00	14.67	0.380	0.407	34.64	36.37	7.67	10.57	1.24	1.78	8.91	12.35
Sitofex 1 ppm at fruit set	13.83	14.83	0.399	0.389	34.90	38.47	7.44	10.70	1.47	1.51	8.91	12.21
Sitofex 3 ppm at fruit set	13.33	14.92	0.380	0.399	35.26	37.65	8.01	10.12	1.20	1.85	9.21	11.97
Sitofex 5 ppm at fruit set	13.58	14.67	0.361	0.399	37.80	37.61	7.58	10.88	1.53	1.67	9.11	12.55
Cultar 250 ppm prebloom	13.25	14.75	0.370	0.408	35.96	36.58	7.75	10.64	1.22	1.56	8.97	12.20
L S D at 5%	0.60	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Red *cv* who found that Cultar treatments decreased juice TSS.

18. Acidity content

The juice acidity percentage, generally, ranged from 0.361 to 0.408% , in the first season, and from 0.389 to 0.418 % in the second season (Table 3). However, no significant differences were noticed among all tested treatments and control in the two seasons.

The obtained results on Sitofex were in line with those reported by Lee-ChangHoo *et al.* (1996) on Kyoho *cv* and AL-Ashkar (2000) on Ruby Seedless *cv* On the other hand, Rizk (1998) on Thompson Seedless *cv*, AL-Ashkar (2000) on Flame Seedless *cv*, Ezzahouani (2000) on Perlette Seedless *cv*, Omar and El-Morsy (2000) on Ruby Seedless, EL-Morsy (2001) on Ruby Seedless *cv*, Aly *et al.* (2001) on Thompson Seedless *cv* and Rizk *et al.* (2003) on Roumi Red *cv* found that Sitofex treatments increased juice acidity.

Reynolds (1988) on Riesling clone 21B Weis *cv* declared that Cultar failed to affect juice acidity. On the other hand, Shaltout *et al.* (1988) on Roumi Red *cv*, El-Morsy and Mansour (1998) on Roumi Red *cv* and Sehrawat *et al.* (1998) on Thompson Seedless *cv* found that Cultar treatment increased juice acidity. Moreover, Zoecklein *et al.* (1991) on Riesling *cv* found that Cultar treatment reduced juice acidity .

19. TSS/acid ratio

The juice TSS / acid ratio, generally, ranged from 33.28 to 37.80, in the first season, and from 34.65 to 38.47 in the second season (Table 3). However, no significant differences were noticed among all tested treatments and control in the two seasons.

In this respect, Rizk (1998) on Thompson Seedless *cv*, Omar and El-Morsy (2000) on Ruby Seedless and EL-Morsy (2001) on Ruby Seedless *cv* found that Sitofex treatments decreased TSS / acid ratio.

20. Sugars contents

The reducing sugars content, generally, ranged from 7.21 to 8.01% in the first season and from 10.12 to 10.88% in the second season. The non-reducing sugars content, generally, ranged from 1.20 to 1.82% in the first season and from 0.98 to 1.85% in the second season. The total sugars content, generally, ranged from 8.91 to 9.56% in the first season and from 11.81 to 12.55% in the

second season. However, no significant differences were noticed among all tested treatments and control in the two seasons, concerning reducing, non–reducing and total sugars contents.

These results are in agreement with those reported by Zoecklein *et al.* (1991) on Riesling *cv* and Forlani and Coppola (1992) on Fiano *cv* who declared that Cultar failed to affect sugars contents. On the other hand, Williams *et al.* (1989) on Thompson Seedless *cv* found that Cultar treatment decreased sugars contents.

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تأثير بعض معاملات السيتوفكس والكلتار على محصول وجودة ثمار العنب صنف رومى أحمر

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أجريت هذه الدراسه فى عامى ١٩٩٨م ، ١٩٩٩م على كروم العنب صنف رومى أحمر عمر ٣٠ سنه والمنزرعه فى ارض طينيه بمزرعه خاصه بمركز كفر صقر محافظة الشرقيه ، حيث رشت العناقيد فى تمام الإزهار أ وعند العقد بالسيتوفكس بتركيز ١ ، ٣ ، ٥ جزء فى المليون لتقليل تساقط الأزهار والثمار حديثة العقد ، كما اختبرت المعامله الشائعه الإستخدام أى الكلتار (بتركيز ٢٥٠ جزء فى المليون قبل التزهير) وأيضا تركت عناقيد للمقارنه بدون معامله.

وأظهرت النتائج استجابة عناقيد العنب صنف رومى أحمر لكل المعاملات المختبره ، وكانت الزياده كبيره فى عدد الحبات على العنقود ، وزن العنقود ، محصول الكرمه ، عرض العنقود ، درجة تزاحم العنقود ، وزن ١٠٠ حبه ، طول وقطر الحبه وذلك فى معظم معاملات السيتوفكس والكلتار فى موسمى الدراسه مقارنه بعناقيد وحبات الكنترول ، وتحققت أفضل النتائج برش العناقيد بالسيتوفكس بتركيز ٣ أو ٥ جزء فى المليون عند عقد الثمار .