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Effect of Coffeic Acid, Jasmonic Oil and Their Mixture on Yield and Fruit Quality of "Ruby Seedless" Grape Cultivar

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Abstract

This study was carried out during 2018 and 2019 seasons to investigate the effects of spraying jasmonic oil (3 cm^3/L or 6 cm^3/L), coffeic acid (30 ppm or 60 ppm) and their mixture at pre-bloom (1^{st} application time) and at 6 mm size of berry (the 2^{nd} time) on yield and fruit quality of "Ruby Seedless" grape cultivar.

The grapevines were grown at a vineyard of Pomology Department, Faculty of Agriculture, Assiut University. The vines were pruned as bilateral cordon leaving 36 buds per vine, 18 fruiting spurs, 2 buds each. The experiments were setted up as split-plot arrangement in acomplete randomized block design, 4 replicates, one vine each.

According to the obtained results, it was found that all the treatments with jasmonic oil or coffeic acid and their mixture induced significant increase in yield components and physical and chemical characteristics, with the exception of titratable acidity % (TA%) in berry juice was increased in response to the treatment.

Generally, it was found that spraying a mixture of jasmonic oil plus coffeic acid was more effective on improving the yield or fruit quality of Ruby Seedless grape cultivar, comparing with untreated vines during the two studied seasons.

Therefore, it could be recommended that to with spraying a mixture of jasmonic oil plus coffeic acid to improve the yield and fruit quality under the condition of this study.

This study is considered first research carried out to investigate the effect of coffeic acid and a mixture of it with jasmonic oil on yield and fruit quality of grapevine. Therefore, we need more studies to concern the obtained of this result.

Keywords: *Jasmonic oil, coffeic acid, yield, fruit quality, Ruby Seedless.*

Introduction

Grapevine (*Vitis vinifera* L.) is considered one of the most popular and common fruits. Grape is currently grown in all major continents of the world for fresh fruit and theis processed products grape which are rich source of fiber and vitamins.

In Egypt grapes rank the second fruit crop, while the citrus crop bring the first. Grapevine are most widely grown in Egypt, whereas the fruiting occupied by vineyard estimated by feddans with production of tons according to the latest statistics of the Ministry of Agriculture and soil reclamation in 2018.

Ruby seedless is a new cultivar. The most facing cluster which small berries, uneven ripening and poor coloration.

Recently, Synthetic substances throughout agriculture practices were using for improving yield and fruit quality. Using natural plant extracts was the new alternative compounds for improving yield and fruit quality

of fruit crops as safety agents for human and environment.

Many reachers dealing with the impact of different plant extracts on fruiting and chemical characteristic of fruit crops (EL-Boray *et al.* (2007) Mostafa *et al* (2015).

El- Kenawy(2018), Abada (2014), El-Zahraa(2016). El- Salhy *et al.* (2017).

EL-Kenawy(2018). Faissal and Asmaa (2019).

Therefore the main objective of this study is to examine the effect of spraying Jasmonic oil and coffeic acid on improving both yield and fruit quality of Ruby Seedless grapevine cultivar under Assiut conditions.

Materials and Methods

This investigation was carried out during two successive seasons 2018 and 2019 on 28 years old grapevines of Ruby seedless cultivars. Grown in loamy clay soils in a vineyard at the experimental Orchard of Pomology, Faculty of Agriculture, Assiut University. The selected vines trained according to the bilateral cordon system. The vine were pruned leaving 36 buds/vine.

The chosen 72 vines were divided into nine different treatments including the control (sprayed water only), four replicates, one vine each. The treatments are as follows

1- Control (sprayed water only)
2- Coffeic acid (30 ppm).
3- Coffeic acid (60 ppm).
4- Jasmonic oil (3 cm^3/L).
5- Jasmonic oil (6 cm^3/L).
6- Coffeic acid (30 ppm) + Jasmonic oil (3 cm^3/L).
7- Coffeic acid (30 ppm) + Jasmonic oil (6 cm^3/L).
8- Coffeic acid (60 ppm) + Jasmonic oil (3 cm^3/L).
9- Coffeic acid (60 ppm) + Jasmonic oil (6 cm^3/L).

The selected vines were treated two times of each treatment. The first spray was at before flowering (shoot length 20 cm) and the second time was after fruit set when the berry reached 6 mm.

Harvesting was carried out at the normal commercial harvest date and following measurements were determined as follow:

2.1- Yield weight (kg)/Vine:

The yield in terms of weight (kg)/vine were recorded at the harvest data.

2.2- Bunch weight (g) and bunch length (cm):

Bunches were taken at random from the yield of each vine at harvest date for measuring both of bunch weight (g) and bunch length (cm).

2.3- Physical and chemical characteristics of berries:

Hundred berries were picked randomly from each sample for assessment of 100 berries weight (g).

2.4- Berry chemical constituents:

The following constituents were estimated in the juice according the corresponding methods:

2.4.1- Total Soluble Solids Percentages (T.S.S%)

The Percentage of total Soluble Solids (T.S.S%) in grape juice.

Extracted from grape berries was determined in treated or untreated grape berries by using a hand refractometer.

2.4.2- Titratable Acidity Percentage (T.A%) and TSS/TA ratio

Titratable Acidity Percentage (T.A%) in grape juice was deter-

mined by titrating10 ml grape juice with phenolphethalin as an indicator against 0.1 n of NaOH and calculated as grams of tartaric acid per 100 ml juice, the ratio between the TSS% and Titratable Acidity % (TSS/TA) ratio was calculated in grape juice.

Statistical analysis

The experiments of this study were conducted in a split-plot arrangement of completely randomized block design (CRB) with four replicates, one grapevine each. Application times of both Jasmonic oil and coffeic acid (at 1st or 2nd time) were assigned to two whole plots and spraying the concentrations of the treatments were considered at splits at one level.

The obtained data were statically analyzed according to Gomez and Gomez (1984). The mean of the treatments were compared using the L.S.D test at level of 0.05.

Results and Discussion

Results and discussion of this study are presented as follows:

1- Effect of jasmonic oil, coffeic acid and their mixture on yield components of Ruby Seedless grape cv.

2- Effect of jasmonic oil, coffeic acid and their mixture on berry quality of Ruby Seedless grape cv.

1. Yield weight (kg/vine)

Data recorded in table (1) revealed that all treatments with jasmonic oil at 3 cm3 or 6 cm3/L or coffeic acid at 30 ppm or 60 ppm and their mixture sprayed at the 1st application time (pre-bloom) and at the 2nd application time berry volume of 6 mm induced significantly increase in yield weight (kg/vine) compared with untreated vines during 2018 and 2019 seasons.

Concerning the effect of carrying out the treatments on yield weight (kg/vine) of Ruby Seedless grape cv, it was noticed that in season 2018, at the 1st time, spraying a mixture of 3 cm^3 jasmonic oil+60 ppm coffeic acid resulted in the highest value of yield weight (kg/vine), (14.150 kg/vine) followed by spraying coffeic acid (60 ppm) (12.800 kg/vine),then spraying coffeic acid (30 ppm) (12.725kg/vine), all compared with untreated vines (9.100 kg/vine), Since at the 2nd time, spraying a mixture of 3 cm3/L jasmonic oil + 60 ppm coffeic acid gave the highest value of yield weight (12.975 kg/vine), followed by spraying a mixture of 3 cm^3/L jasmonic oil + 30 ppm coffeic acid (12.100 kg/vine), then spraying a mixture of 6 cm^3 jasmonic oil + 60 ppm coffeic acid (11.725 kg/vine), all compared with untreated vines (9.100 kg/vine), in season 2019, At the 1st time, it was found that spraying a mixture of 3 cm^3/L jasmonic oil + 60 ppm coffeic acid gave the highest value of yield weight (19.250 kg/vine), followed by spraying 60 ppm coffeic acid (16.750 kg/vine), then spraying 30 ppm coffeic acid (13.750 kg/vine), since at the 2nd time spraying a mixture of 3 m^3/L jasmonic oil + 30 ppm coffeic acid or 6 cm^3/L jasmonic oil + 60 ppm coffeic acid induced the highest value of yield weight (17.125 kg/vine, each) followed by 3 cm^3/L of jasmonic oil (12.750 kg/vine), then6 cm^3/L jasmonic oil (11.00 kg/vine) compared with yield weight (9.225 kg/vine) of untreated vines.

Table 1. Effect of Jasmonic Oil, Coffeic acid and Their mixture on Yield weight (kg)/ vine during 2018 and 2019 seasons

Yield weight						
	Season 2018			Season 2019		
	D1	D2	Mean(A)	D1	D2	Mean(A)
Control	9.100	9.100	9.100	9.225	9.225	9.225
Jasmonic oil 3cm	11.250	10.050	10.650	12.275	12.750	12.513
Jasmonic oil 6cm	11.325	10.025	10.675	13.350	11.000	12.175
Caffic 30ppm	12.800	10.725	11.763	13.750	10.125	11.939
Caffic 60ppm	12.725	10.275	11.500	16.750	10.750	13.750
J 3cm+C 30ppm	11.825	12.100	11.963	11.900	17.125	14.513
J 3cm+C 60ppm	14.150	12.975	13.563	19.250	10.000	14.625
J 6cm+C 30ppm	10.650	11.225	10.938	10.000	10.625	10.313
J 6cm+C 60ppm	10.600	11.725	11.162	13.625	17.125	15.375
Mean (B)	11.603	10.911		13.347	12.081	
L.S.D.0.05 A= B= AB=	0.625 ** 1.014			0.974 ** 1.097		

D_1 =At pre-bloom, D_2= At berry size of 6mm

Generally, it was clearly observed that spraying jasmonic oil or coffeic acid or their mixture at different concentrations induced an improvement of yield weight (kg/vine) of Ruby Seedless grape cv., these effects could be due to an enhancement of the two compound in increasing the bunch weight of Ruby Seedless grape cv.

These obtained results of this study are in agreement with those reported by Gehan *et al*. (2011) and Mostafa *et al*. (2015) who reported that natural oils induced significant improvement in yield Kg/vine.

2. Bunch weight:

Data in Table (2) showed that spraying jasmonic oil (3 cm^3/L or 6 cm^3/L), or coffeic acid (30 ppm or 60 ppm) and their mixture at the 1st application time (pre-bloom) or at the 2nd time (at 6 mm berry volume) resulted in significantly increase in bunch weight of Ruby Seedless grape cv. during 2018 and 2019 seasons.

Regarding to the effect of spraying jasmonic oil or coffeic acid and their mixture at the 1st or 2nd application time on bunch weight (g) of Ruby Seedless grape cv, it was noticed that spraying mixture of 6 cm^3/L jasmonic oil + 30 ppm coffeic aid at the 1st time gave the highest bunch weight (684.6 g), followed by a mixture of 6 cm3 jasmonic oil + 60 ppm coffeic acid (603.6 g), then 30 ppm coffeic acid (590.7 g), compared with 442 g of bunch weight per untreated grape vines, while at the 2nd time, spraying mixture of 6 cm^3/L jasmonic oil + 30 ppm coffeic acid resulted in the highest bunch weight (606.2 g), followed by a mixture of 3 cm^3/L jasmonic oil + 30 ppm coffeic acid (597.4 g), then 60 ppm coffeic acid (592.5 g), all treatments were compared with untreated vines in season 2018.

Concerning the effect of jasmonic oil, coffeic acid and their mixture on bunch weight in season 2019, it was observed that all treatments in-

creased bunch weight during the two application times.

Moreover, the 1st time spraying a mixture of 6 cm^3/L jasmonic oil + 30 ppm coffeic acid resulted in the heaviest bunch weight (595.6 g), followed by spraying coffeic acid at 30ppm (585.3 g), then spraying coffeic acid at 60 ppm (571.1 g), while at the 2nd time also spraying the mixture of 6 cm^3/L jasmonic oil + 30 ppm coffeic acid gave the harvest bunch weight (590.1 g), followed by spraying 3 cm^3/L jasmonic oil (586.9 g), then spraying coffeic acid at 60ppm (584.3g), all treatments compared with untreated vines (423.5 g).

Table 2. Effect of Jasmonic Oil, Coffeic acid and their mixture on Bunch weight (g) during 2018 and 2019 seasons

Bunch weight						
	Season 2018			Season 2019		
	D1	D2	Mean(A)	D1	D2	Mean(A)
Control	442.9	442.9	442.9	423.5	423.5	423.5
Jasmonic oil 3cm	574.8	578.4	576.6	542.7	586.9	564.8
Jasmonic oil 6cm	588.4	553.5	570.9	546.3	497.8	522.1
Coffeic 30ppm	590.7	559.5	575.1	585.3	466.4	525.9
Coffeic 60ppm	546.6	592.5	569.6	571.1	584.3	577.7
J 3cm+C 30ppm	562	597.4	579.7	541.4	511.3	526.4
J 3cm+C 60ppm	565	563.1	564.1	550.6	541.3	545.9
J 6cm+C 30ppm	684.6	606.2	645.4	595.6	590.1	592.9
J 6cm+C 60ppm	603.6	560.9	582.3	566.4	581.0	573.7
Mean (B)	573.2	561.6		546.9	531.4	
L.S.D.0.05						
A=	33.9			43.7		
B=	**			**		
AB=	41.3			51.0		

D_1 =At pre-bloom, D_2= At berry size of 6 mm

These obtained results could be attributed to an estimulative effect of coffeic acid in enhancement of biosynthesis of IAA in cells of the grape berries resulted in more cell elongation (Kefeli and Kutacek, 1976).

The obtained results of this study were supported by the finding results of Gehan *et al*. (2011) who found that spraying with Jasmine oil improved percentage of bud burst and good yield with high bunch quality.

3. Bunch length (cm):

Data in Table (3) showed that most of treatments with jasmonic oil (3 m3 or 6 m3/L) or coffeic acid (30 ppm or 60 ppm) and their mixture during the two application times induced significant decrease in bunch length (cm) in season 2018, while in season 2019, resulted in significant increase in bunch length, compared with untreated vines.

Regarding, the effect of treatment on bunch length at the 1st time, it was noticed that all treatments reduced the bunch length, except spraying a mixture of 6 m3/L jasmonic oil + 60 ppm coffeic acid induced an increase in bunch length, while at the 2nd time, spraying a mixture of 3 cm^3/L jasmonic oil + 30 ppm coffeic acid gave the longest bunch length

(29.25 cm), followed by spraying a mixture of 6 cm^3/L jasmonic oil + 60 ppm coffeic acid (28.25 cm), then spraying a mixture of 6 cm^3/L jasmonic oil + 30 ppm coffeic acid (28.13 cm), compared with untreated vines (25.75 cm) in 2018 season.

On the other hand, during season 2019, all the treatments induced an increase in bunch length at the 1st or 2nd time, with the exception of treatment with 3 cm^3/L jasmonic oil. Furthermore, it was clear that at the 1st time, spraying a mixture of 6 cm^3/L jasmonic oil + 60 ppm coffeic acid gave the longest bunch length (30.00 cm), followed by spraying 30 ppm coffeic acid (29.50 cm), then spraying a mixture of 6 cm^3/L jasmonic oil + 30 ppm coffeic acid (27.38 cm), while at the 2nd time, spraying a mixture of 3 cm^3/L jasmonic oil + 30 ppm coffeic acid produced the longest bunch length (32.75 cm), followed by treatment with 6 cm^3/L jasmonic oil (31.00 cm), then spraying a mixture of 6 cm^3/L jasmonic oil + 60 ppm coffeic acid (29.75 cm), all compared with untreated vine (25.50 cm).

These positive effects of spraying the jasmonic oil or coffeic acid and their mixtures could be due to the enhancement effect of coffeic acid in increasing the rate of IAA biosynthesis in grape berries according to studies of Kafeli and Kutacek (1976).

These obtained results are in parallel with the finding by El-Kenawy (2018) who deduced that application of jasmonic acid + girdling induced improving cluster length and weight.

Table 3. Effect of Jasmonic Oil, Coffeic acid and their mixture on Bunch Length (cm) during 2018 and 2019 seasons

Bunch length						
	Season 2018			Season 2019		
	D1	D2	Mean(A)	D1	D2	Mean(A)
Control	25.75	25.75	25.75	25.50	25.50	25.50
Jasmonic oil 3cm	22.50	24.38	23.44	24.25	24.38	24.31
Jasmonic oil 6cm	23.75	22.00	22.88	25.25	31.00	28.13
Coffeic 30ppm	25.25	24.60	24.93	29.50	26.88	28.19
Coffeic 60ppm	23.50	26.05	24.78	27.25	28.50	27.88
J 3cm+C 30ppm	23.63	29.25	26.44	27.38	32.75	30.06
J 3cm+C 60ppm	23.00	25.38	24.19	25.88	25.50	25.69
J 6cm+C 30ppm	24.88	28.13	26.50	25.88	27.50	26.69
J 6cm+C 60ppm	27.00	28.25	27.63	30.00	29.75	29.88
Mean (B)	24.36	25.98		26.76	27.97	
L.S.D.0.05						
A=	1.70			1.9		
B=	**			**		
AB=	2.7			2.1		

D_1 =At pre-bloom, D_2= At berry size of 6 mm

4. Weight of 100 berry:

Data recorded in Table (4) showed that spraying all the concentrations of jasmonic oil or coffeic acid and their mixture at the 1st or 2nd time resulted in significant increase in 100 berry weight of Ruby Seedless grape cv. in 2018 and 2019 seasons.

During the 1st season, 2018, it was found that at the 1st time spraying a mixture of 3 cm^3/L jasmonic oil + 30 ppm coffeic acid gave the highest weight of 100 berry (207.6 g), followed by spraying 60 ppm coffeic acid (206.4 g), then spraying 3 cm^3/L jasmonic oil (203.8 g), while at the 2nd time, spraying 60 ppm coffeic acid induced the heaviest weight of 100 berry (248.6 g), followed by spraying a mixture of 3 cm^3/L jasmonic oil + 30 ppm coffeic acid (235.1 g), then spraying 3 cm^3/L jasmonic oil (219.5 g). On the other side, it was noticed that all treatments were more effective at the 2nd application time than at the 1st time.

Furthermore, the mixture of jasmonic oil plus coffeic acid showed more effects the spraying both of jasmonic oil or coffeic acid alone. On the other hand, it was obviously that all treatment with jasmonic oil or coffeic acid and their mixture showed more effects in the 2nd season than the 1st season, these effects could be due to accumulative effects of spraying both of jasmonic oil or coffeic acid at the last season.

Table 4. Effect of Jasmonic oil, coffeic acid and their mixture on 100 Berries weight(g) during 2018 and 2019 seasons

	Season 2018			Season 2019		
	D1	D2	Mean(A)	D1	D2	Mean(A)
Control	196.3	196.3	196.3	197.1	197.1	197.1
Jasmonic oil 3cm	203.8	219.5	211.7	253.5	222.8	238.2
Jasmonic oil 6cm	198.4	200.7	199.6	200.0	208.3	204.2
Coffeic 30ppm	197.6	199.9	198.8	202.2	215.2	208.7
Coffeic 60ppm	206.4	248.6	227.5	234.5	270.5	252.5
J 3cm+C 30ppm	207.6	235.1	221.3	233.5	264.8	249.2
J 3cm+C 60ppm	200.0	198.5	199.25	208.5	220.8	214.65
J 6cm+C 30ppm	199.5	206.4	202.9	208.4	214.0	211.2
J 6cm+C 60ppm	200.0	205.7	202.9	198.4	217.7	208.0
Mean (B)	201.1	212.3		215.1	225.6	
L.S.D.0.05						
A=	10.1			11.8		
B=	**			**		
AB=	16.3			8.9		

D_1 =At pre-bloom, D_2= At berry size of 6 mm

Thus, it was found that spraying 3 cm^3/L jasmonic oil resulted in the heaviest weight of 100 berry (253.5 g), followed by spraying 60 ppm coffeic acid (234.5 g), then spraying a mixture of 3 cm^3/L jasmonic oil + 30 ppm coffeic acid (233.5 g), all treatments compared with untreated vines (197.1 g).

As well as, all treatments with jasmonic oil or coffeic acid and their mixture induced an increases in weight of 100 berry at the 2nd time, meanwhile, spraying 60 ppm coffeic acid gave the heaviest weight of 100 berry (270.5 g), followed by spraying a mixture of 3 cm^3/L jasmonic oil + 30 ppm coffeic acid (264.8 g), then spraying 3 cm^3/L jasmonic oil (222.8 g), all compared with untreated vine (197.1 g).

These obtained results of this study are confirmed by the finding of El-Kenawy (2018) who found that

spraying Crimson seedless grapevine with jasmonic oil improved berry weight, volume, berry length and width.

2. Effect of spraying jasmonic oil, coffeic acid and their mixture on berry chemical characteristics:

3.2.1. Total soluble solids (TSS%)

Presented data in Table (5) indicated that all treatments with jasmonic oil (3 or 6 cm^3/L) or coffeic acid (30 or 60 ppm) and their mixture induced significant increase in percentage of the total soluble solids (TSS%) in berry juice of Ruby Seedless grape cv. in 2018 and 2019 seasons.

Table 5. Effect of Jasmonic Oil, Coffeic acid and their mixture on Total soluble solids% (T.S.S%) in Juice of Ruby seedless Grapes during 218 and 2019 seasons

Total soluble solids (%)						
	Season 2018			Season 2019		
	D1	D2	Mean(A)	D1	D2	Mean(A)
Control	17.98	17.98	17.98	18.04	18.04	18.04
Jasmonic oil 3cm	18.93	18.80	18.86	19.05	18.10	18.58
Jasmonic oil 6cm	18.10	18.45	18.27	18.25	18.43	18.43
Coffeic 30ppm	18.25	19.63	18.94	18.45	18.88	18.66
Coffeic 60ppm	19.51	18.61	19.06	19.13	18.63	18.88
J 3cm+C 30ppm	18.75	19.08	18.91	18.05	18.15	18.10
J 3cm+C 60ppm	18.65	19.33	18.99	18.20	19.05	18.62
J 6cm+C 30ppm	18.45	18.70	18.58	18.93	18.35	18.64
J 6cm+C 60ppm	18.68	18.98	18.83	18.13	19.10	18.61
Mean (B)	18.58	18.84		18.47	18.53	
L.S.D.0.05						
A=	0.76			0.50		
B=	**			**		
AB=	0.81			0.68		

D_1 =At pre-bloom, D_2= At berry size of 6 mm

Concerning the effect of the treatments at the2018 season at the 1st time, it was found that spraying 60 ppm coffeic acid resulted the highest percentage of TSS (19.51%), followed by spraying 3 cm^3/L jasmonic oil (18.93%) then spraying a mixture of 3 cm^3/L jasmonic oil + 30 ppm coffeic acid (18.75%). As well as, at the 2nd time, all treatments increased the TSS% in berry juice rather than at the 1st time. Whereas, spraying 30 ppm coffeic acid gave the highest value of TSS% (19.63%), followed by spraying a mixture of 3 cm^3/L jasmonic oil + 60 ppm coffeic acid (19.33%), then spraying a mixture of 3 cm^3/L jasmonic oil + 30 ppm coffeic acid (19.08%), all treatments compared with untreated vines (17.98%), during 2018 season.

As well as, all treatments exhibited an increase in TSS% in berry juice at the 1st or 2nd time during 2019 season. Moreover, it was observed these that spraying 60 ppm coffeic acid gave the highest value of TSS% (19.13%), followed by spraying 3 cm^3/L jasmonic oil (19.05%), then spraying a mixture of 6 cm^3/L + 30 ppm coffeic acid (18.93%).

Moreover, it was found that spraying a mixture of 6 cm^3/L jasmonic oil + 60 ppm coffeic acid resulted in the highest percentage of TSS in berry juice (19.10%), followed by spraying a mixture of 3 cm^3/L of jasmonic oil + 60 ppm cof-

feic acid (19.05%) then spraying 30 ppm of coffeic acid (18.88%), all treatments compared with untreated vines at the 2nd time in season 2019.

These positive effects of spraying all the concentrations of jasmonic oil or coffeic acid and their mixture on increasing the TSS% in berry juice of Ruby Seedless grape cv. could be attributed with inducing the berries more ripening than untreated berries.

These obtained results are agreement with these reported by El-Kenawy (2018) and Faissal and Asmaa (2019) who reported that application of Jasmonic oil + girdling were effective for improving soluble solids content.

3.2.2. Titratable acidity (TA%):

Data presented in Table (6) revealed the effect of spraying jasmonic oil (3 or 6 cm^3/L) or coffeic acid (30 or 60 ppm) and their mixture at the 1st or 2nd time on the percentage of titratable acidity (TA%) in berry juice of Ruby Seedless grape cv in 2018 and 2019 seasons.

It was noticed that all treatments increased the percentage of titratable acidity (TA%) at the 1st or 2nd time, at the 1st in 2018 season, meanwhile, spraying a mixture of 6 cm^3/L jasmonic oil + 60 ppm coffeic acid produced the highest percentage of TA in berry juice (0.745%), followed by a mixture of 3 cm^3/L jasmonic oil + 60 ppm coffeic acid (0.683%), then spraying 3 cm^3/L jasmonic oil (0.555%), on the other side, all treatments at the 2nd time were more effective than the 1st time. During the 2nd time, it was found that spraying 6 cm^3/L jasmonic oil gave the highest value of TA% (0.815%), followed by spraying 30 ppm coffeic acid (0.800%), then spraying a mixture of 3 cm^3/L jasmonic oil + 30 ppm coffeic acid (0.720%), all to compared with untreated vines.

Table 6. Effect of Jasmonic Oil, Coffeic acid and their mixture on Titratable acidity% (T.A%) in Juice of Ruby seedless Grapes during 2018 and 2019 seasons

Titratable acidity (%)						
	Season 2018			Season 2019		
	D1	D2	Mean(A)	D1	D2	Mean(A)
Control	0.368	0.368	0.368	0.378	0.378	0.378
Jasmonic oil 3cm	0.555	0.628	0.591	0.440	0.628	0.534
Jasmonic oil 6cm	0.465	0.815	0.640	0.550	0.670	0.610
Coffeic 30ppm	0.403	0.800	0.601	0.615	0.653	0.634
Coffeic 60ppm	0.378	0.593	0.485	0.633	0.560	0.596
J 3cm+C 30ppm	0.483	0.720	0.601	0.608	0.513	0.560
J 3cm+C 60ppm	0.683	0.683	0.683	0.565	0.515	0.540
J 6cm+C 30ppm	0.435	0.568	0.501	0.570	0.485	0.528
J 6cm+C 60ppm	0.745	0.610	0.678	0.475	0.475	0.475
Mean (B)	0.501	0.643		0.537	0.542	
L.S.D.0.05						
A=	0.06			0.05		
B=	**			**		
AB=	0.06			0.07		

D_1 =At pre-bloom, D_2= At berry size of 6 mm

During the 2nd season (2019), it was observed that also all treatments resulted in an increase in the TA% in berry juice of Ruby Seedless grape cv., meanwhile, spraying 60 ppm coffeic acid induced the highest value of TA% (0.633%), followed by spraying 30 ppm coffeic acid (0.615%), then

spraying a mixture of 3 cm^3/L jasmonic oil + 30 ppm coffeic acid (0.608%). Furthermore, it was noticed that carrying out the treatments at the 2nd time were more effective on increasing the TA% that a the 1st time, meanwhile, spraying 6 cm^3/L jasmonic oil resulted in the highest percentage of TA% (0.670%), followed by spraying 30 ppm coffeic acid (0.653%), then spraying 3 cm^3/L jasmonic oil (0.628%), all treatments compared with untreated vines (0.378%).

These obtained results of this study could due to increasing the TSS% in berry juice rather than decreasing the TA% in berry juice compared with untreated vines during the two studied seasons.

These obtained results are disagreement with those finding deduced by in discordance deduced by El-Kenawy (2018) who found that Jasmonic oil decreased total acidity in fruit of Crimson seedless grapevine cultivar

3.2.3. Total soluble solids/ Titratable acidity Rate (TSS/TA Ratio)

Data recorded in Table (7) indicated that all treatments with jasmonic oil (3 or 6 cm^3/L), coffeic acid (30 or 60 ppm) and their mixture applied at the 1st or 2nd time resulted in significant decrease in the ratio between the TSS% and TA% in berry juice of Ruby Seedless grape cv. during 2018 and 2019 seasons.

Regarding the effect of spraying the jasmonic oil, coffeic acid or their mixture on TSS/TA ratio in berry juice at the 1st time in 2018 season, it was found that spraying a mixture of 6 cm^3/L jasmonic oil + 60 ppm coffeic acid induced the lowest value of TSS/TA ratio (23.91) followed by a mixture of 3cm^3/L jasmonic oil + 60 ppm coffeic acid (24.52), then a mixture of 3 cm^3/L jasmonic oil + 30 ppm coffeic acid (39.11), on the other side, at the 2nd, it was clear that spraying 6 cm^3/L jasmonic oil induced the lowest value of TSS/TA ratio (21.49), followed by spraying 30 ppm coffeic acid (24.75), then spraying a mixture of 3 cm^3/L jasmonic oil + 30 ppm coffeic acid (26.49), all compared with untreated vines (49.31) during 2018 season. Concerning the effect of treatments at the 2nd studied season, 2019, it was found that at the 1st time, spraying a mixture of 3 cm^3/L jasmonic oil + 30 ppm coffeic acid exhibited the lowest value of TSS/TA ratio (29.88), followed by spraying 60 ppm coffeic acid (30.26), then spraying a mixture of 3 cm^3/L jasmonic oil + 60 ppm coffeic acid (30.75). Moreover, at the 2nd time, it was noticed that spraying 6 cm^3/L jasmonic oil resulted in the lowest value of TSS/TA ratio (26.13), followed by spraying 3 cm^3/L jasmonic oil (28.98), then spraying 30 ppm coffeic acid (29.07), all compared with untreated vines (47.72) in 2019 seasons.

These obtained results of this study are unacordance with these found by Faissal *et al*. (2018) who Found that spraying natural extracts were very effective in enhancing TSS/TA ratio.

Table 7. Effect of Jasmonic Oil, Coffeic acid and their mixture on (T.S.S/T.A) ratio in Juice of Ruby seedless Grapes during 2018 and 2019 seasons

TSS/TA ratio						
	Season 2018			Season 2019		
	D1	D2	Mean(A)	D1	D2	Mean(A)
Control	49.31	49.31	49.31	47.72	47.72	47.72
Jasmonic oil 3cm	34.11	30.13	32.12	43.35	28.98	36.17
Jasmonic oil 6cm	39.19	21.49	30.34	33.29	26.13	29.71
Coffeic 30ppm	45.43	24.75	35.09	30.60	29.07	29.83
Coffeic 60ppm	51.82	31.69	41.75	30.26	33.58	31.92
J 3cm+C 30ppm	39.11	26.49	32.80	29.88	35.48	32.68
J 3cm+C 60ppm	24.52	28.60	26.56	30.75	37.04	33.90
J 6cm+C 30ppm	42.60	33.19	37.89	33.39	37.84	35.61
J 6cm+C 60ppm	23.91	31.20	27.55	38.33	40.26	39.30
Mean (B)	38.89	30.76		35.28	35.12	
L.S.D.0.05						
A=	4.49			3.14		
B=	**			**		
AB=	3.84			3.22		

D_1 =At pre-bloom, D_2= At berry size of 6 mm

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تأثير حمض الكافييك وزيت الياسمين وخليط منهما علي المحصول وجودة ثمار العنب الروبي سيدلس

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الملخص

أجريت الدراسة خلال موسمي (٢٠١٨ ، ٢٠١٩) لدراسة تأثير رش كل من زيت الياسمين وحمض الكافييك وخليط منهما علي كرمات العنب صنف الروبى سيدلس المنزرع في مزرعة العنب الخاصة بقسم الفاكهة – كلية الزراعة – جامعة أسيوط ولقد تم رش ٣ سم٣/لتر و٦ سم٣/لتر من زيت الياسمين، ٣٠ جزء في المليون أو ٦٠ جزء في المليون من حمض الكافييك وخليط منهما في الميعاد الأول قبل التزهير والميعاد الثانى عند وصول حجم ثمرة العنب إلى ٦ مم لغرض دراسة تأثير هذه المعاملات علي المحصول وجودة الثمار وتم تقليم كرمات العنب المرباة بنظام الكوردون الثنائي الزراعى مع ترك ٣٦عين/كرمة بمعدل ١٨ دابرة ثمرية طول كل منها عينان فقط وتم تصميم التجربة بنظام القطع المنشقة كاملة العشوائية في نظام القطاعات كاملة العشوائية مع تكرار كل معاملة ٤ مرات وتخصيص شجيرة واحدة لكل مكررة. وقد وجد انه من النتائج المتحصل عليها من هذه الدراسة أن جميع معاملات الرش بزيت الياسمين او حمض الكافييك أو خليط منهما احدثت زيادة معنوية في المحصول والصفات الطبيعية والكيميائية للثمار مقارنة بالأشجار غير المعاملة وقد وجد ان المخلوط من زيت الياسمين وحمض الكافييك أكثر تأثيرا على الصفات المدروسة في ميعادى الرش عن كلا منهما منفردا وعليه فإنه نوصي برش خليط من زيت الياسمين وحمض الكافييك في الميعاد الثانى لتحسين المحصول وصفات الجودة لثمار العنب الروبى سيدلس تحت ظروف الدراسة.

تعتبر هذه الدراسة الأولي لبحث تأثير حمض الكافييك أو مخلوط منه مع زيت الياسمين علي المحصول وجودة ثمار العنب ومن ثم هناك حاجة إلي مزيد من الدراسات لتأكيد نتائج هذه الدراسة.