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Effect of Garlic and Camphor Oils on Bud Fertility and Yield Components of Flame Seedless Grape Cultivar

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Abstract:

This study was conducted through three successive seasons 2010/2011, 2011/2012 and 2012/2013 on Flame Seedless grape 12 years old. The grapevines were grown at the vineyard of Plant Pathology Department, Faculty of Agriculture, Assiut University. The study was performed to examine the effects of spraying garlic and camphor oils at 1.0% and 1.5% each on bud fertility, yield (kg/vine) and berry quality. The grapevine were trained as bilateral cordon leaving 48 buds/vine. These natural oils were sprayed twice at full bloom and at the beginning of the veraison stage (when 20% of berries of 50% bunch/vine were softened). The experiment was carried out as split-plot arrangement at one level of randomized complete block design with three replicates, one grapevine each.

All treatments of garlic and camphor oils induced significant improvement in bud fertility, yield (kg/vine), and berry weight (g). The inferior taste of garlic oil, we recommend to use camphor oil at 1.0% to improve bud fertility, yield and berry quality of Flame Seedless grape cv.

Keywords: Grapevine, garlic oil, camphor oil, Flame Seedless, bud fertility, yield/berry quality.

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Introduction:

Grapevine is considered the first major fruit crop allover the world. In Egypt, grapes rank the second fruit crop among fruit crops, while the citrus crops bring the first. Flame seedless cultivar is an early-ripening cv.

Recently, more efforts were done to eliminate using of synthetic substances throughout agricultural practices, using natural plant extracts were the new alternatives for improving yield and fruit quality of fruit crops.

Garlic and its preparations have been widely recognized as agents for prevention and treatment of cardiovascular and other metabolic diseases, atherosclerosis, hyperlipidemia, thrombosis, hypertension and diabetes. Effectiveness of garlic in cardiovascular diseases was more encouraging in experimental studies, which prompted several clinical trials. This review has attempted to make a bridge of the gap between experimental and clinical study and to discuss the possible mechanisms of such therapeutic actions of garlic (Sanjay and Maulik, 2002).

Marodin and Roman (1997) sprayed "Shiro" plum trees at dormant bud stage, immediately after pruning using 3 or 4% garlic extract. They observed that both concentrations of garlic extract did not reduce the yields and were similar to those of the yield untreated plants.

The effect of garlic and onion extracts on bud break and flowering of "Daebong" grapes was studied by Kim and Kim, 1999. They observed that all treatments hastened bud break and very effective in hastening flowering than untreated grapevines (control). No significant differences in heaviest dates among the treatments.

Kim and Kim (2000) mentioned that treating Campbell Early grapevine buds with garlic juice, its ethanol and ethyl ether extracts, onion juice and its ethanol and ethyl ether extracts was effective in increasing percentage of bud break.

Kubota *et al*. (2000) examined the effects of garlic paste, garlic oil and disulfide on "Thompson Seedless" grapevines. They found that the mean number of clusters that developed on the shoots was unaffected by treatments.

Shaddad (2010) recorded that application of garlic extract (15%) and onion at 5% significantly enhanced percentage of bud burst and fruiting bud percentage of "Superior" grapevines.

Abd El-Rzek *et al*. (2011) studied the effect of spraying garlic oil on Canino apricot trees, sprayed once (mid January) after winter pruning at dormant bud stage with materials: (1) 4% garlic extract (2) 4% garlic extract + 1% olive oil (3) 4% garlic extract + 2% olive oil (4) 1% olive oil (5) 2% olive oil (6) 2 % hydrogen cyanamide (as synthetic chemical product) (7) control (spraying with water only).Garlic extract and olive oil treatments achieved earlier full bloom than the control. All treatments had higher flowering percentage and produced higher yield than the control. Olive oil at 2% achieved the highest yield compared with all other treatments. Fruit weight, volume and dimensions were increased by all treatments than the control. The highest fruit flush weight was obtained by 2% olive oil. Fruit TSS % was in-

creased, while acidity as well as firmness was decreased by all treatments compared with control. Spraying olive oil at 2% is recommended to improve productivity and fruit quality of Canino apricot trees.

Kamra *et al*. (2012) reported that the strong smelling juice of garlic bulb cotains volatile oils composed of sulpher containing compounds, allicin, diallyl disulfide and diallyl trisulfide, which are responsible for anti-microbial activity.

Mostafa and El-Yazal (2013) reported that a 2. seasons orchard trail was carried out to verify the effects of garlic extract (GE) at 0, 50, 100, 150 and 200 ml L^{-1} on bud break dormancy and metabolic alterations in buds of "Anna" apple trees, water content, total carbohydrates, reducing and total sugars. The obtained results showed that, GE treatments enhanced date of floral bud break and increased percentage of bud break, fruit set, total number of fruits and fruit yield per tree. The best results were obtained from treatments of 150 ml L^{-1}.

Ahmed *et al*. (2014) reported that during 2012 and 2013 seasons, Keitte mango trees subjected to foliar application of onion and garlic oils each at 0.1% and/or salicylic acid at 100 ppm. The study focused on the impact of plant extract and salicylic acid treatments on growth, percentages of healthy and malformed inflorescences, length and six ratio of these inflorescences, fruit setting %, yield and fruit quality. Single and combined applications of onion and garlic oils each at 0.1% and/or salicylic acid at 100 ppm was very effective in stimulating growth, healthy inflorescences %, fruit setting %, yield and fruit quality relatively to the control treatment. Using all plant extracts was favourable than using salicylic acid in this respect. Application of onion oil and garlic oil in ascending order had an announced effect on fruiting of the trees. Using each plant extract plus salicylic acid was superior than using each alone in this respect.

Coating grape berries (*Vitis labruscana* B.) with emulsions of lemongrass oil did not significantly alter the berry flavor. The coatings wee also effective on reducing berry weight losses, firmness, phenolic compounds, antioxidant activity and delaying increases in total anthocyanin in berries (Kim *et al*., 2014).

Mohamed *et al*. (2014) pointed out that exogenous onion extract has been, positively alters enzyme activity, hormone, amino acids and phenol contents, and improves fruit quality in "Anna" apple trees. Furthermore, yield with high quality increased by regulating the metabolism of amino acids including proline and indoles, the activities of catalase and hydrogen peroxide in apple floral buds.

Therefore, the objectives of this research are to investigate the effects of spraying garlic and comphore oils on bud fertility and yield components of Flame Seedless grape cultivar grown under Assiut climatic conditions.

Materials and Methods:

This study was carried out during three successive seasons 2011, 2012 and 2013 on 12-years old grapevines of Flame Seedless cv. grown in loamy clay soils in a vineyard at the Orchard of Faculty of Agriculture, Assiut University.

The selected vines were of normal growth uniform in vigour and trained according to the bilateral cordon. The vines were pruned leaving 48 bud/vine. The selected vines were sprayed with 1.0% and 1.5% of garlic and camphor oils at full bloom and the beginning veraison stage of grape berries.

Field observation and laboratory measurements were achieved during the investigation periods as follows:

1. Bud fertility:

To determine anatomical bud fertility, 4 grape canes, 9 nodes each were taken from each treatment during the 3rd season from the winter pruning wood. Bud fertility was examined microscopically as pointed out by El-Mogy *et al*. (1982). Samples from each treatment of the 1st three nodes was considered as basic position (a_1, b_1 and c_1), the following three nodes was the middle position (a_2, b_2 and c_2) and then the three later nodes were the terminal position (a_3, b_3 and c_3) as shown in Fig. (1).

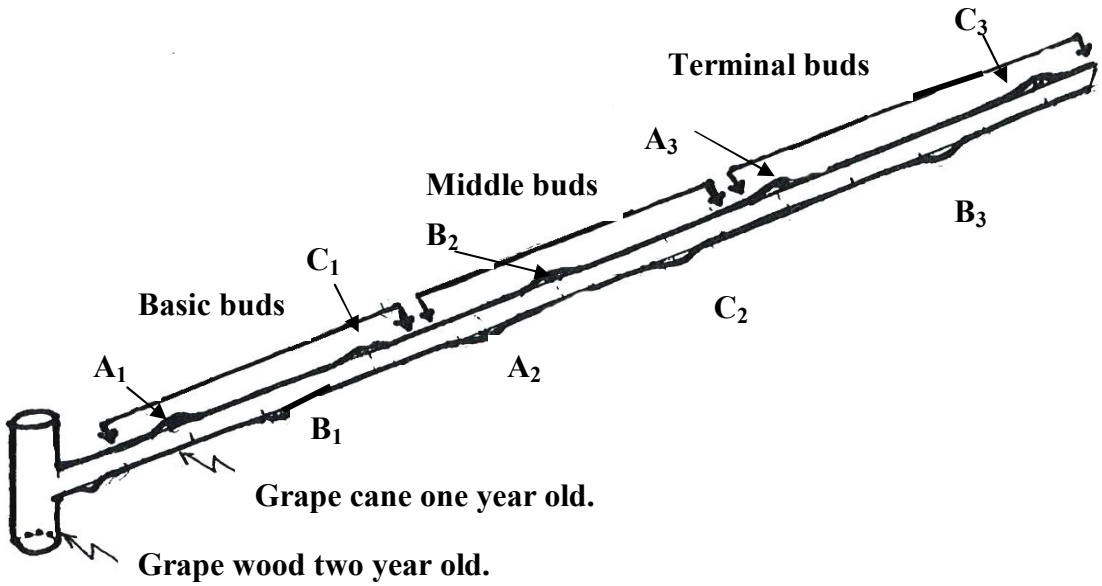


Fig. (1): Diagram showed grape buds position on a grape cane (shoot one year old) of pruning winter woods. A: the 1st bud, B: the 2nd bud, C: the 3rd bud of the basic position, as well as of the middle and terminal positions.

2. Yield components:

2.1. Yield weight (kg/vine).

2.2. Bunch weight (g).

3. Grape berry weight (g) as average of 50 berry weight.

4. Grape berry volume (cm^3), as average of 50 berry volume.

Statistical analysis:

The experiments were conducted in a split-plot arrangement of completely randomized block design (CRB) with three replicates, one grapevine each. Application times were assigned to two whole plots, and spraying both of garlic oil and camphor oil at 1.0% and 1.5% were considered as splits. The obtained date were statistically analyzed according to Gomez and Gomez (1984). Mean of the treatments were compared using the new L.S.D. test at level of 0.05.

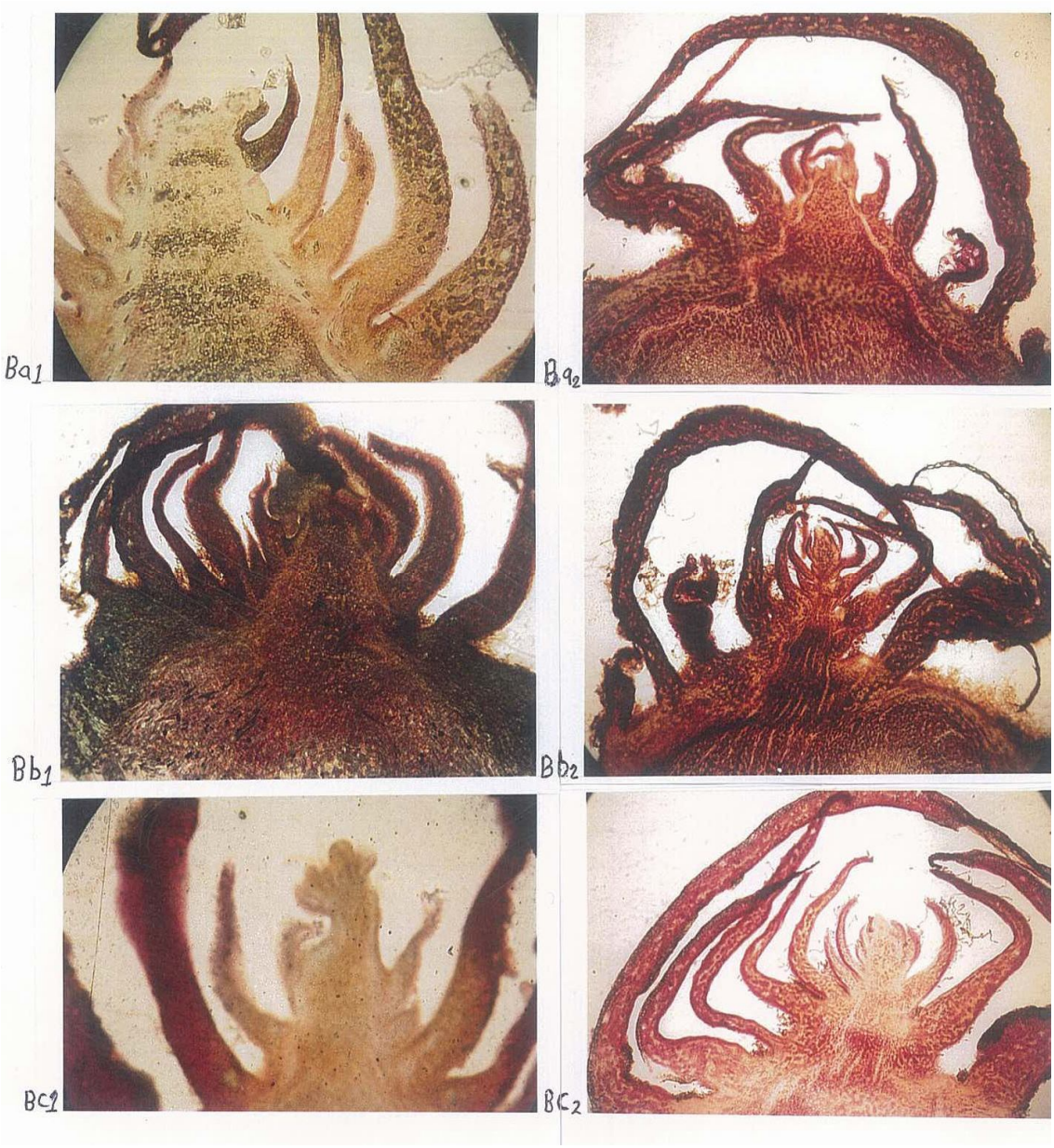
Results and Discussion:

Effect of garlic oil and camphor oil on grape bud fertility:

The anatomical part of this investigation showed vegetative and generative buds occurring on different position of grape cane of Flame Seedless grape cultivar in response to spraying garlic oil at 1.0% and 1.5% during 2012/2013 season.

As shown in Figure (2), plates (Ba_1-Bc_2) indicated that floral grape buds are affected with spraying both of garlic oil (1.0% and 1.5%) and camphor oil (1.0% and 1.5%) during 2012/2013 season. It is well known that generative grape buds were changed from vegetative buds to floral buds throughout two phases: the 1st phase is tissue premordia (tissue anlage or protrusion tissues) at the 2nd stage of grape berry growth (log period of berry growth during the growth season). This phase is floral bud imitation. Moreover, this phase is reversible phase to vegetative grape bud particularly, under grapevine stress. The 2nd phase is developed during growth season until bud deep dormancy. During this phase the inflorescence order are formed. The 3rd phase of floral grape buds is forming the flowers on the grape inflorescence during the 3 weeks after bud burst at the beginning of the next growth season.

According to plates in Fig. (3) it could be observed that the 1st basic bud on the grape cane is vegetative bud and the 2nd basic bud on the grape cane is tendral bud, while the 3rd basic bud on the grape cane is floral bud (or generative bud, plate ba_1, Bb_1 and Bc_1 of untreated grapevines). In response to spraying garlic oil at 1.0% it was found that the 1st basic buds on the grape cane is vegetative bud (Ba_2), while the 2nd and the 3rd basic buds on grape cane are floral buds (Bb_2 and Bc_2).



Untreated grapevines **Treated grapevines (garlic 1.0%)**

Fig. (2): Changes in basic grape buds (winter and summer buds) taken from untreated and treated grape canes with garlic 1.0% in 2011/2012 season.

Ba_1= The 1st basic grape bud. Vegetative bud.
Bb_1= The 2nd basic grape bud. Floral bud.
Bc_1= The 3rd basic grape bud. More advanced floral bud.
Ba_2= The 1st basic grape bud. Floral bud of treated cane.
Bb_2= The 2nd basic grape bud. Vegetative bud treated cane.
Bc_2= The 3rd basic grape bud. Floral bud treated cane.

Untreated grapevines **Treated grapevines (garlic 1.5%)**

Fig. (3): Changes in basic grape buds (winter and summer buds) taken from treated grape canes with garlic 1.5% in 2012/2013 season.

Ba_2= The 1st basic grape bud. Vegetative bud.

Bb_2= The 2nd basic grape bud. Floral bud.

Bc_2= The 3rd basic grape bud. Floral bud.

As well as, concerning to effect of spraying garlic oil at 1.5%, it was demonstrated that the 1st basic bud on grape cane is vegetative bud, Fig. 4 (Plate Ba2), while both of the 2nd and the 3rd bud on the grape cane are floral buds, Fig. (4), (Plates Bb_2 and Bc_2).

Regarding to effect of spraying garlic oil 1.0% on grapevines, it could observed that the 1st middle bud on grape cane is tenderal bud (Plate Ma_2), and the 2nd middle bud on grape cane is vegetative bud (Plate Mb_2), in addition to that the secondary bud is floral bud in the 2nd middle bud (Plate Mb_2). On the other hand the 3rd middle bud on grape cane (Plate Mc_2) is floral bud. Furthermore, it was found that all the three middle buds on grape cane of untreated control grapevines were floral bud, but spraying garlic oil at 1.0% induced more development of floral buds rather than untreated grape buds (Fig. 4, plate Ma_1-Mc_2).

Concerning the effect of spraying garlic oil at 1.5% on grapevines, it was pointed out the garlic oil at 1.5% induced an inhibition of floral bud differentiation. Fig. (5, Ma_2-Mc_2).

As pointed out in Fig. (5) and (6), plates showed the grape bud differentiation on the terminal buds of untreated and treated grapevines with garlic oil at 1.0% and 1.5% during 2012/2013 season.

As shown in Fig. (5), Plates Ta_1-Tc_1), it could be reported that the 1st terminal bud on untreated grapevines is floral bud while both the 2nd and the 3rd terminal buds are tenderal buds. On the other hand, the 1st and the 2nd terminal buds on treated grapevines with garlic oil at 1.0% are floral buds (Ta_2 and Tb_2), while the 3rd terminal bud is tenderal bud as affected with 1.0% garlic oil, thus means that spraying garlic oil at 1.0% enhanced bud fertility of grapevines in comparison with untreated control grapevines.

Concerning to effect of spraying garlic oil at 1.5% on grapevines, it was illustrated that garlic oil at higher concentration (1.5%) induced more advanced of floral bud at the 1st terminal bud on grape cane, while induced as inhibition of floral bud in the 2nd and the 3rd terminal buds of treated grapevines (Fig. 7, plates Ta_2-Tc_2).

These obtained results are in agreement with those found by Shaddad (2010) recorded that application of garlic extract (15%) and onion at (5%) significantly enhanced percentage of fruiting bud on "Superior" grapevines rather than untreated grapevines.

Abd El-Rzek *et al*. (2011) studied the effect of spraying garlic canino apricot trees were sprayed once (mid January) after winter pruning at dormant bud stage with materials: (1) 4% garlic extract, (2) 4% garlic extract + 1% olive oil, (3) 4% garlic extract + 2% olive oil, (4) 1% olive oil, (5) 2% olive oil, (6) 2% hydrogen cyanamide, (7) control. They found that all treatments had higher flowering percentage than the control.

Untreated grapevines **Treated grapevines (garlic 1.0%)**

Fig. (4): Changes in middle grape buds (winter and summer buds) taken from untreated and treated grape canes with garlic 1.0% in 2011/2012 season.

Ma_1= The 1st middle grape bud. Vegetative bud.
Mb_1= The 2nd middle grape bud. Floral bud.
Mc_1= The 3rd middle grape bud. More advanced floral bud.
Ma_2= The 1st middle grape bud. Floral bud of treated cane.
Mb_2= The 2nd middle grape bud. Vegetative bud treated cane.
Mc_2= The 3rd middle grape bud. Floral bud treated cane.

Untreated grapevines **Treated grapevines (garlic 1.5%)**

Fig. (5): Changes in middle grape buds (winter and summer buds) taken from treated grape canes with garlic 1.5% in 2012/2013 season.

Ma_2= The 1st middle grape bud. Vegetative bud.

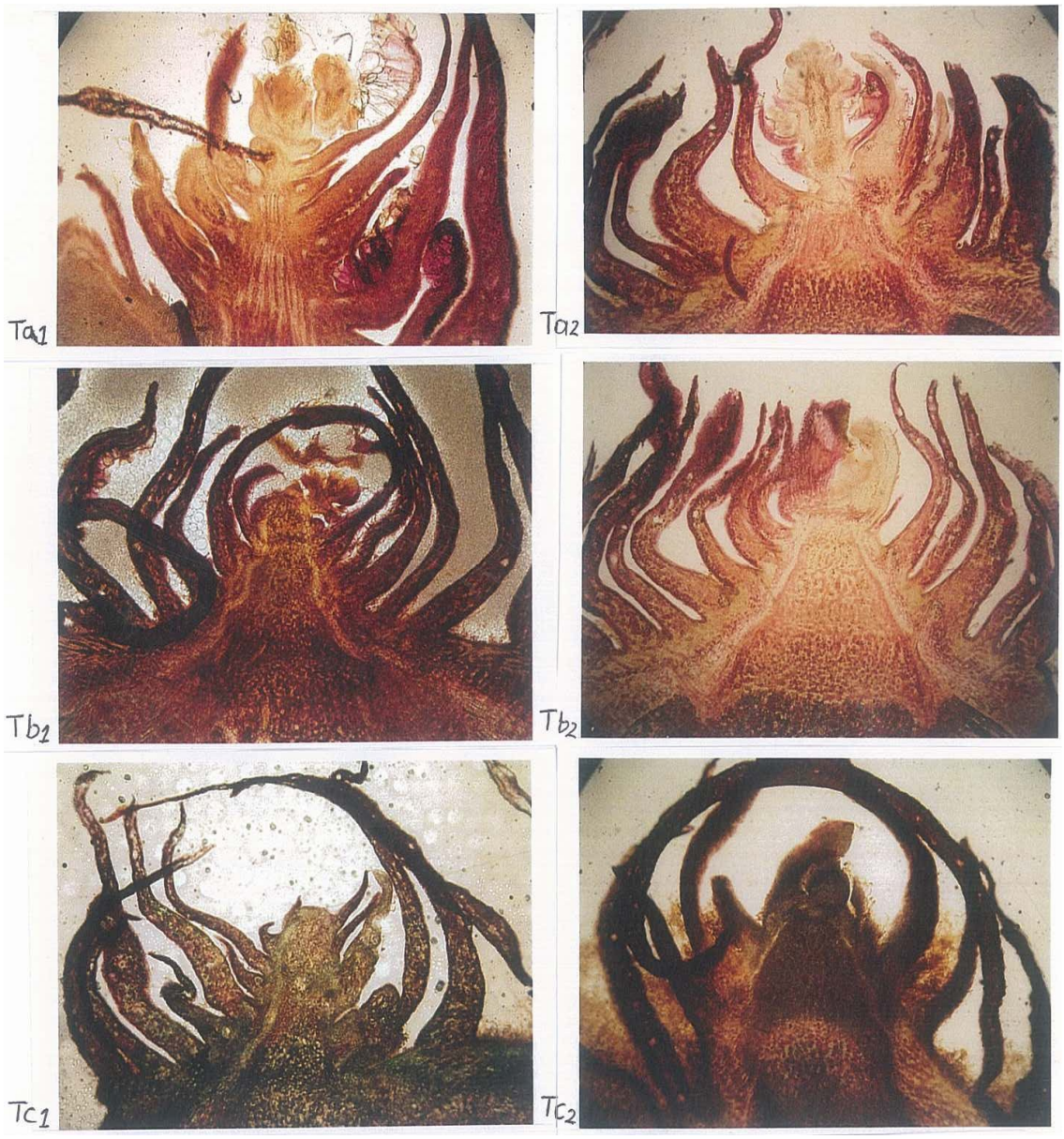
Mb_2= The 2nd middle grape bud. Floral bud.

Mc_2= The 3rd middle grape bud. Floral bud.

Untreated grapevines **Treated grapevines (garlic 1.0%)**

Fig. (6): Changes in terminal grape buds (winter and summer buds) taken from un-treated and treated grape canes with garlic 1.0% in 2011/2012 season.

Ta_1= The 1st terminal grape bud. Vegetative bud.
Tb_1= The 2nd terminal grape bud. Floral bud.
Tc_1= The 3rd terminal grape bud. More advanced floral bud.
Ta_2= The 1st terminal grape bud. Floral bud of treated cane.
Tb_2= The 2nd terminal grape bud. Vegetative bud treated cane.
Tc_2= The 3rd terminal grape bud. Floral bud treated cane.



Untreated grapevines **Treated grapevines (garlic 1.5%)**

Fig. (7): Changes in terminal grape buds (winter and summer buds) taken from treated grape canes with garlic 1.5% in 2012/2013 season.

Ta_2= The 1st terminal grape bud. Vegetative bud.

Tb_2= The 2nd terminal grape bud. Floral bud.

Tc_2= The 3rd terminal grape bud. Floral bud.

Mohamed *et al*. (2014) they studied effect exogenous onion extract on "Anna" apple trees. The obtained results showed that increased in floral buds.

As well as, Nicolas *et al*. (2014) demonstrated that grapevine yield formation extends over two consecutive years (seasons 1 and 2). The inflorescence formation (around flowering in season 1) is crucial as it is involved in the formation of both the bunch number per vine and the berry number per bunch in season 2. Their results showed that the maximum yield that can be reached in season 2 is determined during the critical period of season 1 and they provide clues to estimate it. These results may help grape growers to adapt their practices (i) in season 1 to ensure a sufficient maximum yield for season 2 and (ii) to actually obtain the targeted yield in season 2 depending on the maximum yield determined in season 1.

The obtained results were disagreement with these found by Kubota *et al*. (2000) examined the effects of garlic paste, garlic oil and disulfide on "Thompson Seedless" grapevines. They found that the mean number of cluster that developed on the shoots was unaffected by treatments.

Effect of garlic and camphor oils on yield weight/vine

Data pointed out on Table (1) showed yield weight (kg)/vine of Flame Seedless grape cv. in response to spraying garlic oil (1.0% and 1.5%) and camphor oil (1.0% and 1.5%) in the three studied seasons 2011, 2012 and 2013). The obtained results indicated that both of garlic and camphor oil significantly increased yield weight (kg)/vine during the three seasons.

Concerning the effect of application time of the used natural oils, it was found that garlic oil concentration at 1.0% was more effective at the 1st application time than other treatments with garlic oil 1.5% or both concentrations of camphor oil (1.0% or 1.5%) at the 1st time, whereas this treatment gave the heaviest yield weight (14.38 kg/vine), followed by camphor oil concentrations at 1.0% or 1.5% (13.33 and 13.33 kg/vine), then garlic oil at 1.5% gave 11.83 kg/vine. In contrast to that at the 2nd application time of garlic or camphor oils, it was observed that spraying camphor oil at 1.0% gave the best results in producing the heaviest yield weight/vine (14.67 kg/vine), followed by the treatment with camphor oil at 1.5% (12.83 kg/vine), then spraying garlic oil at 1.5% (12.15 kg/vine), thereafter spraying garlic oil at 1.5% gave 11.33 kg/vine.

Regarding to studied seasons, it was demonstrated that spraying garlic oil at 1.0% produced the heaviest yield weight (kg)/vine at the 1st application time during the three studied seasons, while spraying camphor oil at 1.0% gave the heaviest yield weight (kg/vine) at the 2nd application time, followed with spraying garlic oil at 1.0% during the three studied seasons.

These obtained results could be attributed to the enhancement effects of spraying both garlic oil and camphor oil in reducing the respiration rate as affected with the thin film produced of spraying the used natural oils on whole grapevine, therefore, more reserved of food and biosynthesis compound used in improving yield weight/vine. Moreover, it was noticed that all the treatments with garlic oil and camphor oil resulted in heavy yield weight (kg/vine) during

the three studied seasons in comparison to untreated control grapevines.

These obtained results are in agreement with those found by Abd El-Rzek *et al*. (2011) studied the effect of spraying garlic canino apricot stage with materials: (1) 4% garlic extract, (2) 4% garlic extract + 1% olive oil, (3) 4% garlic extract + 2% olive oil, (4) 1% olive oil, (5) 2% olive oil, (6) 2% hydrogen cyanamide, (7) control. Results showed that, all treatments produced higher yield than the control. Olive oil at 2% achieved the highest yield compared with all other treatments.

Mostafa and El-Yazal (2013) studied the effects of garlic extract (GE) at 0, 50, 100, 150 and 200 ml L^{-1} on bud break dormancy and metabolic alterations in buds of "Anna" apple trees. The obtained results showed that, GE treatments enhanced fruit yield per tree.

Ahmed *et al*. (2014) they studied effect of some plant extracts namely oils of onion and garlic and extracts of green tea and turmeric each at 0.1% and 10 V salicylic acid at 100 ppm on Keitte mango trees. They found that, the treatments were very effective in yield relatively to the control treatment.

As well as, Mohamed *et al*. (2014) studied effect of exogenous onion extract on "Anna" apple trees. They found that, yield increased with high quality as affected with treatments.

Effect of garlic and camphor oils on bunch weight:

Data presented in Table (1) indicated that all treatments with garlic oil (1.0% and 1.5%) and camphor oil (1.0% and 1.5%) sprayed at the 1st and 2nd application times showed the same trend of garlic or camphor oil effects on yield weight (kg)/vine during the three studied seasons (2011, 2012 and 2013).

Regarding to the effects of spraying time of the used natural oils, it was observed that spraying camphor oil at 1.5% and garlic oil at 1.0% gave the heaviest bunch weight (g) at the 1st application time (366.7 and 363.3 g, respectively), followed by treatment with garlic oil at 1.5% (349.09 g), then treatment with camphor oil at 1.0% during the 1st studied season (2011). The treatments with all concentrations of garlic oil and camphor oil sprayed at the 1st time gave the same trend during the two other studied seasons (2012 and 2013). On the other hand, spraying camphor oil at 1.0% produced the heaviest bunch weight (401.7 g) at the 2nd application time, followed by spraying camphor oil at 1.5% (342.0 g), thereafter spraying garlic oil at 1.5% (325.0 g), then spraying garlic oil at 1.0% (310.0 g), in comparison with the untreated control vine (288.3 g) in the 1st studied season (2011).

During the 2nd application time in both the two other studied seasons, it was found that also spraying camphor oil at 1.0% gave the best results in bunch weight (403.3 g and 408.3 g) in season 2012 and 2013, respectively. All data were compared with untreated control vines.

Table (1): Effect of garlic and camphor oil concentrations (at 1.0% and 1.5% each) on yield weight (kg/ vine) and bunch weight/(g) of Flame Seedless grape cultivar during 2011, 2012 and 2013 seasons.

Character	Yield weight (kg/ vine)								
Treatments (A) / (B)	2011			2012			2013		
	First time	Second time	Mean (B)	First time	Second time	Mean (B)	First time	Second time	Mean (B)
Control	10.30	10.30	10.30	9.33	9.33	9.33	9.50	9.50	9.50
T1(Garlic 1%)	14.33	11.33	12.83	15.50	14.17	14.84	15.83	14.17	15.00
T2(Garlic 1.5%)	11.83	12.50	12.17	14.00	14.00	14.00	13.67	13.83	13.75
T3(Camphor1%)	13.33	14.67	14.00	14.67	15.00	14.83	14.67	14.83	14.75
T4(Camphor1.5%)	13.33	12.83	13.08	14.33	14.00	14.17	14.33	14.00	14.17
Mean (A)	12.63	12.33		13.57	13.30		13.60	13.27	
F-test A(Time)=			N.S		N.S		N.S		
L.S.D 0.05 B(TRE.)=			0.79		1.17		0.90		
L.S.D 0.05 AB(T x TRE.)=			1.12		1.65		1.27		

Character	Bunch weight/(g)								
Treatments (A) / (B)	2011			2012			2013		
	First time	Second time	Mean	First time	Second time	Mean	First time	Second time	Mean
Control	288.3	288.3	288.3	256.3	256.3	256.3	268.3	268.3	268.3
T1(Garlic 1%)	363.3	310.0	336.7	423.3	384.0	403.7	420.0	380.0	400.0
T2(Garlic 1.5%)	349.0	325.0	337.0	390.0	394.7	392.3	387.7	396.3	392.0
T3(Camphor1%)	343.3	401.7	372.5	386.3	403.3	394.8	386.7	408.3	397.5
T4(Camphor1.5%)	366.7	342.3	354.5	393.0	383.0	388.0	395.0	384.0	389.5
Mean	342.1	333.5		369.8	364.3		371.5	367.4	
F-test A(Time)=			N.S		N.S		N.S		
L.S.D 0.05 B(TRE.)=			26.6		25.9		22.2		
L.S.D 0.05 AB(T x TRE.)=			37.6		36.63		31.40		

Furthermore, throughout the three studied seasons, it was found that treatment with 1.0% camphor oil at the 2nd application time gave the best results in comparison with the other treatment and the untreated control grapevines.

These obtained results are in agreement with those pointed out by Mostafa and El-Yazal (2013) studied the effects of garlic extract (GE) at 0, 50, 100, 150 and 200 ml L^{-1} on bud break dormancy and metabolic alterations in buds of "Anna" apple trees. The obtained results showed that, GE treatments enhanced fruit set and total number of fruits per tree.

Also, Ahmed *et al*. (2014) they studied effect of onion and garlic oils each at 0.1% and/or salicylic acid at 100 ppm on Keitte mango trees. They found that, the treatments were very effective in fruit setting % and fruit quality relatively to the control.

Effect of garlic and camphor oil on grape berry weight:

As shown in Table (2) it was clear that all treatments with garlic oil (1.0% and 1.5%) and camphor oil at (1.0% and 1.5%) at the 1st or the 2nd application time significantly increased grape berry weight during the three studied seasons (2011, 2012, and 2013) in comparison with untreated control grapevines.

Concerning the response to spraying garlic oil and camphor oil at the 1st or the 2nd application time, it was observed that spraying garlic oil at 1.0% at the 1st time gave the heaviest grape berry weight during the three studied season (102.00, 114.00 and 115.00 g/50 berry, respectively), followed by spraying camphor oil at 1.5% in the 1st season (100.33 g/50 berry) and spraying camphor oil at 1.0% during the other two studied seasons (106.33 and 106.00 g/50 berry, respectively) in comparison with untreated control grapevines during this study.

On the contrary to that spraying 1.0% camphor oil at the 2nd application time gave the heaviest grape berry weight during the three studied seasons (107.33, 112.67 and 112.00 g/50 berry, respectively), followed by spraying 1.5% garlic oil (99.33, 103.67 and 104.00 g/50 berry), then spraying 1.0% garlic oil (91.33, 101.00 and 101.33) all data were compared to the untreated control grapevines.

Regarding to effects of garlic and camphor oils at (1.0 or 1.5% for both of them) it was noticed that took the same trend of the effects of spraying garlic oil or camphor oil at the two application times in comparison with untreated control grapevines.

These obtained results are in agreement with those pointed out by Abd El-Rzek *et al*. (2011) studied the effect of spraying garlic oil on canino apricot stage with materials: (1) 4% garlic extract, (2) 4% garlic extract + 1% olive oil, (3) 4% garlic extract + 2% olive oil, (4) 1% olive oil, (5) 2% olive oil, (6) 2% hydrogen cyanamide, (7) control. Results showed that, the fruit weight increased by all treatments than the control.

As well as, Mostafa and El-Yazal (2013) studied the effects of garlic extract (GE) at 0, 50, 100, 150 and 200 ml L^{-1} on bud break dormancy and metabolic alterations in buds of "Anna" apple trees. The obtained results showed that, GE treatments enhanced fruit yield per tree.

Effect of garlic and camphor oils on grape berry volume:

According to presented data in Table (2), it was clear that all treatments with garlic oil (1.0% or 1.5%) and camphor oil (1.0% and 1.5%) sprayed at the 1st or the 2nd application time induced significantly increase in grape berry volume (cm^3) during the three studied seasons.

In addition to that the response to spraying with the concentrations of garlic oil or camphor oil at 1.0% or 1.5% showed the same trend of the effects of treatments on grape berry weight in comparison with untreated control grapevines during the studied seasons 2011, 2012 and 2013.

Furthermore, it was noticed that the low concentration of garlic oil (1.0%) was more effective on the most of studied parameters at the 1st application time, while the higher concentration of garlic oil (1.5%) was the more effective rather than it low concentration at the 2nd application time. On contrary to that, the low concentration of camphor oil (1.0%) was the more effective on improving yield and grape berry quality at the 2nd application time rather than the other treatments all in comparison with untreated control grapevines during the three studied seasons.

These obtained results are coincided with these results demonstrated by Abd El-Rzek *et al*. (2011) studied the effect of spraying garlic canino apricot stage with materials: (1) 4% garlic extract, (2) 4% garlic extract + 1% olive oil, (3) 4% garlic extract + 2% olive oil, (4) 1% olive oil, (5) 2% olive oil, (6) 2% hydrogen cyanamide, (7) control. Results showed that, fruit volume was increased by all treatments than the control.

Table (2): Effect of garlic and camphor oil concentrations (at 1.0% and 1.5% each) on fifty berry weight (g) and fifty berry volume (cm^3) of Flame Seedless grape cultivar during 2011, 2012 and 2013 seasons.

Character	Fifty berry weight (g)								
Treatments (A) / (B)	2011			2012			2013		
	First time	Second time	Mean	First time	Second time	Mean	First time	Second time	Mean
Control	77.00	77.00	77.00	79.00	79.00	79.00	79.33	79.33	79.33
T1(Garlic 1%)	102.00	91.33	96.67	114.00	101.00	107.50	115.00	101.33	108.17
T2(Garlic 1.5%)	98.67	99.33	99.00	101.33	103.67	102.50	102.33	104.00	103.17
T3(Camphor1%)	98.00	107.33	102.67	106.33	112.67	109.50	106.00	112.00	109.00
T4(Camphor1.5%)	100.33	90.67	95.50	105.33	92.00	98.67	105.67	92.67	99.17
Mean	95.20	93.13		101.20	97.67		101.67	97.87	

F-test A(Time)=	N.S	N.S	N.S
L.S.D 0.05 B(TRE.)=	7.70	8.60	6.90
L.S.D 0.05 AB(T x TRE.)=	10.89	12.16	9.8

Character	Fifty berry volume (cm^3)								
Treatments (A) / (B)	2011			2012			2013		
	First time	Second time	Mean	First time	Second time	Mean	First time	Second time	Mean
Control	72.67	72.67	72.67	74.33	74.33	74.33	74.67	74.67	74.67
T1(Garlic 1%)	96.33	86.67	91.50	106.67	95.33	101.00	109.33	94.33	101.83
T2(Garlic 1.5%)	92.33	94.67	93.50	96.33	98.00	97.17	97.33	97.67	97.50
T3(Camphor1%)	93.00	101.67	97.33	100.67	107.00	103.83	100.00	105.67	102.84
T4(Camphor1.5%)	94.33	84.33	89.33	96.33	86.33	91.33	99.67	87.33	93.50
Mean	89.73	88.00		94.87	92.20		96.20	91.93	

F-test A(Time)=	N.S	N.S	*
L.S.D 0.05 B(TRE.)=	7.80	8.30	6.70
L.S.D 0.05 AB(T x TRE.)=	N.S	11.74	9.4

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تأثير رش زيت الثوم والكافور علي خصوبة البراعم ومكونات المحصول لصنف العنب فليم سيدلس

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الملخص:

أجريت هذه الدراسة خلال ثلاث مواسم هي ٢٠١١ ، ٢٠١٢ ، ٢٠١٣ بمزرعة العنب بقسم أمراض النبات بكلية الزراعة – جامعة أسيوط علي صنف العنب فليم سيدلس المربي بطريقة الكردون ثنائي الذراع في إتجاهين حيث تم تقليم الكرمات دابرياً بحيث تترك ٤٨ برعماً (عين) علي كل كرمة (١٢ دابرة ، طول كل منها ٤ عيون)، بهدف دراسة تأثير رش زيت الثوم والكافور بتركيزي ١%، ١,٥% في موعدين هما: فترة التزهير الكامل وفترة بداية طراوة الثمار ولقد صممت التجربة بنظام القطع المنشقة كاملة العشوائية في تصميم قطاعات كاملة العشوائية مع تكرار كل معاملة ثلاث مرات وتم تخصيص كرمة لكل مكررة. وتم تحديد خصوبة البراعم للكرمات المعاملة وغير المعاملة تشريحياً وكذلك دراسة مكونات المحصول (وزن المحصول/الكرمة) وزن العنقود وكذلك وزن وحجم ٥٠ ثمرة عنب.

ولقد وجد من النتائج المتحصل عليها من هذه الدراسة أن رش زيت الثوم بتركيزيه ١% ، ١,٥% أحدث تنشيط وتطور للبراعم الثمرية علي العيون القاعدية مقارنة بالكرمات غير المعاملة. والرش بتركيز ١% أحدث تنشيط لخصوبة البراعم الوسطية في حين الرش بتركيز ١,٥% أحدث تثبيط لخصوبة البراعم مقارنة بالكرمبات غير المعاملة علي العكس من ذلك فإن التركيز العالي من الثوم أحدث تنشيطاً وتطوراً لخصوبة البراعم في العيون الطرفية مقارنة بالكرمات غير المعاملة.

وبخصوص محصول وخصائص العنقود فإن جميع المعاملات بزيت الثوم أو الكافور بتركيزيهما ١% أو ١,٥% أدي إلي تحسين وزيادة معنوية مقارنة بالكرمات غير المعاملة وذلك خلال سنوات الدراسة. إلا أن زيت الثوم أكسب الثمار نكهته المميزة وخاصة عند رشه في الميعاد الثاني.

وعليه فإنه يمكن التوصية برش زيت الكافور بتركيز ١% خلال موعدي الدراسة لتحسين المحصول وخصائص الثمار، بينما لتحسين خصوبة البراعم فيتم رش الثوم في الميعاد الأول بتركيز ١% تجنباً لحدوث نكهة غير مرغوبة في الميعاد الثاني.