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EFFECTS OF SPRAY VOLCK OIL IN DIFFERENT TIMES ON THE CLUSTER CHARACTERS OF GRAPE (KOLAH DARI VAR) IN NORTH KHORASAN CONDITION

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ABSTRACT

In order to study the effect of Different Times foliar application of Volck Oil on cluster characters of grape (Kolahdari var) this experiment was conducted in a factorial experiment in a Randomized Complete Block Design (RCBD) with three replications in 2013. The first factor, the time of spraying as the major factor was carried out in three levels including one week before flower formation, one week after the full bloom and two weeks after the full bloom. Various concentrations of oil as the secondary factor had four levels including oil spraying concentrations of 0 (control), 0.5, 1 and 1.5%. The characteristics studied in this research included: cluster weight, length and width of cluster, the number of clusters and percentage of cluster thinning. The results showed that application of different levels of oil and its spraying time had significant impact on length and width of the cluster, cluster weight and the percentage of cluster thinning. ($P \leq 0.01$) Generally, among various concentrations of Volk oil, using 1.5 % Volk oil one week after the full bloom had the greatest effect on the studied characteristics which caused reductions in the number of the cluster and hence increased length and width of cluster and their weights.

Keywords: *Volck, Foliar Application, Thinning Of Flowers, Cluster*

INTRODUCTION

Grapes are the most widely grown commercial fruit crop in the world, and also one of the most popular fruit crops for home production. Volk Oil (80% emulsifiable oil) is a contact insecticide that is widely used for controlling bud opening and fruit thinning in apple, pear, peach, and apricot trees, besides being employed as an insecticide. In recent years the oils are used in agriculture for different purposes. Using vegetable oils in recession season can sparse the flower buds and can also postpone their physiological growth in spring. Using Volek oil in winter increases the flowering process, and increases the quality and quantity of pistachios (Beede *et al.*, 1998). In a research conducted on the effects of bunch and shoot thinning in the grape variety Sauvignon blanc on vine yield, it was shown that both bunch and shoot thinning reduced yield compared to control vines (Naor *et al.*, 2002). Use of Volk Oil in winter accelerated flowering, caused flowering uniformity and increased yield, and improved quality of pistachios (Beede *et al.*, 1998). Kliewer (1970) stated that reduced grape weight resulting from leaf thinning in Soltani variety could be due to decreased levels of hormones produced in leaves. These hormones were probably involved in this reduction, because lower quantities of food for plants to grow definitely lowered grape volume and grape weight considerably at flowering and two weeks after that. This could be the reason for reduction in length, width, and weight of grapes, in weight, length, and width of bunches, and in yield of vines pruned at these times. Stopar (2004) stated that application of 3% vegetable oils at flowering on apple trees raised the average weight of an apple. Looney (1990) reported that bunch thinning with the hormone gibberellin increased grape weight and average grape weight, but reduced the yield of some vines. Kok (2012) studied the effects of bunch thinning at different times on yield components and on grape quality in the Sauvignon blanc variety. His results showed that bunch thinning significantly increased grape weight at the one percent probability level, but that the rise in average bunch weight was not significant. Stover (2000) stated that thinning at full bloom, and before that, could substantially increase grape weight and grape yield compared to thinning 50 days after full bloom. Bubola *et al.* (2011) reported that bunch thinning in the grape variety Merlot increased average grape and bunch weights. Treder (2008) reported that factors such as age of trees, type of stock, and time

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of thinning fruit influenced average fruit weight. Use of vegetable oils at flowering of apple trees substantially increased the average weight of an apple compared to control trees (Stopar, 2004). In a research it was reported that the location of chlormequat trimethyl ammonium chloride decadence 7 to 10 days before flowering can increase the berry formation but they will be smaller and of lower quality (Lonny, 1975). Results Johnson (1994) obtained in his research indicated that early thinning in apple trees increased the average weight of an apple. Based on results Akin (2001) found in his studies, grape thinning and application of humic acid at fruit set increased grape and bunch weights compared to the control, but bunch thinning at various times did not significantly influence average bunch weight. Nevertheless, thinning four weeks after flowering increased bunch weight compared to thinning 6, 8, 10, or 12 weeks after flowering and compared to the control (Kok, 2011).

MATERIALS AND METHODS

This experiment was conducted in 1392 in one of the grape gardens located in Bedranlou, one of the environs of the central part of Bojnourd in North Khorasan province as the 2 factorial experiments in the form of completely randomized blocks. The form of growth for the shrubs of this homogenous garden was puccaruqi and they had the same growth power. The interval between the shrubs was 3×3 meters and they were 30 years old. The soil was of clay loam tissue and the shrubs were guided in climatic and nesting systems. The selected shrubs were specified by labels. The time of spraying was in 3 levels of a week before flowering, a week after the flowering was complete and 2 weeks after it or the end of flowering. Each treatment was repeated 3 times and each repeat included four shrubs, which totally would include 144 shrubs under examination. In order to spray we made use of Volek oil (Emulsion oil 80%) and an automotive sprayer at the beginning of the day (before the warm hours of the day) to prevent the burning of the leaves. In growing season all treatments including irrigation, struggling with the diseases and pests, etc. were performed steadily. Sampling in the end of the growing season, was performed from 2 middle grapevines simultaneously with crop harvesting in the region (late in Shahrivar). 5 cluster es were selected from each shrub and the adjunct shrubs were considered as peripherals. The shrubs in each treatment were separately placed in plastic pockets and were kept in refrigerator in 5 ° C in lab until the measurement of the properties was conducted. The characteristics studied in this research included: cluster weight,, length and width of cluster, the number of clusters and percentage of cluster thinning. To statistically analyze the data, SAS 9.1 was used. Comparing the averages based on Duncan's multiple-range test was performed on levels 1 and 5 percent. The charts are drawn using Excel.

RESULTS AND DISCUSSION

The analysis of changes within cluster properties by using test treatments showed that using different concentrations of Volck oil led to a significant difference in the properties of cluster's weight and dimensions (height and width) at a probability level of $p \leq 0.01$. Also, the effects of using different concentrations of Volck oil on the percentage of cluster thinning showed a significant difference at the $p \leq 0.01$ level of significance. However, the number of cluster es before and after spraying was not affected by different concentrations (Table 1)

Table 1. Analysis of variance for cluster characters.

S.O.V	df	Percentage of cluster thinning	Cluster width	Cluster length	Cluster weight
Replication	2	0.007 ^{ns}	0.18 ^{ns}	1.27 ^{ns}	209.5 ^{ns}
Time of Spray	2	0.35 ^{ns}	0.66 ^{ns}	0.95 ^{ns}	1253.5 ^{**}
Oil concentration	3	2.11 ^{**}	3.93 ^{**}	5.85 ^{**}	468.3 [*]
× Oil concentration Time of Spray	6	0.13 ^{ns}	0.06 ^{ns}	0.69 ^{ns}	65.2 ^{ns}
Error	22	0.13	0.22	0.43	142.6
CV	-	18.27	6	4	5.19

*, ** significantly at the 5% and 1% levels of probability respectively and ns (non significant)

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Cluster Weight

The highest average weight of 382.02g was obtained when Volck oil with 1.5% concentration was used. The lowest value was observed in the control without using the Volck oil. The use of concentrations of 1% and 0.5% with respective weight values of 378.48 and 368.66 grams was in the next rank (Figure 1). The results of Stoupar research (2004) suggested that soybean and sunflower oils with a 3% concentration at flowering time caused an increase in growth of apple fruit and in its average weight owing to thinning. Kavoussi and colleagues (1388) reported that cluster thinning had a significant effect on the cluster average weight and thinning 25 cluster as compared to thinning 50 cluster increased the average cluster weight. The results of Johnson research (1994) showed that early thinning of apple tree increased the average weight of fruits. Based on the results of Akin (2001), berry thinning and use of humic acid at the fruit set stage increases the cluster and berry weight compared to the control group. Cluster thinning on different times has not had significant effect upon the average cluster weight. However, thinning in 4 weeks after flowering increased the cluster weight compared with the periods of 6, 8, 10 and 12 weeks after booming the flowers and the control plants (Cook, 2012). Babula *et al.* (2011) reported that cluster thinning of grape causes an increase in berry and cluster average weight. Terder (2008) pointed out that factors such as tree's age, species and timing of fruit thinning affect the average weight of fruits.

Cluster Length

As with cluster weight, cluster length had its highest value (17 cm) using a Volck oil of 1.5% concentration and in the next rank, using 1% concentration Volck oil led to the highest cluster length of 16.80cm without a significant difference. Also, the use of Volck oil of 0.5% concentration caused a length of 16.24cm for cluster es. The shortest cluster length (15.20cm) was observed for the control without using Volck oil (Figure 2).

Cluster Width

The analysis of the average width of cluster in conditions of different Volck oil concentrations showed the highest cluster average width of 12.73cm for 1.5% concentration Volck oil. Using 1% and .5% concentrations of Volck oil was also ranked next (leading to 12.25 and 11.66cm length, respectively) and next, the lowest cluster width (11.15cm) was observed for the control without using Volck oil. The figure of comparing cluster average widths (Figure 3) in different concentrations of Volck oil suggested that as with other properties of the cluster, the maximum cluster width was gained in 1.5% treatment of Volck oil and thus this concentration level of Volck oil is recommended for gaining cluster es with higher weight and dimensions. Research carried out by Cook (2011) about grape thinning indicated that it did not cause a significant difference on the length and width of cluster es of Sauvignon Blank grapes cultivar at 1% probability level. However, thinned plants had the highest cluster length and width, in comparison with control plants.

Percentage of Cluster Thinning

The results of comparing average percentage of cluster thinning at different concentrations of Volck oil showed that increased Volck oil concentration led to an increase in the percentage of cluster thinning so that the highest percentage of cluster thinning were observed at Volck oil concentrations of 1.5% and then 1% to be 2.42% and 2.31%, respectively. Percentage of cluster thinning treated in 0.5% Volck oil with value of 2.03% was in the next rank; it should be noted that the percentage of cluster thinning at a 0.5% concentration of Volck oil was not significantly different from that when 1% concentration was used but using 1.5% concentration Volck oil showed a significant difference from its 0.5% concentration in terms of cluster thinning percentage. The least cluster thinning percentage (1.34%) was observed in the control without using the Volck oil (Figure 4).

The use of soybean oil and sunflower oil in thinning fruit and cluster thinning at the concentrations of 1% and 3% was studied in flowering apples. The results showed that 3% concentration of these oils has had the greatest effect on thinning of fruits and flowers (stoupar, 2004).

Conclusion

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The analysis of features of cluster es showed that different concentrations of Volck oil led to significantly different values of weight, dimensions (length and width) and percentage of cluster thinning. Among Volck oil concentrations, the highest values of the mentioned features were recorded for 1.5% concentration. This indicates greater impact of this quantity of Volck oil on berry and cluster thinning of the grape cultivar under study. Thus among the concentrations tested, 1.5% concentration of Volck oil is recommended for getting the best results out of thinning operations. These results can be led to increased marketability and economy along with advantages such as alternate bearing prevention, berry corruption prevention, pest reduction and fungal disease reduction.

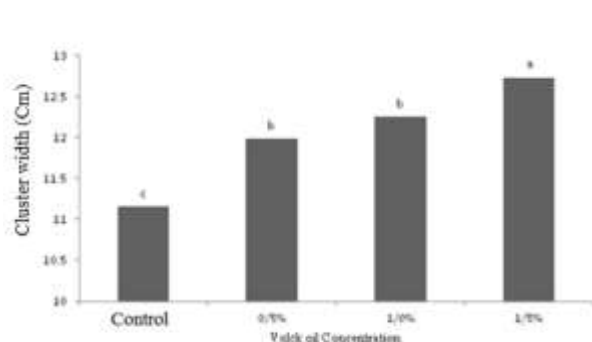


Figure 1: Effect of volck oil concentration on cluster width

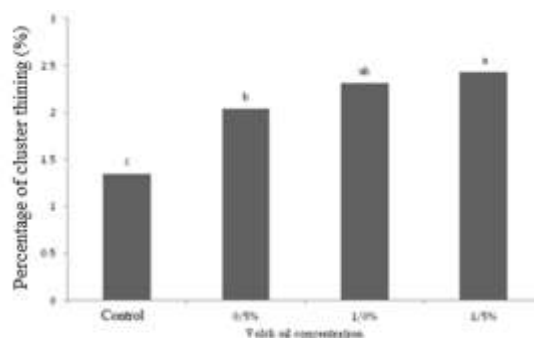


Figure 2 : Effect of volck oil concentration on percentage of cluster thinning

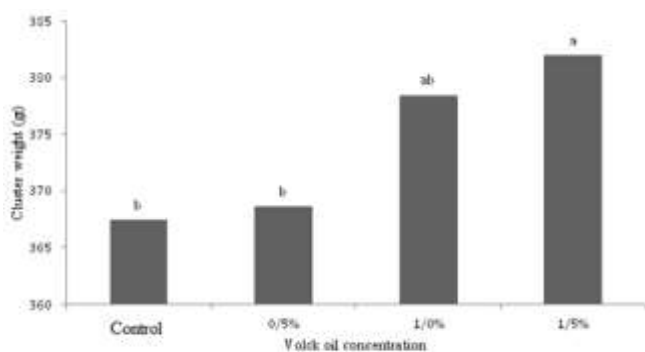


Figure 3: Effect of volck oil concentration on cluster weight

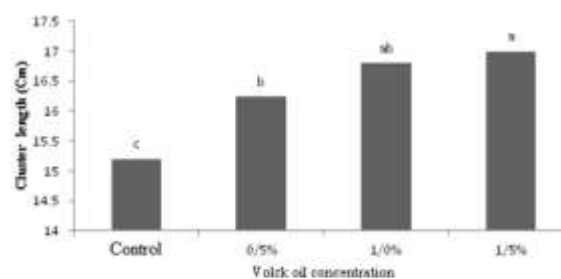


Figure 4: Effect of volck oil concentration on cluster length

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