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# Foliar Application of Bread Yeast and Organic Fertilizer to Improve Yield Quantity and Quality of Thompson Seedless Grape (*Vitis vinifera* L.)

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## Abstract

Study was conducted using Thompson seedless grapevines 11 years old, trained as arbors (espalier) training in a vineyard at Erbil Directorate of Agriculture Researches / Kurdistan Region / Iraq during the growing season of 2015 to investigate the possible effects of foliar application of natural bread yeast (bio-fertilizer) and liquid organic fertilizer (B&S Pot-min) on yield quantity and quality. Results indicated that the concentration of 12 g.l-1 of bread yeast, liquid organic fertilizer at 4 ml.l-1 and interaction between them affected on yield and physical characteristics of clusters, berries and chemical properties of berries significantly over other concentrations and interactions. The number of clusters/vine, cluster weight, yield increased by application of bread yeast, and there were significant differences between treatments comparing to control. Applications of bread yeast and organic fertilizer significantly improve physical characteristics of berries comparing to control. Bread yeast application caused significant increase in total soluble solid (TSS), decreased titratable acidity (TA), with highest value of TSS/TA ratio compared with control.

***Keywords*:** Bread yeast, organic fertilizer, grapevine, Thompson seedless, Yield.

## 1. Introduction

Grape (*Vitis vinifera* L.) belongs to the Vitaceae family; it is one of the most essential commercial fruit crops of temperate to tropical regions (Gowda et al., 2008). Due to its high nutritive value, multipurpose use (Table grape, raisin, wine, juice and can) returns becoming more popular (Ghosh et al., 2008). Thompson seedless grapevines are planted throughout the world and are used to produce dried fruits (raisins), and for the fresh market (table grapes), because of a good taste of berries and juice that acceptable for consumers, and it is considered to be the best seedless variety for raisin (Alsaidi, 2014). Nowadays, it is doubtless that new fertilization techniques have been developed in different vineyards located in newly reclaimed areas, where, organic fertilization (in

composting phase) of various grapevines has called the attention of researchers as a positive alternative to minimize the intensive amounts of mineral N (Kassem and Marzouk, 2002). Moreover, the necessity to use humic acid together with organic fertilizer for improving vine growth, nutritional status and berry quality, was supported by many experimental results (Zhu, 2000; Guo et al;. 2000; Ali et al., 2006; Eman *et al*, 2008). Organic and bio-fertilizations are very safe for consumers, due to the fact that their application leads to reduce the accumulation of nitrate and nitrite residues in the edible tissues (Montasser et al, 2003; Farag, 2006).

Fawzi et al. (2014) clarified that Influence of spraying bread yeast on growth, yield, leaf chemical composition and fruit quality of "superior" 12 years old Grapevines (*Vitis vinifera* L.) bread yeast at 0.1% and 0.2% four times during growing season (i.e. at the beginning of growth, first bloom, after fruit set and 3 weeks later). It is obvious from the obtained data that bread yeast significantly increasing, of clusters/vine, yield, cluster weight, cluster length, number of berries/cluster, berry weight and TSS compared with control. Results from Al-Atrushy and Birjely (2015) showed that organic fertilizers caused a remarkable stimulation on growth characters, yield as well as berries quality parameters compared to control. Total acidity percentage in the juice has also tended to reduce with using organic manure.

The main goal of the present study was to produce healthy fruits without the use of chemical fertilizers as well as protect our environment from pollution and to investigate the possible effects of foliar application of natural bread yeast (bio-fertilizer) and organic fertilizer (B&S Pot-min) on yield quantity and quality of Thompson seedless grapevines.

## 2. Materials and Methods

This study was carried out in a vineyard at Erbil Directorate of Agriculture Researches / Kurdistan Region / Iraq during 2015 growing season to investigate the possible effects of foliar application of (bio-fertilizer) natural bread yeast (*Saccharomyces cerevisiae*) at 0, 4, 8 and 12 $g.l^{-1}$ (Commercial baking yeast was dissolved in warm water (38°C) followed by adding sugar at ratio 1:1 and kept overnight before spraying for activation and reproduction of yeast (Hegab et al.,1997).) and liquid organic fertilizer (B&S Pot-min) at 0, 2 and 4 $ml.l^{-1}$ on yield quantity and quality of 11 years old grapevine cultivar (*Vitis vinifera* L.) cv. Thompson seedless. It was trained as arbors (espalier) training, planted at 2 x 4 m apart and pruned at the second week of February to leave 72 eyes/vine (6 fruiting canes with 10 eyes plus 6 renewal spurs with 2 eyes) under drip

irrigation. The Physical and chemical analysis of the vineyard soil listed in table 1, soil samples were analyzed according to (Wilde *et al.*, 1985).

Table 1 Physical and chemical analysis of the vineyard soil*

| Sample Depth(cm) | N $mg.l^{-1}$ | P $mg.l^{-1}$ | K $mg.l^{-1}$ | Organic Matter % | pH (pH-meter) | EC (ds/m) | Type of soil |
|---|---|---|---|---|---|---|---|
| **0-30** | 56 | 1.08 | 358 | 2.2 | 7.96 | 1.15 | Silty clay loam |
| **30-60** | 91 | 0.099 | 165 | 1.3 | 8.01 | 0.280 | Loamy |
| **60-90** | 63 | 0.22 | 177 | 1.2 | 7.93 | 0.300 | Silty loam |

***The data were analyzed at Erbil director of agriculture researches

Bread yeast and liquid organic fertilizer in addition of control (only water) and their interactions were sprayed as foliar application at three times within twenty-one days intervals, starting from 7 days after fruit setting (19/5/2015), the first spraying was on 26/5/2015, the second on 15/6/2015 during fruit development and the third spraying was on 5/7/2015 after the veraison stage. Tween-20 at a rate of 0.1% was used with each spray solution as wetting agent. All treatments were replicated four times means that 48 vines. Chemical composition of organic liquid fertilizer showed in table 2 and 3 respectively.

Horticulture practices except the addition of bread yeast and organic fertilizer were used as usual. Effect of bread yeast and organic fertilizer were evaluated in terms of the change in number of cluster per vine, cluster weight, yield per vine, cluster length and diameter (Representative random samples of 5 clusters/ vine were harvested at maturity when TSS reached about 16 – 17 % according to (Tourky et al., 1995)) as well as number of berries per cluster, berry length, diameter, weight and size of 100 berries as Total Soluble Solid (TSS), Titratable Acidity (TA) and TSS/TA ratio (Tehranifar et al., 2010).

Table 2 Chemical composition of used Bread yeast (*Saccharomyces cerevisiae*).

| Composition of minerals $mg.g^{-1}$ | | Amino acids $mg.kg^{-1}$ | |
|---|---|---|---|
| **N** | 20.23 | Lysine | 5.800 |
| **P** | 21.26 | Histidine | 7.600 |
| **K** | 47.20 | Phenyl alanine | 19.900 |
| **Mg** | 2.160 | Methionine | 4.200 |
| **Fe** | 0.036 | Cystine | 21.600 |
| **Zn** | 0.210 | Glycine | 7.810 |
| **Cu** | 0.015 | Glutamic | 21.600 |
| **Si** | 7.800 | Aspartic | 16.900 |
| Another compounds | | | |
| **Glyceriizine** | 3.093 % | Glucose | 3.841 % |
| **Sucrose** | 1.570 % | GA | 0.620 |

Table 3 Chemical composition of used organic liquid fertilizer (B&S Pot-min)*

| Content | Percentage % |
|---|---|
| **Organic Carbon** | 30 |
| **Organic Nitrogen** | 0.5 |
| **Potassium Oxide** | 3.1 |
| **Total Nitrogen** | 0.5 |
| **Organic matter** | 48 |
| | **mg/kg** |
| **Copper** | 25.35 |
| **Nickel** | 14.27 |
| **Zinc** | 25.53 |
| **pH** | 4.8 |

Results were analyzed statistically according to Factorial Randomized Complete Block Design (RCBD), and analysis of variance and Duncan's multiple range tests at 5% levels were used to differentiate means using SAS program.

## 3. Results

### 3.1. Yield and physical characteristics of clusters

Data presented in Table 4 revealed that number of clusters/vine, cluster weight, yield increased by application of bread yeast, there were significant differences between treatments comparing to control. Bread yeast treatment at concentration 8 $g.l^{-1}$ resulted in greatest increase in number of cluster/vine (52.25), while highest number of clusters weight, yield, cluster length and diameter were obtained by concentration of bread yeast at12 $g.l^{-1}$ (173.85 g, 8.79 kg ,25.50 cm and 13.52 cm), respectively.

In addition, data declared that organic fertilizer affected on physical characteristic of cluster and yield /vine comparing to control. Increasing concentration of organic fertilizer significantly increased yield and cluster length. Whereas spraying organic fertilizer had no effect on cluster diameter.

The results from Table 4 also denoted that interaction of both factors significantly affected on physical characteristics of clusters and yield. It had significant difference between treatments. Maximum increase of number of clusters was obtained by interaction of 8 $g.l^{-1}$ bread yeast and 4 $ml.l^{-1}$ organic fertilizer (58.75) while, minimum level of it was obtained by control treatment (40.00). Maximum increase of yield was obtained by interaction of 12$g.l^{-1}$ bread yeast and 4$ml.l^{-1}$ organic fertilizer (9.25kg)

while, minimum level of it was obtained by control treatment (5.61kg). Highest level of cluster length was recorded with interaction between concentration of 12g.l$^{-1}$ bread yeast and 2ml.l$^{-1}$ organic fertilizer (27.43cm), while maximum cluster diameter was obtunded by interaction between concentration of 12g.l$^{-1}$ bread yeast and 4ml.l$^{-1}$ organic fertilizer (14.88cm).

Table 4 Effect of bread yeast, organic fertilizer and their interactions on yield and physical characteristics of clusters "Thompson seedless" grapevines*

| Treatments | | | Parameters | | | | |
|---|---|---|---|---|---|---|---|
| | | | No.clusters/vine | Cluster weight (g) | Yield (kg/vine) | Cluster length (cm.) | Cluster diameter (cm) |
| Bread Yeast (g.l$^{-1}$) | | 0 | 44.25 d | 141.54 d | 6.54 d | 22.56 b | 11.86 b |
| | | 4 | 48.08 c | 146.56 c | 7.04 c | 23.41 b | 13.09 ab |
| | | 8 | 52.25 a | 166.6 b | 8.61 b | 23.15 b | 13.52 a |
| | | 12 | 50.67 b | 173.85 a | 8.79 a | 25.50 a | 14.48 a |
| Organic fertilizer (ml.l$^{-1}$) | | o | 46.44 c | 159.53 a | 7.43 c | 22.83 b | 12.77 a |
| | | 2 | 48.06 b | 157.63 b | 7.79 b | 24.38 a | 13.19 a |
| | | 4 | 51.94 a | 154.29 c | 8.01 a | 23.75 a | 13.75 a |
| Bread Yeast 0 | Organic fertilizer | 0 | 40.00 k | 140.14 k | 5.61 l | 21.42 e | 10.48 c |
| | | 2 | 46.75 h | 145.16 i | 7.60 h | 23.36 b-d | 11.76 bc |
| | | 4 | 46.00 i | 139.32 l | 6.41 k | 22.90 c-e | 13.35 a-c |
| Bread Yeast 4 | Organic fertilizer | 0 | 44.25 j | 151.84 f | 6.72 i | 23.26 b-d | 13.32 a-c |
| | | 2 | 47.00 g | 142.22 j | 6.70 j | 22.67 c-e | 12.52 a-c |
| | | 4 | 53.00 c | 145.60 h | 7.72 g | 24.29 bc | 13.44 a-c |
| Bread Yeast 8 | Organic fertilizer | 0 | 46.75 h | 186.37 a | 8.65 d | 22.34 de | 13.32 a-c |
| | | 2 | 51.25 d | 166.21 d | 8.50 e | 24.06 b-d | 13.59 ab |
| | | 4 | 58.75 a | 147.41 g | 8.68 c | 23.06 b-e | 13.65 ab |
| Bread Yeast 12 | Organic fertilizer | 0 | 54.75 b | 159.79 e | 8.75 b | 24.30 bc | 13.98 ab |
| | | 2 | 47.25 f | 176.94 c | 8.36 f | 27.43 a | 14.88 a |
| | | 4 | 50.00 e | 184.81 b | 9.25 a | 24.76 b | 14.57 ab |

*Values within followed by the same letter in each column for each factor and interactions are not significantly different according to Duncan's Multiple Range Test at 5% level of probability.

### 3.2. Physical characteristics of berries

As seen in Table 5 application of bread yeast significantly increased number of berries comparing to control. Highest number of berries, berry length and diameter, and weight and size of 100 berries was occurred by 12 g.l$^{-1}$ bread yeast (142.10, 1.47cm, 1.14cm, 121.10g and 119.42cm$^3$) where, these values of characteristics were recorded with control treatment (120.64, 1.25cm, 1.03cm, 109.40g and 105.60cm$^3$).

Data presented in Table 5 revealed that application of organic fertilizer exhibited significant increase inphysical characteristics of berries. In this concern, highest increase of number of berries, berry diameter was occurred by 4 $ml.l^{-1}$ organic fertilizer (134.10 and 1.11cm), while lowest values were obtain in control (129.77 and 1.07cm), respectively. The results alsoshowed that organic fertilizer had non-significant effect between treatments comparing to control Table 5.

The results from Table 5 denoted that interaction of both factors significantly increased number of berries per cluster, cluster length and diameter. Maximum increase was obtained by interaction of 12$g.l^{-1}$ bread yeast and 4$ml.l^{-1}$ organic fertilizer (150.70, 1.58cm and 1.23cm), the interaction between 8$g.l^{-1}$ bread yeast and 0$ml.^{l-}$organic fertilizer indicate the significant increase of weight and size of 100 berries (137.1g and 134.66$cm^3$), while, minimum level of them were obtained by control treatment (115.20, 1.11cm, 0.90cm, 104.47g and 99.01$cm^3$).

Table 5 Effect of bread yeast on physical characteristics of berries of "Thompson seedless" grapevines*****

| Treatments | | | Parameters | | | | |
|---|---|---|---|---|---|---|---|
| | | | **No. berries/cluster** | **Berry length (cm)** | **Berry diameter (cm)** | **Weight.100 berries (g)** | **Size.100 berries ($cm^3$)** |
| **Bread Yeast ($g.l^{-1}$)** | | 0 | 120.64 d | 1.25 c | 1.03 c | 109.40 b | 105.60 b |
| | | 4 | 132.52 c | 1.36 b | 1.12 ab | 108.82 b | 106.72 b |
| | | 8 | 134.87 b | 1.39 b | 1.08 b | 122.05 a | 119.91 a |
| | | 12 | 142.10 a | 1.47 a | 1.14 a | 121.10 a | 119.42 a |
| **Organic fertilizer ($ml.l^{-1}$)** | | o | 129.77 c | 1.34 b | 1.07 b | 117.53 a | 111.58 a |
| | | 2 | 133.73 b | 1.40 a | 1.10 ab | 115.57 a | 113.11 a |
| | | 4 | 134.10 a | 1.36 ab | 1.11 a | 112.93 a | 111.04 a |
| **Bread Yeast 0** | **Organic fertilizer** | 0 | 115.20 l | 1.11 d | 0.90 d | 104.47 d | 99.01 g |
| | | 2 | 121.98 k | 1.28 c | 1.06 bc | 114.33 b-d | 110.81 b-f |
| | | 4 | 124.75 j | 1.37 b | 1.12 b | 109.41 cd | 106.98 e-g |
| **Bread Yeast 4** | **Organic fertilizer** | 0 | 137.18 d | 1.45 b | 1.14 b | 109.13 cd | 106.87 e-g |
| | | 2 | 132.03 h | 1.43 b | 1.13 b | 105.83 d | 103.68 gf |
| | | 4 | 128.35 i | 1.22 c | 1.09 bc | 111.51 b-d | 109.60 c-g |
| **Bread Yeast 8** | **Organic fertilizer** | 0 | 133.80 e | 1.42 b | 1.15 b | 137.19 a | 134.66 a |
| | | 2 | 138.20 c | 1.45 b | 1.07 bc | 119.46 bc | 117.24 b-e |
| | | 4 | 132.60 g | 1.29 c | 1.03 c | 109.51 cd | 107.82 d-g |
| **Bread Yeast 12** | **Organic fertilizer** | 0 | 132.90 f | 1.39 b | 1.09 bc | 119.34 bc | 117.793 b-d |
| | | 2 | 142.70 b | 1.45 b | 1.12 b | 122.67 b | 120.7 b |
| | | 4 | 150.70 a | 1.58 a | 1.23 a | 121.30 bc | 119.75 bc |

*Values within followed by the same letter in each column for each factor and interactions are not significantly different according to Duncan's Multiple Range Test at 5% level of probability.

### 3.3. Chemical characteristics of berries

From the given data in Table 6 it clearly revealed that bread yeast application rays at 4, 8 and 12g.$l^{-1}$ caused significant increase in total soluble solid (TSS), decreased titratable acidity (TA), with highest value of TSS/TA ratio compared with control, (24.00% and 44.02) was obtained by concentration 12g.$l^{-1}$, while the same concentration of bread yeast significantly reduced titratable acidity (0.55), where lowest values were recorded with control (21.14% and 31.25) with the highest value of acidity (0.68).

Table 6 illustrates the significant effect of organic fertilizer on the parameter of chemical characteristics of berries which increased total soluble solid and decreased titratable acidity with highest value of TSS/TA ratio compared with control. The results in Table 6 also denote that significant differences were detected between interactions of bread yeast with organic fertilizer. Interaction of concentrations 12g.$l^{-1}$ bread yeast with control recorded the highest value in these parameters (24.90%, 44.26 and 1.06) with lowest value of acidity (0.53) and the lowest value resulted from control (19.70%, 29.47 and 1.03) respectively.

Table 6 Effect of bread yeast, organic fertilizer and their interactions on chemical characteristics (TSS; Total Soluble Solis, TA; Titratable Acidity and TSS/TA ratio) ) of berries of "Thompson seedless" grapevines

| Treatments | | | Parameters | | |
|---|---|---|---|---|---|
| | | | TSS (%) | TA (g/100ml.juice) | TSS/TA ratio |
| Bread Yeast ($g.l^{-1}$) | | 0 | 21.14 d | 0.68 a | 31.25 d |
| | | 4 | 23.10 c | 0.62 b | 37.79 c |
| | | 8 | 23.99 b | 0.58 c | 41.27 b |
| | | 12 | 24.00 a | 0.55 d | 44.02 a |
| Organic fertilizer ($ml.l^{-1)}$ | | o | 22.56 c | 0.59 c | 38.24 b |
| | | 2 | 22.89 b | 0.62 a | 37.14 c |
| | | 4 | 23.72 a | 0.60 b | 40.36 a |
| Bread Yeast 0 | Organic fertilizer | 0 | 19.70 l | 0.60 f | 32.83 j |
| | | 2 | 20.85 k | 0.71 b | 29.47 l |
| | | 4 | 22.88 h | 0.73 a | 31.44 k |
| Bread Yeast 4 | Organic fertilizer | 0 | 22.28 j | 0.65 c | 34.26 i |
| | | 2 | 22.28 i | 0.62 e | 36.26 h |
| | | 4 | 24.74 b | 0.58 g | 42.86 e |
| Bread Yeast 8 | Organic fertilizer | 0 | 23.38 f | 0.56 h | 41.62 f |
| | | 2 | 24.50 c | 0.63 d | 39.21 g |
| | | 4 | 24.09 d | 0.56 i | 42.98 d |
| Bread Yeast 12 | Organic fertilizer | 0 | 24.90 a | 0.56 h | 44.26 a |
| | | 2 | 23.93 e | 0.55 j | 43.64 c |
| | | 4 | 23.17 g | 0.53 k | 44.17 b |

*Values within followed by the same letter in each column for each factor and interactions are not significantly different according to Duncan's Multiple Range Test at 5% level of probability.

## 4. Discussion

### 4.1. Yield and physical characteristics of clusters

Increasing number of clusters resulting in bread yeast application may be due to bread yeast containment of Cytokinin the high content of vitamin B5 and minerals. Yeast composition might be play a considerable role in orientation and translocation of metabolites from leaves in to the productive organs and in the synthesis of protein, and nucleic acid (Natio et al, 1981). Warring and Philips (1973) stated that bread yeast is rich in tryptophan which consider precursor of IAA which stimulate cell division and elongation. Similar results to the present study was found by Mahmoud (1996) on Roomy Red Grapevines and by Akl et al., (1997) and Ahmed-Kamelia et al., (2000) on Ruby Seedless Grapevines. Results also are nearly similar to those reported by Amen et

al., (2000a) on King Ruby and Gaser et al., (2006) on Flame seedless who found that bread yeast applications significantly increased the yield/vine.

The positive effect of organic fertilizer on increasing clusters number per vine may due to the role of elements in physiological processes and their effect in the accumulation of carbohydrate in the berries Delas (1981). Nitrogen organic fertilizer activates photosynthesis processes through increasing the leaf area, which leads to increasing food supply to the clusters and, in turn, decreasing abortion of those clusters which increased the production of metabolites resulted in cluster weight, number of berries per cluster, berry volume and yield ( Dhillon and Aulakh 1972; Ahlawat and Yamdagni 1988; Beniwal et al., 1992 and Koblet and Candolfi-Vasconcelos, 1995). El-Shenawy and Fayed (2005) concluded that adding humic acid with organic fertilizer increased yield of Crimson Seedless grapevine significantly than organic fertilizer alone. These results are in accordance with those found by (Bhangoo et al., 1988) on Thompson seedless.

The significant increase of number of clusters and cluster weight with regard on yield/vine, it is obvious that the applied bread yeast combined with organic fertilizer resulted in significant increase in the yield/vine. This may due to the beneficial effect of both bio and nitrogen organic fertilizer together on the absorption and efficiency of plant nutrients. The obtained results are in accordance with those of EL-Boray et al., (2004).

**4.2. Physical characteristics of berries**

The enhancement effect of bread yeast on physical characteristics of berries of Thompson seedless might be because of yeast richness in protein and its B vitamin group content (thiamin, riboflavin and pyridoxines), and yeast are also prolific producers of vitamins, amino acid, hormones and other growth regulating substances (Harrison, 1968). Moreover, bread yeast contains tryptophan which consider precursor of IAA, so it increases size of fruit (Moor, 1979). Concerning the effect of bread yeast concentrations it was clearly observed that with increasing concentrations used significantly increased physical characteristics of berries (No. of berries/cluster, weight of 100 berry, length and diameter of berries and Juice density. These effects of bread yeast might play a role in the synthesis of protein and nucleic acids which enhances cell division and enlargement leading to number, weight, length, diameter of berry increases. Findings in this study are on line with those found by Natio et al., (1981) and Akle et al., (1997). Increasing the number of berries per cluster by using nitrogen organic fertilizer (as foliar spraying) may due to its positive effect on cell division and elongation which lead to improve growth; berry set and cluster number per vine, which reflected on improvement of the yield per vine (Ribereau-Gayon and Paynoud, 1978; Champagnol,

1978). The promoting effect of organic fertilization on fruit quality was mainly attributed to their essential role in enhancing organic foods especially total carbohydrates and plant pigments which is reflected on advancing fruit maturity (Nijjar, 1985). The positive effect of organic fertilizer treatments on berry weight, size and diameter may be attributed to the increase of organic matter content and improvement of the structure and physical properties of the soil (Gamal, 1992). The effect of organic fertilizer concentrations on physical characteristics of berries was clearly observed. The positive effects of interaction of bread yeast and organic fertilizer on berry dimensions could be due to increasing uptake of various nutrients, active photosynthesis process, cell division and cell enlargement by the physical mutants of yeast which considered as a source of IAA and cytokinins hormones.

### 4.3. Chemical characteristics of berries

IncreasingTSS% may due to hydrolysis of starch into sugars as it is completed, no further increase in TSS could be detected and subsequently a decline in this parameter predictable since sugars along with other organic acids are primary substrates used for respiration (Gerasopoulos and Drogoudi, 2005). Moreover, the positive effects of bread yeast application on berry chemical properties i.e. TSS%, TSS/Acid ratio and the negative effects on acidity % in the grape juice could be attributed to the enhancement effects of photosynthesis processes and increasing promoter hormones as cytokinins (Moor, 1979), it is well known that these hormones induce a considerable amount of sugar contents and consequently caused an increase in TSS%, TSS/acid ratio and a decrease in acidity % in the grape juice. Results in this study are in agreement with those found by Gaser et al., (2006) Besides, Gouble et al., (2005) recorded that the increase in TSS during fruit development is normally linked to changes in fruit color and ethylene production. Fawzi and Eman (2004) found that spraying bread yeast significantly increased TSS and TSS/acid ratio and reduced the total acidity in berry juice of Flame Seedless Grapevines. The above findings agreed with those reported by (Mansour et al., 2011 and Ayman, 2011). Yeo et al., (2000) found that bread yeast contains trehalose- 6-phosphate synthase which is a key enzyme for trehalose biosynthesis. Trehalose affects sugar metabolism as well as osmoprotection against several environmental stresses. These results are in line with that obtained by Barnett et al., (1990) and Mady (2009). The improvement in quality of berries due to spraying bread yeast was supported by Makhij'a et al., (1990) on “Perlette” Grapes on TSS, acidity and TSS/TA ratio.

## References

Al-Atrushy, S.M.M. 2012. Effect of foliar application of humic acid and bread yeast on some vegetative growth characteristics, yield and quality of Grape (*Vitis vinifera* L.) cv. Rash-Mew under non irrigated condition. *Journal of University of Duhok*, 15 (1). p.36-43.

Ahlawat, V. P. and Yamdagni, R. (1988). Effects of Various Levels of Nitrogen and Potassium Application on Growth Yield and Petiole Composition on Grapes cv. Perlette. Progressive Horticulture 20 (3-4), 190-196.

Ahmed-Kamelia, I. A.; Mostafa, F. M. A. and El-Bolock, A. A. (2000). Effect of yeast application of bud burst, physical and chemical characteristics of grape berries in king ruby. Cultivar during growth stages. L-effect of applied yeast on bud burst, yield components and winter pruning wood weight. *Assiut .J. Agric. Sci., 31(4): 193-205.*

Akl, A. M.; Ahmed, F. F.; E-Morsy, F. M. and Ragab, M. A. (1997).The beneficial effects of biofertilizers on red roomy grapevines (*Vitis vinifera* L.) the effect on berry set, yield and quality of berries. *Annals of agric, sci., moshtohor.,* 35(1): 497-502.

Ali , M.A., El-Gendy, S.S and El- Shal, S.A. (2006). The role of humic acid in reducing mineral fertilizer rates applied in vineyards. *Journal of Agriculture Sciences*. Mansoura University. 21(11).p202-224.

Al-Saidi, I. H. 2000. Grape Production. 1st Edi, Mosul University Press, Dar-Alkutub for printing & publishing. Mosul. Iraq.

Ayman A. H. (2011). Effects of spraying some chemical compounds on fruit set and fruit characteristics of ' Le Conte ' pear cultivar. *J. Hort. Sci. & Ornamen. Plants*, 3(1): 55-64.

Barnett, J.A., Payne, R.W. and Yarrow, D. 1990. Yeast Characteristics and Identification, 2nd Ed. Press, Cambridge Univ., London, UK. p.999-1012.

Beniwal, S. B.; Gupta, O. P. and Ahlawat, V. P. (1992). Effect of foliar application of urea and potassium sulphate on physicochemical attributes of grapes (Vitis vinifera L.) cv. Perlette. *Haryana J. Hort. Sci*. 21(4): 161-165.

Bhangoo , M.S., Sudanagunta, V.R. and Pertrucet, V.E. (1988). Application of poultry manure influence on Thompson seedless grape production and soil properties. *Hortsscience.* 23 (6). P. 1010-1012.

Champagnol, F. (1978). Fertilization optimal de la vigine. Progress Agricole et Viticole 15 & 16: 423-440.

Delas, J. (1981). Les oligo- elements ey la Vigne, Vititechnique 45: 4-6.

Dhillon. B. S. and Aulakh, B. S. (1972). Foliar Fertilization on AnabShahi grapes. Punjab Agric. Univ. J. Res. 9:71 pp.

EL-Komy, H. M. and Wahab, A. M. A. (1998). Effect of simultaneous inoculation of Azospirillum fixation of two legumen using the N-isotope diluation technique (IDT) and the different method (DM). *Acta Microbiologica. Polonica*, 47(3): 283-296.

El-Shenawy, F.E. and Fayed, T.A. 2005. Evaluation of the conventional to organic and bio-fertilizers on Crimson Seedless Grapevine in comparison with chemical fertilization 2-Yield and fruit quality. *Egypt Journal of Applied Sciences.* 20 (1). p.212-225.

Eman, A.A., Saleh, M.M.S. and Mostafa, E.A.M. (2008). Minimizing the quantity of mineral nitrogen fertilizers on grapevine by using humic acid, organic and bio- fertilizers, *Res.J. of Agric. And Biol.Sci.* 4 (1). P. 46-50.

Fawzi, M.I.F., Haggag, L.F., Shahin, M.F.M., Merwad, M.A. and Genaidy, E.A.E. (2014). Influence of spraying urea, born, and active dry yeast on growth, yield, leaf chemical composition and fruit quality of "Superior" Grapevines (*Vitis vinifera* L.) grown in sandy soil conditions. *Middle East Journal of Applied Sciences.* 4 (3). p.740-747.

Ferguson, J.J., Aving, W.T., Allen, L.H. and Koch, K.E. 1995. Growth of $CO_2$ enriched sour orange seedlings treated with Gibberellic acid and cytokinins. *Proc. Florida-State Hort. Soc*. 99. p.37-39.

Gamal, A. A. (1992). Effect of soil conditioners on soil properties and plant yield. M.Sc. Thesis, Fac. Agric. AL-Azhar Univ., Egypt.

Gerasopoulos, D. and Drogoudi, P. D. (2005). Summer- pruning and preharvest calcium chloride sprays affect storability and low temperature breakdown incidence in kiwifruit. *Post-Harvest Biol. Techno.* 36: 303-308.

Ghosh, S.N., Tarai, R. and Pal, P.P. 2008. Performance of eight grape cultivars in laterite soil of west bengal. Proceedings of the International symposium on grape production and processing. *Acta Hort*. (785). p.73-77.

Gouble, B.; Bureau, S.; Grotte, M.; Reich, M.; Reling, P. and Audergon, J. M. (2005). Apricot postharvest ability in relation to ethylene production: Influence of picking time and cultivar. *Acta Horticulture*, 682, 127-134.

Gowda, V.N., Keshava, S.A. and Shyamalamma, S. 2008. Growth, yield and quality of Bangalore Blue grapes as influenced by foliar applied poly feed and multi-K. Proceedings of the International Symposium on Grape Production and Processing. *Acta Hort.* (785). p.207-211.

Harrison, J. S. (1968). Characteristics of food yeast. Proce. Biochem. Acad. Press. New York and London. 8. P. 59-62.

Kassem, H.A. and. Marzouk, H.A. 2002. Effect Of Organic And/Or mineral nitrogen fertilization on the nutritional status, yield and fruit quality of Flame seedless grapevines grown in calcareous soils. *Res. Agric. &. Biol. Sci.* 4 (1). p.46-50.

Koblet, W., Candolfi- Vasconcelos, C (1995). Development of the canopy and grape quality Abs. And Weinbau 131 (18): 468-470.

Kolble, H., Neineke, H.S. and Zhang, W.L. 1995. Differences in organic and mineral fertilization on potato tuber yield and chemical composition compared to model calculation. *Agribiol. Res.* 48 (1). p.63-73.

Mady, M. A. (2009). Effect of foliar application with yeast extract and zinc on fruit setting and yield of faba bean (Vicia faba L.). J. Biol. Chem. Environ. Sci. 4(2): 109-127.

Mahmoud, Y.A. (1996). Studies on histophysiological effects of hydrogen cyanamide (dormex) and yeast application on bud fertility vegetative growth and yield of "roumired" grape cultivars ph. D. Thesis. Fac. Agric. Assiut univ. Egypt.

Mohammed, S. M. and Abdulqader S. M. (2007). Effect of foliar application of Nitrogen and Magnesium on Grapevine cv. Taifi under non- irrigated condition. *Journal of University of Duhok*., 10 (2): 70- 74.

Montasser, A.S., El-shahat, N., Ghobreial., G.F. and El- wadoud, M.Z. (2003). Residual effect of nitrogen fertilizer on leaves and fruits of Thompson seedless grapes. *J. Environ. Sci.* 6 (2) . p. 465-484.

Moor, T.C. (1979). Biochemistry and physiology of plant hormones. Pub. By Springer-Verlag., New York, USA.

Natio , K.; Nagama, S.; Furye, K. and Suzuki, H. (1981). Effect of benzyl adenine on RNA and protein synthesis in intact bean leaves at various stages of agein. Plant Physiol., 52: 342-348.

Nijjar, G. S. (1985). Nutrition of fruit trees. Published by Mrs Usha Raj umar for Kalyani, India, New Delhi, pp: 10-52.

Saleh, M. M. S.; El-Ashry, S. and Gomaa, A. M. (2006). Performance of Thompson Seedless Grapevine (Vitis vinifera L.) as Influenced by Organic Fertilizer, Humic Acid and Biofertilizers under Sandy Soil Conditions. *Res. J. Agric. & Biol. Sci*., 2(6): 467-471.

Tehranifar, A; M. Zarei; B. Esfandiyari and Z. Nemati (2010). Physicochemical properties and antioxidant activities of pomegranate fruit (Punica granatum) of different cultivars grown in Iran. *Hort. Environ. Biotech.*, 51(6): 573-579.

Tourky, M.N., El-Shahat, S.S. and Rizk, M. H. (1995). Effect of Dormex on fruit set, quality and storage life of Thompson seedless grapes (Banati grapes). J. *Agric. Sci*., Mansoura Univ., Egypt. 20(12): 5139-5151.

Warring, P. E.; Phillips, I. D. G. (1973). The control of growth and differentiation in plants. E L B S ed., Pub by Pergamon Press Ltd. VK.

Yeo, E.; HawkBin, K.; SangEun, H.; JoonTak, L.; JinChang, V.; MyungOk, B.; Yeo, E. T.; Kwon, H. B.; Han, S. E.; Lee, J. T.; Ryu, J. C. and Byun, M. O. (2000). Genetic engineering of drought resistant potato plants by introduction of the trehalose-6-phosphate synthase (TPSI) gene from Saccharomyces cerevisiae. *Mol. Cells* 10(3): 260-268.