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Quality of grape as influenced by foliar spray of zinc and boron

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Abstract

A field experiment was conducted at Horticulture farm, Rajasthan College of Agriculture, Udaipur. The experiment comprised of sixteen treatment combinations consisting of four levels of zinc and boron (0, 0.2, 0.3 and 0.4%). The foliar spray of zinc and boron were done at pre-bloom and after fruit set stages. Foliar spray of zinc at 0.4% gave the maximum juice content (71.87%), ascorbic acid (8.04 mg/100 ml juice), TSS (21.72%), reducing sugar (4.54%), non-reducing sugar (1.76%), total sugar (16.30%) and gave lowest acidity (0.61%), while foliar spray of 0.2 per cent boron gave the maximum juice content (72.02%), Ascorbic acid (8.18 mg/100 ml juice), TSS (21.47 %), reducing sugar (14.50 %), non-reducing sugar (1.71%) and Total sugar (16.22%) and gave lowest acidity (0.60%).

Key words: *Berry size, foliar spray, fruit set, and oxidation-reduction, pre-bloom*

Introduction

Grape is one of the most delicious, refreshing and nourishing fruit of the world. In India, grape is cultivated in Andra Pradesh, Maharashtra, T.N., Karnataka, Punjab, Haryana, Himachal Pradesh and Rajasthan. It requires a long dry and moderately hot season during maturity of canes and ripening of berries followed by a cool winter. In India 90 per cent produce of grapes is consumed as fresh table grapes and the remaining for raisins and wine making.

Despite the fact that grape can have an important place in the state of Rajasthan, less attention has been given to improve the quality. One of the most important steps which can ensure lucrative income from grape growing is the proper feeding and judicious nutrition to the vines. Among the various macro and micronutrients zinc and boron are important in viticulture. Zinc is required for the normal development of leaf, shoot elongation, pollen formation, fruit set and berry development (Christensen, 1975). Similarly boron is essential for the regulation of carbohydrate metabolism and normal fruit set. It also increases bunch and berry size and sugar content of juice. No attempt appears to have been made for such studies in case of grape in Rajasthan and thus the present investigation has been taken up.

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Materials and methods

The investigation was carried out at nine year old uniform grape vines *cv.* Thompson Seedless, trained on 'Pergola' system at Horticulture farm, Rajasthan College of Agriculture, Udaipur during January, 2001 to June, 2001. The soil of orchard was clay loam in texture, having pH 8.0, total nitrogen 0.073%, available P_2O_5 12.11 kg/ha, available K_2O 252.00 kg/ha, zinc 0.391 ppm and boron 1.2 ppm. Sixteen treatment combination consisting of four levels of zinc and boron (0, 0.2, 0.3 and 0.4%) were laid out in factorial randomized block design with three replications. The foliar sprays of zinc and boron were done at pre bloom and after fruit set stage

Results and discussion

Juice content

Foliar spray of zinc had the significant effect on the juice content of grape (Table 1). The maximum juice content was recorded in treatment Z_4 (0.4%) and minimum in control (67.08%). There is no significant difference between Z_3 and Z_4. Hence at par w.r.t. juice content. The results of the present investigation corroborate the findings of Gonzalez *et al* (1994) in orange.

The application of boron also significantly increased the juice content. The maximum juice content was recorded in treatment B_2 (0.2%) and minimum in control. The possible explanation for the increase in juice content as a result of boron treatment may be due to the fact that increase in boron status of the vine which in turn increased the juice content. It was also noticed that the nitrogen uptake was

Table 1. Effect of spray of zinc and boron on quality of grape

Treatments	Juice Content (%)	Ascorbic acid mg/100 ml juice Juice	Acidity (%)	T.S.S (%)	Reducing sugar (%)	Non-reducing sugar (%)	Total sugar (%)
Zinc Spray							
Z_1 Control	67.08	7.91	0.64	19.01	12.65	1.56	14.21
Z_2 0.2 %	69.91	7.98	0.62	20.74	13.82	1.64	15.47
Z_3 0.3 %	71.68	7.99	0.62	21.15	14.09	1.70	15.79
Z_4 0.4 %	71.87	8.04	0.61	21.72	14.54	1.76	16.30
C. D at 5 %	1.556	N S	N S	0.55	0.20	0.03	0.21
Boron Spray							
B_1 Control	68.03	7.96	0.65	19.57	13.05	1.63	14.69
B_2 0.2 %	72.01	8.18	0.60	21.47	14.50	1.71	16.22
B_3 0.3 %	70.80	7.93	0.62	20.90	13.91	1.68	15.60
B_4 0.4 %	69.69	7.85	0.62	20.69	13.63	1.64	15.27
C D at 5 %	1.55	0.12	0.02	0.55	0.20	0.03	0.21

the highest with boron treatment. Walter *et al* (1997) reported that boron application increased the nitrogen uptake. This higher nitrogen content in the plants increased the berry size, which in turn, increased the juice content.

Ascorbic acid

The data presented in Table 1 showed that application of zinc at different levels had non-significant effect on ascorbic acid content and the maximum increase in ascorbic acid content was recorded in Z_3 (8.048 mg/100 ml juice) followed by Z_2 (7.990 mg/100 ml juice) and Z_1 (7.981 mg/100 ml juice). The maximum ascorbic acid content was recorded in treatment Z_4 (0.4%) and minimum in control.

Boron also increased the ascorbic acid content significantly but with increasing concentration beyond B_2 (0.2%) it reduced the ascorbic acid content. The present results are in agreement with the findings of yadav (1998) in guava.

Acidity

Foliar application of zinc had no effect on acidity (Table 1).The foliar spray of boron at different levels had significant effect on acidity in grape juice. The minimum acidity was recorded in treatment B_2 (0.60%) and maximum in control (0.65%). The lowest acid content recorded under treatment B_2 might be due to the reason that the boron helps in conversion of acid into sugar. Similar findings were reported by Hoggag *et al.* (1995) in mango.

Total soluble solids (TSS)

Foliar application of zinc influenced the T.S.S content of grape (Table 1).The maximum T.S.S content was recorded in treatment Z_4 (0.4%) and minimum in control. The increase in TSS content might be due to the fact that it increased photosynthetic activity in the vine, which might have resulted in production of more sugar in grape. Similar results were also reported by Bacha *et al.* (1997) in grape.

The foliar spray of boron at different levels had significant effect on TSS content of grape. The maximum TSS was recorded in treatment B_2 (0.2%)and minimum in control. The increase in TSS by boron treatment might be due to its physiological role in nitrogen metabolism.

Reducing sugar, non-reducing sugar and total sugar

The foliar spray of zinc influenced the reducing sugar, non-reducing sugar and total sugar in grape (Table 1). The maximum reducing sugar (14.54%), non-reducing sugar (1.76%) and total sugar (16.30%) were reported with treatment Z_4(0.4%) and minimum in control. The improvement in the sugar of fruits might be due to improved auxin content with the application of zinc and it also acted as catalyst in oxidation-reduction process. Similar results were reported by Agaev (1985) and Alekperov (1985) in grapes.

The application of boron as foliar spray significantly enhanced the reducing, non-reducing and total sugar in grapes. The maximum reducing (14.50%), non-reducing (1.71%) and total sugar (16.22%) were recorded in treatment B_2 (0.2%) and minimum in control. The improvement in quality of fruits in terms of increase in sugar content might be attributed to enzymatic reactions like hexolumax and formation of cellulose and also acted as catalyst in oxidation-reduction process (Levitt, 1972). Similar findings were also reported by Hoggag *et al.* (1995) in mango.

References

Agaev, N.R.1985. Effectiveness of minor elements for the foliar nutrition of grape vines. Vinodelie- i -vinogradarstvo- SSSR, 6,51-52.

Alekperov, I.N. 1985.Effect of micro elements on the productivity and quality of Tavriz grape vines. Vinodelie-i -vinogradarstvo-SSSR, 6,49

Bacha, M.A., Sabbah, S.M. and Hamady, M.A. 1997. Effect of foliar application of iron, zinc and manganese on yield, berry quality and leaf mineral composition of "Thompson Seedless" and "Roumy Red" grape

cultivars. Journal of King Saud University, *Agricultural Sciences*. 9: 127-140.

Christenson, L.P 1975. Zinc deficiency in vineyards. Calif coop. Ext. Eresno Country Bull., p. 12

Gonzalez, R., Carrion,M., Siso, J.A. and Charlot,T. 1994.Effectivity of the application of lignomosulphonates of micro elements to some crops. Io-anon-de-la-Eastacion-*Experimental-Agronomica de-Santiago-de-las*. 213-223.

Hoggag, L.F., Maksoud, M.A. and El-Barkouky, F.M.Z. 1995.Effect of boron sprays on sex ratio and fruit quality of mango (*Mangifera indica L*) *cv* Hindi Be Sinnara. *Annals of Agricultural Science*. 40(2): 753-758.

Levitt.,J. 1972. Effect of zinc on sugar : Responses of plants to environmental stress. Academic Press. New York, London.

Walter, T., Warren, B.M. and Frank, N.F. 1997.Foliar diagnosis : Boron in relation to the major elements in apple trees. In: *Procceding of Amercian Society of Horticultural Science*. 47: 26-34.

Yadav, P.K. 1998. Note on yield and quality parameters of guava as influenced by foliar application of nutrient and plant growth regulators. *Current Agriculture*. 22(1/2) : 117 - 119.