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Effect of Biozyme Fruit on Fruit Set, Yield and Quality of Apple cv Red Delicious

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Abstract

Investigations were carried out to assess the influence of biozyme fruit on fruit set, yield and quality of apple cv Red Delicious during 2006 and 2007. There were four treatments of biozyme fruit spray viz. T_1—1.0 ml/liter of water, T_2—1.50 ml/liter of water, T_3—2.0 ml/liter of water and T_4—Control (water spray). Biozyme fruit was applied thrice at pink bud stage, petal fall stage and fruit setting stage (25 days after second spray). Plants treated with biozyme fruit at the rate of 1.5 ml per liter of water (T_2) resulted in higher fruit set, more yield, higher fruit weight and volume, more TSS, total sugars and shelf life. Fruit drop and acidity were least under this treatment. Fruits were more colored and also maturated earlier with this treatment.

Key words : Biozyme fruit, Fruit production, Quality, Apple, Red delicious.

Apple is the most important temperate fruit crop grown mainly in the states of Jammu and Kashmir, Himachal Pradesh and Uttarakhand. Among these the state of Jammu and Kashmir has emerged as the largest apple producing region in the country and has made significant progress during the last decade as the area has increased 16 times, production by about 60 times and productivity by 5 fold. But the productivity of apple is quite low (10.27 MT/ha during 2006-07) as compared to other horticulturally advanced countries. One of the main causes for this is the low availability of essential nutrients as the farmers are only supplying N, P and K fertilizers and that too indiscrimately. Biozyme fruit which contains GA_3, Zeatin, IAA, enzymes and hydrolyzed protein complexes and micronutrients is a bio-fertilizer, non-toxic and natural organic product based on freshly harvested sea weed *Ascophyllum nodosum.* Application of biozyme which is reported to improve the productivity and quality of cereal and vegetable crops by supplying the natural hormones and improving the availability of macro- and micro-nutrients can also improve the productivity and quality of apples. Therefore, the present investigation was undertaken to study the influence of biozyme fruit on fruit set, yield and quality of apple cv Red Delicious.

Methods

The present investigation was carried out in the experimental orchard of Division of Pomology, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar, Srinagar during the years 2006 and 2007. There were four treatments of biozyme fruit spray viz. T_1—1.0 ml/liter of water, T_2—1.50 ml/liter of water, T_3—2.0 ml/liter of water and T_4—Control (water spray). Biozyme fruit was applied thrice at pink bud stage, petal fall stage and fruit setting stage (25 days after second spray). The experiment was laid out in the randomized block design with six replications. Uniform trees of Red Delicious apple were selected for recording different observations. Per cent fruit set was calculated at fruit let stage by using the formula suggested by Westwood (1). Fruit drop was calculated by counting the number of fruits that reached to maturity.

Fruit yield was estimated by taking weight of all the fruits harvested from the tree under each treatment and expressed as kg/tree. Fruit weight was determined by weighing 15 fruits obtained from each experimental plant on a common monopan balance and expressed in grams. Fruit volume was determined by water displacement method. Fruit TSS was measured with the help of hand refractometer. Titratable acidity was determined by titration method and values were expressed as percentage of malic acid (2). Total sugars were determined by Lan and Eynon method (3). Days taken to harvesting were calculated by counting the days from full bloom till matu-

Table 1. Effect of biozyme fruit on fruit set, yield and quality of apple cv Red Delicious (pooled data for two years). *Based on 4-point scale : 0—25% red color-1, 26—50% red color-2, 51—75% red color-3, 76—100% red color-4.

Treatments	Fruit set (%)	Fruit drop (%)	Fruit yield (kg/tree)	Percent increase in fruit yield over control	Fruit weight (g)	Fruit volume (cc)	TSS (^{0}B)	Acidity (%)	Total sugars (%)	Fruit color* (%)	Harvesting (days from full bloom)	Shelf life (days)
T_1	52.19	9.92	50.10	20.00	207.21	206.67	14.5	0.15	10.10	3.48	162	67
T_2	54.16	8.11	52.19	25.01	214.88	216.67	15.5	0.12	10.93	3.68	160	72
T_3	53.75	10.82	49.27	18.01	196.67	200.00	14.7	0.14	10.31	3.50	160	66
T_4	49.56	16.36	41.75	–	175.63	176.67	14.2	0.16	8.98	3.30	165	61
$CD_{(0.05)}$	1.46	1.62	9.92	–	6.41	9.56	0.36	0.03	0.38	0.11	1.73	1.91

rity. Fruit color was determined on 4-point scale as given by Blanpied (4) i.e. 0—25% red color-1, 26—50% red color-2, 51—75% red color-3, 76—100% red color-4. The data generated from two years study were pooled and subjected to statistical analysis.

Results and Discussion

Application of biozyme fruit at different concentrations resulted in significant increase in fruit set (Table 1). Highest fruit set was obtained in T_2 (54.16%) followed by $T_3$and T_1. However, fruit drop was highest in control plants (T_4) and lowest in T_2. Higher fruit set and lower drop in T_2 can be attributed to increased supply of IAA and hydrolyzed proteins with the application of biozyme fruit. These results are in agreement with the findings of Kumar et al. (5)

Plants treated with T_2 produced significantly more yield (52.19 kg/tree) which was 25.01% more than control plants followed by T_1 (50.10 kg/tree) and T_3 (49.27) (Table 1). However, control plants resulted in least yield (41.75 kg/tree). This could possibly be attributed to the enhanced uptake of macro- and micro-nutrients with the application of biozyme fruit.

Fruit weight (214.88 g) and fruit volume (216.67 cc) were found to be highest in T_2 followed by T_1 (207.21 g and 206.67 cc) and T_3 (196.67 g and 200.00 cc) (Table 1). This may possibly be due to more supply of IAA and GA_3 which are mainly responsible for cell division and cell enlargement. These results are in line with EL-Sayed (6) and Sontakke et al. (7). However, lowest fruit weight and volume were recorded in control plants (175.63 g and 176.67 cc).

Fruit chemical characteristics were also appreciably influenced by different biozyme fruit treatments (Table 1). Highest fruit TSS (15.5 ^{0}B) and total sugars (10.93%) and lowest fruit acidity (0.12%) were observed with T_2. This could possibly be due to conversion of starch to sugar and higher uptake of nutrients in the treated plants.

Fruits of the plants treated with T_2 attained more color (3.68%) followed by T_3 and T_1 (Table 1). However, the fruits of the control plants were least colored. This could be due to more anthocyanin synthesis in the treated plants. Fruits of the plants treated with T_2 and T_3 attained early maturity (160 days after full bloom). Fruits of the plants treated with T_2 had prolonged shelf life (70 days) followed by T_1 (67 days) and T_3 (66 days).

Thus it can be concluded that application of biozyme fruit at the rate of 1.5 ml per liter of water (T_2) at pink bud stage, petal fall stage and fruit setting stage (25 days after second spray) resulted in enhanced production and quality of Red Delicious apples.

References

1. Westwood M. N. 1993. Temperate zone pomology. W. H. Freeman and Co., San Francisco.
2. Rangana S. 1986. Hand book of analysis and quality

control for fruit and vegetable products, 2nd edition. Tata McGraw Hill Publ. Co., New Delhi, India.
3. AOAC. 1980. Official methods of analysis of the Association of Analytical Chemists. Benjamin Franklin Station, Washington, DC, USA.
4. Blanpied G. D. 1979. Predicting early harvest maturity dates for Delicious apples in New York. Hort. Sci. 14 : 710—711.
5. Kumar P., S. D. Dube and V. S. Chauhan. 2000. Photosynthetic response of bell pepper to biozyme in relation to fruit yield. Veg. Sci. 27 : 54—56.
6. El-Sayed S. F. 1995. Response of three sweet pepper cultivars to biozyme under unheated plastic house conditions. Scientia Horticulturae 61 : 285—290.
7. Sontakke M. B., S. S. Sarsamkar, N. H. Kulkarni and P. M. Machewad. 2003. Effect of navzyme and biozyme on yield and quality of okra. J. Soils and Crops 13 : 231—233.