

## **Effect of foliar sprays of Zinc and Boron on the physical parameters of aonla (*Emblica officinalis* Gaertn.) fruits cv. BANARASI**

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### **ABSTRACT**

A field experiment was conducted during 2006 at Kanpur on thirty five year old aonla trees, to study the effect of foliar sprays of zinc and boron on the physical parameters of aonla (*Emblica officinalis* Gaertn.) fruits cv. BANARASI, revealed that fruit drop, fruit size (length and breadth), weight, volume, specific gravity and yield were maximized when foliar spray was done with 2% boron  $\pm$  5% zinc sulphate.

**Key words :** Aonla, Boron, Zinc, Physical parameters, Yield.

**A**onla or Indian gooseberry (*Emblica officinalis* Gaertn.) belongs to the family Euphorbiaceae and sub family Phyllanthoidae with the chromosome number  $2n = 28$ . It is suitable for semi-arid and arid regions and withstands well in salinity and drought conditions. It is also suitable for various types of wastelands. The aonla fruit is also valued for its products like preserves (murabba), sauce, candy, dried chips, tablets, chayvanprash, Trifla, Jellies, pickles, and tophies powder. It is used for treatment of diseases like dysentery, bronchitis, diabetes, fever and other diseases. It is also used for pharma cordials and cosmetic products. Nutrients play vital role in the bearing and improving the fruit yield and quality. Among the trace elements zinc and boron play significant role in flowering and fruiting process, N-metabolism, hormonal movement and cell division (Babu and Singh, 2001). Boron and zinc increase the fruit set, reduce fruit drop and improve fruit quality in various fruit crops (El. Sherif *et al.*, 1997). The present investigation was, therefore, undertaken to study the effect of foliar sprays of zinc and boron on physical parameters of aonla fruits cv. Banarasi.

### **MATERIALS AND METHODS**

Thirty five year old aonla tree of Banarasi cultivar uniform in size and vigour growing in Horticulture Garden of C.S.Azad University of Agriculture and Technology, Kanpur – 208 002 were selected for the present investigation during 2006. Zinc sulphate 0.3% ( $T_1$ ), 0.5% ( $T_2$ ), 0.7% ( $T_3$ ), borax 0.1% ( $T_4$ ), 0.2% ( $T_5$ ),  $T_4+T_1$  ( $T_6$ ),  $T_4+T_2$  ( $T_7$ ),  $T_4+T_3$  ( $T_8$ ),  $T_5+T_1$  ( $T_9$ ),  $T_5+T_2$  ( $T_{10}$ ) and  $T_5+T_3$  ( $T_{11}$ ) along with a control ( $T_{12}$ ) were sprayed in 1<sup>st</sup>

week of March (4 March) and repeated in mid July (15 July). The experiment was laid out in R.B.D. with three replications. Both the minerals were applied through foliar feeding. Observations were recorded for fruit drop, fruit length, breadth, weight, volume, specific gravity and yield. The data so obtained were analysed statistically.

### **RESULTS AND DISCUSSION**

A perusal of data presented in Table 1 shows that significant response in fruit drop (52%) was recorded with spray of 0.2% borax + 0.5%  $ZnSO_4$  ( $T_{10}$ ) followed by 0.2% borax + 0.7%  $ZnSO_4$  (52.17) and  $T_9$  (52.37%) in comparison to control (55%). The similar findings were also reported by Ram *et al.* (1977) in aonla, Singh and Vashistha (1997) in ber. Reduction in fruit drop of aonla may be due to the increased level of auxin induced by zinc sprays. Their findings are in agreement with the observations of Awasthi *et al.* (1975) who reported that zinc is required for the synthesis of tryptophan, which is a precursor of auxin.

The maximum fruit length (4.41 cm) and breadth (5.07 cm) were measured with foliar the application of 0.2% borax + 0.5%  $ZnSO_4$  ( $T_{10}$ ) which was significantly superior than 0.1 borax + 0.7%  $ZnSO_4$  ( $T_8$ ) and minimum fruit length (3.67 cm) and breadth (4.35 cm) were recorded under control. The fruit weight of aonla differed significantly with the sprays of zinc and boron alone or in combination. The maximum fruit weight (48.16 g) was recorded when 0.2% borax + 0.5%  $ZnSO_4$  ( $T_{10}$ ) was sprayed. It was followed by 0.1% borax + 0.7%  $ZnSO_4$  (47.76g) while the minimum fruit weight (44.26g) was measured under control ( $T_{12}$ ). The findings are similar to

**Table 1 : Effect of foliar sprays of zinc and boron on the physical parameters of aonla**

Treatments	Fruit drop (%)	Fruit size (cm)		Fruit weight (g)	Specific gravity (g/cm <sup>3</sup> )	Fruit volume (cm <sup>3</sup> )	Yield (kg/tree)
		Length	Breadth				
T <sub>1</sub>	53.66	3.90	4.84	45.08	1.070	42.80	87.86
T <sub>2</sub>	54.40	3.80	4.92	45.51	1.075	43.78	94.80
T <sub>3</sub>	54.20	3.93	4.82	45.18	1.071	43.38	90.84
T <sub>4</sub>	53.97	3.77	4.94	44.43	1.020	42.12	94.13
T <sub>5</sub>	54.66	3.84	4.99	45.60	1.078	43.98	96.68
T <sub>6</sub>	53.44	4.07	4.96	45.87	1.083	44.01	89.15
T <sub>7</sub>	52.53	4.29	5.00	47.08	1.086	44.96	96.07
T <sub>8</sub>	52.63	4.32	4.98	47.76	1.088	45.10	95.16
T <sub>9</sub>	52.37	4.25	5.02	46.99	1.085	44.61	96.73
T <sub>10</sub>	52.00	4.41	5.07	48.16	1.091	45.57	104.80
T <sub>11</sub>	52.17	4.25	5.02	46.90	1.085	44.61	103.76
T <sub>12</sub>	55.00	3.67	4.35	44.26	1.065	41.83	77.16
S.E. ±	0.84	0.03	0.02	0.69	0.005	0.73	1.33
C.D. (P=0.05)	1.75	0.06	0.04	1.43	0.011	1.52	2.77

those reported by Singh *et al.* (2001) in aonla and Babu and Singh (2001) in litchi. The increase in fruit size and weight might be due to increased rate of cell division and cell enlargement leading to more accumulation of metabolites in the fruit (Babu and Singh, 2001).

The maximum volume of fruit (45.57 cm<sup>3</sup>) was recorded when foliar spray of 0.2% borax + 0.5% ZnSO<sub>4</sub> was done followed by 0.1% borax + 0.7% ZnSO<sub>4</sub> (T<sub>8</sub>) 45.10 cm<sup>3</sup>. Minimum fruit volume was observed (41.83 cm<sup>3</sup>) under control. Increase of fruit volume was mainly due to the fact that zinc and boron are growth promoting elements, playing the significant role in development of fruits. The results are inconformity with the observations recorded by Babu and Singh (2001), in litchi and Singh *et al.* (2001) in aonla.

The spray of micro-nutrients (zinc and borax) showed significant effect on improving the specific gravity of aonla fruits. It was recorded maximum when 0.2% borax + 0.5% ZnSO<sub>4</sub> (1.091 g/cm<sup>3</sup>) was applied followed by 0.1% borax + 0.7% ZnSO<sub>4</sub> (1.088 g/cm<sup>3</sup>). The minimum specific gravity was observed (1.065 g/cm<sup>3</sup>) under control. Similar finding are also reported by Singh *et al.* (2001) in aonla.

The foliar application of zinc and boron showed better response in improving the fruit yield of aonla. The highest fruit yield per tree was recorded with the foliar sprays of 0.2% borax + 0.5% ZnSO<sub>4</sub> (104.80 kg/tree) which was at par with 0.2% borax + 0.7% ZnSO<sub>4</sub> (103.76 kg/tree) followed by 0.2% borax (96.68 kg/tree). The minimum fruit yield (77.16 kg/tree) was recorded under the treatment T<sub>12</sub> (control). The increase in yield is obviously due to the consolidated effect of increased size and weight of fruits caused by foliar sprays of zinc and boron. Similar results have been reported by Ram *et al.* (1977) and

Dashora *et al.* (2005) in aonla.

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