

## Effect of Micronutrients on Fruit Set, Fruit Retention and Yield of Ber (*Zizyphus mauritiana* Lamk.)

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**Abstract** Studies on foliar applications of Fe, Zn, Mn, B in ber revealed that all nutrients increased flower clusters, shoot-1; fruit set, fruit retention, fruit weight and yield.  $ZnSO_4$  at 0.4%,  $FeSO_4$  at 0.4% and boric acid at 0.2% gave best results when sprayed in August-September. Application in July or October were not useful to increase yield.

**Key words** Ber, Micronutrients

Ber is an important indigenous fruit of India. In last decade, its cultivation has increased by many folds in Maharashtra, both under irrigated and unirrigated conditions. The situation invites standardizations in various cultural aspects. Ber cultivation faces natural problem of low fruit set and heavy drop (Singhota & Singh 1973, Singh *et al.* 1991). Micronutrient have been found useful in this regards in other fruit crops (Jadhav *et al.* 1979 Kumar *et al.* 1988) but no work has been done on this aspect on ber under Maharashtra condition. Reports from other part of the country are also scanty. Hence to see the effect of important micronutrients on yield attributes of ber, the present investigation was conducted.

### Materials and Methods

The experiment was conducted on 12 year old plants of cultivar Karaka planted at 5 x 5 m on light to medium soil with depth 30 to 60 cm and good drainage, but alkaline in nature (pH 8.2). The trees were pruned in 1st week of April. The fertilizers, irrigation and plant protection measure were taken as per recommendations. Experiment was laid out in Factorial Randomized Block Design having eleven foliar micronutrient treatments (10 micronutrients + 1 control) and four stages of application (Table 1) replicated thrice. The applications were done in the first week of July, first week of August, first week of September and first week of October, each as separate treatment. The applications were done in 1991 and 1992. The observations were recorded during 1992-93. Initial soil analysis was done.

### Results and Discussion

**Effect of micronutrient :** Foliar sprays of Zn, Mn, Fe and B increased the flower clusters shoot-1. The higher concentration of each micronutrient was better than the lower concentration, except boron. Amongst the micronutrients, 0.4%  $FeSO_4$ , 0.4% and 0.4%  $MnSO_4$  were better. However, they had no influence on flowers cluster-1. Spray in first week of August was found to give more flower clusters shoot-1.

The fruit set percentage was also significantly influenced by all the micronutrients (except the lower concentrations of boric acid and  $FeSO_4$ ) and the higher levels of micro-nutrients were better.  $MnSO_4$  at 0.4% and combination of all the micronutrients had maximum effect. Fruit retention was also better than control, in all the micronutrient treatments; the most effective being 0.4%  $ZnSO_4$ . Application in September had the highest fruit retention percentage.

The spray treatments had also significant influence on average fruit weight which varied from 17.3 to 19.4 g. The yield tree<sup>-1</sup> varied from 23.9 kg in control to 33 kg in 0.4%  $FeSO_4$ . All the micronutrient treatments were better than control. The most promising treatment being 0.4%  $FeSO_4$ , 0.4%  $MnSO_4$  and 0.2% boric acid.  $FeSO_4$  at 0.4% and  $MnSO_4$  at 0.4% were at par for flower cluster, fruit set percentage, fruit retention percentage and average fruit weight. However,  $FeSO_4$  at 0.4% had more flower clusters shoot-1 which might have resulted in higher yield than  $MnSO_4$  at 0.4%.

Table 1 Effect of different micronutrients and their time of application on yield parameters

Treatment	Flower cluster shoot <sup>-1</sup>	Flower Cluster <sup>-1</sup>	Fruit set (%)	Fruit retention (%)	Av. fruit wt. (g)	Yield tree <sup>-1</sup> (kg)
<b>Micronutrients</b>						
FeSO <sub>4</sub> 0.2%	24.3	16.1	5.35	2.69	18.1	29.4
FeSO <sub>4</sub> 0.4%	30.3	16.2	5.92	2.82	18.4	33.0
ZnSO <sub>4</sub> 0.2%	25.3	15.4	5.82	2.56	17.8	27.8
ZnSO <sub>4</sub> 0.4%	27.4	16.2	5.93	3.04	19.1	29.1
MnSO <sub>4</sub> 0.2%	24.8	16.2	5.55	2.00	18.8	28.4
MnSO <sub>4</sub> 0.4%	27.3	16.4	6.38	2.77	19.4	30.7
Boric acid 0.1%	25.0	15.8	5.16	2.00	18.2	27.8
Boric acid 0.2%	25.0	16.3	5.67	2.68	19.1	31.0
FeSO <sub>4</sub> + ZnSO <sub>4</sub> + MnSO <sub>4</sub> + Boric acid (0.2 + 0.2 + 0.2 + 0.1%)	24.6	16.3	5.90	1.96	17.7	28.2
FeSO <sub>4</sub> + ZnSO <sub>4</sub> + MnSO <sub>4</sub> + Boric acid (0.4 + 0.4 + 0.4 + 0.2%)	26.2	16.5	6.34	2.71	18.1	29.7
Control	20.8	15.9	4.89	1.43	17.3	23.9
SE	0.49	0.45	0.20	0.14	0.39	0.31
CD	1.38	NS	0.57	0.39	1.12	0.88
<b>Time of spray</b>						
July	27.6	16.8	5.50	2.27	17.8	28.4
August	30.7	17.3	6.05	2.71	18.4	32.5
September	25.2	15.5	6.90	3.19	19.8	30.7
October	20.6	15.1	4.75	1.93	17.9	26.4
SE	0.31	0.28	0.13	0.09	0.25	0.20
CD	0.87	0.81	0.36	0.25	0.71	0.56

*Effect of time of spray:* The sprays of micronutrients in first week of August gave significantly more flower clusters shoot<sup>-1</sup> and the flowers cluster<sup>-1</sup>. Under Maharashtra conditions, ber flowering commences in July and continues upto September, August being the peak period, and hence the observed influence of time of application is obvious. While fruit set and fruit retention percentages were higher with spray in 1st week of September which coincides with peak period of fruit set. These consequently resulted in higher yield. Thus, spraying in August and September was the best to improve yield. While, spray in July or October was not helpful to increase the yield.

The soil pH was 8.2. Under such conditions micronutrient availability is less. Moreover Zn content of soil (0.4 ppm) was in deficient range and Mn (3.6 ppm) and B (1.36 ppm) were not in higher range. Under such conditions beneficial effects of micronutrients are anticipated as observed in present investigation. Since ber possesses xerophytic physiological attributes and was considered minor crop in Maharashtra, it was not studied for micronutrient response. Joon *et al.* (1984) found increase in ber yield by Zn application. Such studies in several other crops have shown useful results (Desai *et al.* 1986, Bambal 1987, Raid *et al.* 1988). Hence, it is advocated to use foliar

applications of 0.4% each of FeSO<sub>4</sub>, ZnSO<sub>4</sub>, MnSO<sub>4</sub> and 0.2% Boric acid in August-September to increase yield of ber under semi-arid conditions of Maharashtra.

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