YIELDS ATTRIBUTES OF BER (ZIZYPHUS MAURITIANA LAMK.)
CV. GOLA AS INFLUENCED BY FOLIAR APPLICATION
OF FERROUS SULPHATE AND BORAX

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ABSTRACT

A field experiment was conducted on loamy sand soils at Bikaner (Rajasthan) during 2003-
2004. Foliar application of ferrous sulphate and borax at pea stage @ 0.6 per cent produced
maximum average fruit weight, fruit length, fruit breadth, pulp weight, stone weight, pulp to stone
weight ratio, fruit yield and net returns and benefit cost ratio of ber than the control and 0.3 per cent
spray of ber.

Ber (Zizyphus mauritiana Lamk.) is important fruit crop of arid and semi arid regions
of the country belonging to the family Rhamanaceae. Its tree is the most hardy, drought
tolerant plant. Its tap root system enables and survive under extreme moisture stress even when
the surface soil completely dries out. Fruits are rich source of ascorbic acid vitamins, total soluble
solids, proteins and carbohydrate. It is well documented that growth and yield of plants are
greatly influenced by a wide range of nutrients including micronutrients. Micronutrients
availability becomes a major limiting factor in Indian soils especially in areas which have high
free CaCO₃, Which can create problems of the deficiency of iron nutrition. (Ray Chaudhary and

Among micronutrients, iron is one of the important plant micronutrient which is essential
for plant growth and development (Marscher, 1986). Iron plays an important role in chloroplast
development and maintenance, plant metabolism and involved in the process of nitrogen fixation. (Jacobson and Oertli, 1957).

Iron is structural component of porphyrin molecules and structural component of non-
haeme molecules (Mengel and Kirkby, 1996). Apart from iron, boron is also important micro-
nutrient which plays a significant role in improving fruit set, their retention, fruit weight,
quality and yield. It is associated with translocation and transformation of sugars, cell
division, uptake of calcium by plant and K/Ca ratio (Zende, 1998). A number of nutritional
surveys have been conducted on various fruit crops but information of arid fruits in western
Rajasthan are meager inspite of their great importance and relevance. Therefore the present
study was undertaken to find out effect of iron and boron on fruit yield contributing characters
and economics of the ber.

The field experiment was conducted on loamy sand soil having pH 8.4 at Pemasar village
(Bikaner) during 2003-2004. The treatments consisted of four levels of ferrous sulphate viz.,
control, 0.3, 0.6 and 0.9 per cent and four levels of borax viz., control, 0.3, 0.6 and 0.9 per cent.
Which were applied as foliar spray in possible combinations. The foliar applications were done
twice, first at growth stage and second at pea stage. Eight year old ber plants (cv. Gola) were
used for testing the treatments which were pruned during the month of May 2003. Sixty four
plants were replicated in four replications. The experiment was laid out in randomized
block design.

(A) Effect of Ferrous Sulphate on Yield
Attributes : Data (Table 1) revealed that foliar application of ferrous sulphate 0.6 per cent
significantly increased the average fruit weight, fruit length, fruit breadth, pulp weight, stone
weight and pulp to stone weight ratio of ber over control and 0.3 per cent spray. Specific gravity
was not affected significantly due to ferrous
Table 1. Effect of foliar spray of ferrous sulphate and borax on fruit characters of ber

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Specific gravity (g cc⁻¹)</th>
<th>Pulp weight (g)</th>
<th>Stone weight (g)</th>
<th>Pulp: stone ratio</th>
<th>Fruit length (cm)</th>
<th>Fruit breadth (cm)</th>
<th>Average fruit weight (g)</th>
<th>Yield (kg tree⁻¹)</th>
<th>Net returns (Rs. ha⁻¹)</th>
<th>Benefit cost ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Ferrous sulphate (%)</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
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<tr>
<td>Control</td>
<td>0.995</td>
<td>24.778</td>
<td>1.871</td>
<td>13.24</td>
<td>4.08</td>
<td>2.97</td>
<td>26.65</td>
<td>78.26</td>
<td>66763.29</td>
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<tr>
<td>0.3</td>
<td>0.987</td>
<td>27.172</td>
<td>1.918</td>
<td>14.17</td>
<td>4.50</td>
<td>3.18</td>
<td>29.09</td>
<td>87.59</td>
<td>76521.01</td>
<td>3.992</td>
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<tr>
<td>0.6</td>
<td>0.979</td>
<td>29.434</td>
<td>1.959</td>
<td>15.02</td>
<td>4.82</td>
<td>3.37</td>
<td>31.39</td>
<td>95.89</td>
<td>85149.20</td>
<td>4.347</td>
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<tr>
<td>0.9</td>
<td>0.974</td>
<td>30.741</td>
<td>1.959</td>
<td>15.69</td>
<td>5.03</td>
<td>3.52</td>
<td>32.70</td>
<td>99.17</td>
<td>88297.44</td>
<td>4.409</td>
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<tr>
<td>SEm±</td>
<td>0.066</td>
<td>0.514</td>
<td>0.007</td>
<td>0.275</td>
<td>0.058</td>
<td>0.062</td>
<td>0.514</td>
<td>1.68</td>
<td>1840.02</td>
<td>0.096</td>
</tr>
<tr>
<td>CD (P= 0.05)</td>
<td>NS</td>
<td>1.465</td>
<td>0.021</td>
<td>0.783</td>
<td>0.244</td>
<td>0.176</td>
<td>1.465</td>
<td>4.80</td>
<td>5241.07</td>
<td>0.275</td>
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<tr>
<td>B. Borax (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
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<tr>
<td>Control</td>
<td>0.991</td>
<td>25.116</td>
<td>1.920</td>
<td>13.07</td>
<td>4.14</td>
<td>2.93</td>
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<td>29.47</td>
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<td>0.6</td>
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<td>1.931</td>
<td>15.12</td>
<td>4.79</td>
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<td>95.92</td>
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<td>0.9</td>
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<td>30.344</td>
<td>1.930</td>
<td>15.70</td>
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<td>3.52</td>
<td>32.28</td>
<td>98.29</td>
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<tr>
<td>SEm±</td>
<td>0.066</td>
<td>0.514</td>
<td>0.007</td>
<td>0.275</td>
<td>0.058</td>
<td>0.062</td>
<td>0.514</td>
<td>1.685</td>
<td>1840.02</td>
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<td>NS</td>
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<td>0.244</td>
<td>0.176</td>
<td>1.465</td>
<td>4.80</td>
<td>5241.07</td>
<td>0.275</td>
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<tr>
<td>CV (%)</td>
<td>2.33</td>
<td>7.34</td>
<td>1.55</td>
<td>7.57</td>
<td>7.43</td>
<td>7.57</td>
<td>6.87</td>
<td>7.47</td>
<td>9.30</td>
<td>9.46</td>
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</table>

NS = non significant
sulphate application. Ferrous sulphate 0.6 per cent significantly increased the average fruit weight, fruit length, fruit breadth, pulp weight, stone weight and pulp to stone weight ratio of ber by 17.79 and 9.16 per cent, 10.30 and 18.30 per cent, 7.07 and 13.46 per cent, 9.66 and 18.79 per cent and 13.44 and 7.02 per cent as compared to control and 0.3 per cent spray, respectively. The greater production of photosynthates and their translocation to economic sinks may be the reason of improved yield characters due to the spray of ferrous sulphate (Jacobson and Oertli, 1957). Secondly the reason for the increase in size might be due to foliar feeding of iron nutrient and consequently rapid fruit development caused by easy availability of iron to the plants. The findings are in accordance with the results obtained by Rajput and Singh (1976) and Chauhan and Gupta (1985) in ber.

(B) Effect of Borax on Yield Attributes:
Spray of borax of @ 0.6 per cent significantly increased the average fruit weight (15.01% and 5.53%), fruit length (15.70% and 6.20%), fruit breadth (15.69% and 6.27%), pulp weight (16.13% and 6.07%) and pulp to stone weight ratio (15.68% and 6.25%) over control and 0.3 per cent spray (Table 1). Stone weight was found at par with different levels of borax spray. The increase in fruit size and yield attributing characters might be due to the foliar feeding of borax and consequently rapid fruit development caused by the easy availability of boron to the plants. Boron is also associated in the cell division that might be another reason for increased fruit weight and size by rapid cell division. These findings are in close agreement with the results obtained by Chauhan and Gupta (1985) and Rajput and Singh (1976).

(2) Effect of Borax spray:
Ber fruit yield per tree was significantly increased up to 0.6% borax spray through the higher fruit yield was obtained with 0.9% which was statistically at par with 0.6% spray. The fruit yield increased by (22.2% and 9.5%) as compare to control and 0.3% spray respectively (Table 1). Net return /ha. increased significantly (26.5% and 10.18%) and benefit and cost ratio also increased significantly by (19.27% and 6.9%) with 0.6% borax spray over control and 0.3% respectively. The remunerative net returns and B: C ratio obtained under 0.6 per cent borax level was because of the increased fruit yield in comparison to the treatment cost involved.

REFERENCES