

Short Communication

Leaf Nutrient Status of Ber Orchards in Bikaner District

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Ber (*Ziziphus mauritiana* Lamk.) is a popular fruit crop of north India. It requires mineral nutrients and if the proper nutrient levels are not maintained in the leaves, the plant growth, flowering, fruiting and yields are adversely affected. Leaf nutrient status in fruit crops is an indicator of their growth and productivity. The present investigation was undertaken during year 1999-2000 to survey the orchards and to evaluate the macro and micronutrient contents in the ber leaves from different locations in Bikaner district.

Studies were conducted in 15 ber orchards in Bikaner district of Rajasthan. In each orchard, 8 to 10-year-old ber trees of uniform size and vigor were marked. The ber leaf samples were collected and processed as suggested by Bhargava *et al.* (1990). Sixth leaf, approximately 24-day-old, either from secondary or tertiary shoots were collected in the month of June from bearing plants from each orchard. The sample size was 40 leaves in each sample collected from all directions of the tree. Leaves collected from 10 trees were mixed

to get a representative sample of an orchard. These samples were washed, dried in an oven at 70°C for 24 hours, ground and analyzed for their nutrient content. N and P contents were determined colorimetrically (Jackson, 1967). Fe, Mn, Cu and Zn in the triacid digest of the leaves were determined with an atomic absorption spectrophotometer.

Large variations in the nutrient contents in ber leaves were recorded in samples collected from different orchards. The N content in leaves varied from 0.20 to 1.62% (Table 1). N content in leaf samples of 13 of the 15 orchards surveyed were found to be low probably due to low N status of soil (19.33 to 53.70 mg kg⁻¹), poor organic matter (0.09 to 0.31%), high pH (8.07 to 8.94) and inadequate application of nitrogenous fertilizers. This indicated that majority of the orchards surveyed were deficient in N content.

Phosphorus content varied from 0.09 to 1.08% (Table 1). 40% leaf samples were found sufficient and 60% samples were found high in phosphorus content. Adequate P content in ber leaves might be due to medium to high P status of orchard soils (11.33 to 27.60 mg kg⁻¹) and proper uptake and utilization by the plants, which is in

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Table 1. Contents of macro and micro nutrients in leaf samples of ber collected from orchards in Bikaner district

Locations	Macronutrients (% of oven dry basis)			Micronutrients (mg kg ⁻¹ of oven dry basis)				Ber cvs grown	FYM given per tree (kg)
	N	P	K	Fe	Mn	Cu	Zn		
	Nokha	1.22	0.33	1.23	99.03	7.28	9.03		
Nokha	0.83	0.51	0.72	199.60	13.48	10.69	6.05	Gola	20
Raisar	0.84	1.08	1.31	196.80	9.26	8.51	6.16	Gola	-
Raisar	0.20	0.44	1.42	172.44	6.35	8.28	5.24	Seb	20
Raisar	1.26	0.20	0.09	60.23	11.06	12.63	11.98	Gola	40
12 JMD	0.71	0.25	0.98	120.54	9.94	12.88	13.21	Gola	40
Bikaaner City	0.76	0.32	0.50	60.93	5.37	7.71	8.30	Gola	10
Kilchu	0.54	0.27	0.26	60.31	4.59	4.24	5.73	Gola	50
Khichiya	0.88	0.24	0.75	168.40	8.60	10.12	4.93	Umran	60
5 BSM	0.49	0.28	0.07	82.75	10.86	11.09	10.76	Gola	25
15 BSM	1.62	0.11	0.15	83.93	10.19	12.21	11.26	Seb	10
Garsisar	0.24	0.12	0.07	72.88	8.99	9.38	10.75	Gola	10
Shobhasar	0.43	0.09	0.12	85.25	5.20	5.72	4.35	Gola	20
Sharah Kazani	0.83	0.49	0.20	80.61	7.25	5.18	7.58	Gola	20
Sagar	0.76	0.37	0.23	72.97	10.56	12.25	11.00	Seb	20
Overall Mean	0.77	0.34	0.54	105.78	8.53	9.09	8.00		
Range	0.20- 1.62	0.09- 1.08	0.07- 1.42	60.23- 199.60	4.59- 13.48	4.24- 12.88	4.35- 13.21		
S.E. (+)	0.0987	0.0625	0.1268	13.0987	0.6562	0.7123	0.7523		
C.V.(%)	49.367	71.20	90.96	47.07	29.56	29.57	34.87		

conformity with the findings of Chawan and Patil (1980) and Reddy *et al.* (1991).

The K content in the leaves of ber trees varied from 0.07 to 1.42%. About 6% of the leaf samples contained sufficient while the remaining 93% leaf samples were low in K content. Low K in leaves might be due to medium K status in soil (59.62 to 109.59 mg kg⁻¹) as well as hidden hunger of plants for this nutrient. Similar observations were reported by Kanwar *et al.* (1963).

The Fe content ranged from 60.23 to 199.60 mg kg⁻¹. All leaf samples were low in Mn probably due to alkaline or

saline nature of soils. The salinity of soils in ber orchards at Bikaner varied from 0.18 to 0.78 dS m⁻¹, except at Sagar 1 (0.05 dS m⁻¹) and Khichiya 1 (0.08 dS m⁻¹). Cu content of ber leaves ranged from 4.24 to 12.88 mg kg⁻¹. About 20% of the leaf samples were low and the remaining 80% were sufficient in Cu content.

Zn content of ber leaves were ranged from 4.35 to 13.21 mg kg⁻¹ (Table 2). The low zinc status might be due high phosphorus that interfered with the availability of Zn. The results of present findings are in accordance with those

Table 2. Correlation, coefficients among different nutrient contents of ber leaves

	P	K	Fe	Mn	Cu	Zn
N	-0.018	-0.0414	-0.082	0.3471*	0.4101*	0.3110*
P		0.5828*	0.6219*	0.1283	0.1455	-0.3156
K			0.7389*	-0.0775	0.0138	-0.3392
Fe				0.3056*	0.1114	-0.4786*
Mn					0.8104*	0.4984*
Cu						0.7116*
Zn						

* Indicates significance at 1% level.

reported by Kanwar *et al.* (1963) and Rao (1993).

The N content in the leaf was positively correlated with Mn, Cu and Zn. It had non-significant relationship with P, K and Fe. The phosphorus content in trees had significant positive correlation with K and Fe, while it had a negative and significant correlation with Zn. The K content in trees had significant positive correlation with Fe and bore significant negative correlation with Zn. The iron content in plant leaves had significant positive correlation with Mn while it had negative correlation with Zn. The Mn content in tree leaves had significant positive correlation with Cu and Zn. The Cu content had significant positive correlation with Zn.

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