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Short Communication

Effect of Nitrogen and Phosphorus Application in Ber (*Ziziphus mauritiana* Lamk.)

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Ber (*Ziziphus mauritiana* Lamk), a poor man's fruit, is highly nutritive, cheap (Bal, 1982) and thrives well throughout the arid and semi-arid regions. It is extensively cultivated in Haryana, Punjab, Uttar Pradesh and Rajasthan. High yield of fruits exhaust the ber plants and the soil of essential elements needed for proper growth (Mehrotra *et al.*, 1987). Hence, various elements are required to be replenished regularly in sufficient quantities to keep the trees in healthy and productive condition. The present investigation was undertaken to test the effects of nitrogen and phosphorus applications on the plant.

The experiment was conducted on ten-years-old healthy and uniform plants of Umran ber at the experimental orchard of SKN College of Agriculture, Jobner, for four years (i.e., 1994-95, 1995-96, 1996-97 and 1997-98). The soil had pH of 7.80, EC 3.30 dS m^{-1}, available N 130 kg ha^{-1}, available P_2O_5 16 kg ha^{-1} and available K_2O 188 kg ha^{-1}.

The treatments comprised of four levels of N, i.e., N_0, N_1, N_2 and N_3 (0, 250, 500 and 750 g N $plant^{-1}$ $year^{-1}$) and three levels of P, i.e., P_0, P_1 and P_2 (0, 250 and 500 g P_2O_5 $plant^{-1}$ $year^{-1}$), leading to twelve treatment combinations. The treatments were replicated thrice with double plant plot in randomized block design with factorial approach. Half of N and full P were applied in soil as basal dose in the month of July. The remaining half dose of N was applied as top dressing at the time of fruit setting (November) every year. The field was irrigated immediately after application of fertilizers. The source of N and P were urea and single super phosphate. Uniform cultural schedules were followed in all the treatments during the course of investigation.

The girth of stem was measured at the height of 15 cm above the ground level with the help of measuring tape. Four current season shoots were randomly selected in each direction and their lengths were measured in all the four years. The plant spread was measured in south-north and east west directions. Other yield and quality parameters were determined according to the methods described in AOAC (1980).

Yield and quality attributes were significantly influenced by nitrogen and phosphorus application (Table 1). Maximum

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*Table 1. Effect of nitrogen and phosphorus on physico-chemical characteristics of ber**

Treatment	Shoot length (m)	Plant spread (m^2)	Stem girth (cm)	Fruit weight (g)	Pulp/stone ratio	TSS (%)	Acidity (%)	Yield (kg $plant^{-1}$)
N_0	2.40	20.22	45.07	19.00	11.12	15.99	0.105	41.77
N_1	2.68	21.38	418.38	20.33	12.05	17.14	0.113	50.14
N_2	2.93	24.09	51.24	23.30	15.18	16.69	0.120	60.38
N_3	2.84	20.77	45.31	21.64	14.33	15.38	0.119	57.10
SEm±	0.04	0.46	0.39	0.20	0.14	0.17	0.0006	1.06
CD (P_2 005)	0.12	1.27	1.09	0.57	0.39	0.46	0.0015	2.94
P_0	2.68	21.36	46.12	20.88	12.81	16.30	0.113	48.21
P_1	2.72	21.76	49.16	21.53	12.91	16.02	0.114	52.03
P_2	2.73	21.66	47.22	21.40	1378.00	16.58	0.115	56.42
SEm±	0.04	0.40	0.34	0.18	0.12	0.14	0.0006	0.92
CD (P_2 005)	NS	NS	NS	NS	0.33	NS	NS	2.55
N_0P_0	2.34	17.95	40.75	19.47	10.67	15.12	0.100	37.44
N_0P_1	2.39	21.05	46.71	19.65	11.49	16.02	0.105	42.70
N_0P_2	2.44	21.38	47.77	19.90	11.44	16.65	0.108	45.64
N_1P_0	2.79	22.05	47.99	19.80	11.44	16.57	0.112	47.37
N_1P_1	2.66	21.22	49.28	21.41	12.56	16.61	0.112	50.56
N_2P_2	2.59	21.02	47.85	19.93	12.17	18.21	0.116	52.50
N_2P_0	2.88	23.34	49.34	22.91	14.42	16.68	0.116	55.71
N_2P_1	2.96	24.06	53.73	24.73	14.98	16.12	0.120	58.37
N_2P_2	2.96	24.90	49.90	24.42	16.63	17.19	0.123	67.07
N_3P_0	2.99	21.84	46.82	21.25	14.70	16.81	0.124	54.34
N_3P_1	2.72	21.10	46.91	22.31	14.27	15.86	0.118	56.50
N_3P_2	2.81	19.37	42.20	21.34	14.02	13.91	0.115	60.44
SEm±	0.08	0.79	0.68	0.35	0.24	0.29	0.0012	1.84
CD (P_2 005)	0.21	2.20	1.89	0.98	0.67	0.80	0.0034	5.09

*Pooled mean of four years (i.e., 1994-95, 1995-96, 1996-97 and 1997-98).

shoot length (2.93 m), plant spread (24.09 m^2), stem girth (51.24 cm), fruit-weight (23.03 g), pulp/stone ratio (15.18), acidity (0.120%) and yield (60.38 kg $plant^{-1}$) were recorded at N_2 (500 g N $plant^{-1}$) treatment. The maximum TSS (17.14%) was observed at N_1 (250 g N $plant^{-1}$) treatment, but it was at par (16.69%) with the N_2 treatment. These findings are in agreement with the work of Singh *et al.* (1995) in ber.

In phosphorus application the maximum pulp/stone ratio (13.78) and yield (56.42 kg $plant^{-1}$) were recorded at P_2 (500 P_2O_5 $plant^{-1}$) treatment. Rest of the parameters were not affected significantly. Singh *et al.* have also reported similar results (1992).

Under interaction effects N_2P_2 (500 g N+500 g P_2O_5 plant^{-1}) treatment combination proved to be the best and exhibited highest yield (67.07 kg plant^{-1}) with better quality fruits.

The improvement in yield and quality of fruits might have been due to beneficial role played by nitrogen in the synthesis of protein through amino-acids (Singh, 1985) and by phosphorus in the process of photosynthesis, which ultimately led to the accumulation of large amount of carbohydrates.

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