

Short Communication

Effect of Different Rootstocks on Growth, Yield and Quality of Ber (*Ziziphus mauritiana* Lamk.) cv. Umran and Gola

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Ber (*Ziziphus mauritiana* Lamk.) is a drought hardy fruit crop of arid and semi-arid regions. It has been rightly termed as 'poor man's fruit', which not only adds to the income of the desert dwellers, but also fortify their precarious diet. Propagation of ber through seed renders large genetic variability in the seedlings, which give poor yield and inferior fruit quality. Budding is the most common propagation method for plantation of commercial orchard of ber (Pareek, 1983) among different methods of vegetative propagation. The role of rootstocks in controlling vigor, yield, fruit quality, tolerance to pests and diseases and suitability under varying soils and agro-climatic situations have been well explored in several fruit crops including ber (Pareek, 1978, 1988; Pareek and Vishal Nath, 1996). Rootstocks have their own merits and demerits and there is no single rootstock that can be regarded as ideal for all the ber cultivars and agro-climatic conditions especially under semi-arid climate. Therefore, to select suitable rootstock(s) for Gola and Umran cultivars of ber, the present study was carried out.

The present investigation was undertaken at Asalpur Research Farm, SKN College of Agriculture, Jobner, during the years 1998-99 and 1999-2000. Seeds of all the

four root stocks (*Z. nummularia*, *Z. rotundifolia*, *Z. mauritiana* var. *Sukhawani* and *Z. mauritiana* var. *Tikadi*) were sown at 8 x 8 m spacing in the month of April, 1992. Two scion cvs. (Umran and Gola) were budded on all the four rootstocks in the month of August, 1993. The orchard was maintained under rainfed (annual average 450 mm) conditions. Uniform cultural practices were adopted as per need of the plants. Observations were recorded on plant height, plant spread and stem girth of the tree. Physico-chemical characteristics of ber fruits were recorded at maturity and analyzed following methods given by AOAC (1990). The experiment was laid out in factorial RBD with three replications.

Analysis of variance revealed maximum height of plants of cv. Umran (1.89 m) with *Z. mauritiana* var. *Tikadi* (very vigorous root stock) and of cv. Gola (1.82 m) with *Z. rotundifolia* (very vigorous rootstock), which was significantly higher than that of *Z. nummularia* (dwarf rootstock) and *Z. mauritiana* var. *Sukhawani* (vigorous rootstock). Similar trend was also recorded in plant spread (Table 1). The stem girth below and above union was significantly higher when cv. Umran was budded on *Z. mauritiana* var. *Tikadi* and cv. Gola budded on *Z. rotundifolia* as compared to

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Table 1. Effect of different rootstocks on growth parameters of ber trees

Scion/ Root stock	Plant height (m)			Plant spread (m ²)			Stem girth below union (rootstock) (cm)			Stem girth above union (scion) (cm)			Stock/scion ratio		
	Umran	Gola	Mean	Umran	Gola	Mean	Umran	Gola	Mean	Umran	Gola	Mean	Umran	Gola	Mean
<i>Z. nummularia</i>	1.07	1.19	1.14	3.60	12.48	8.04	9.84	21.21	15.52	13.53	24.89	19.21	0.73	0.85	0.79
<i>Z. rotundifolia</i>	1.73	1.82	1.77	9.71	19.14	14.42	35.58	43.27	39.42	30.00	39.04	34.51	1.19	1.11	1.15
<i>Z. mauritiana</i> var. Sukhawani	1.14	1.35	1.24	4.21	14.61	9.41	20.50	30.75	25.62	16.26	26.73	21.49	1.26	1.15	1.20
<i>Z. mauritiana</i> var. Tikadi	1.89	1.80	1.84	12.54	15.08	13.81	36.87	38.39	37.63	31.91	33.59	33.21	1.16	1.14	1.15
Mean	1.46	1.54		7.52	15.33		25.70	33.40		22.92	31.06		1.08	1.06	
	SEm±	CD at 5%		SEm±	CD at 5%		SEm±	CD at 5%		SEm±	CD at 5%		SEm±	CD at 5%	
Root stock (R)	0.06	0.17		0.73	2.13		0.81	2.35		1.22	3.54		0.023	0.071	
Scion (S)	0.04	0.12		0.52	1.51		0.42	1.21		0.86	2.50		0.017	NS	
R x S	0.08	0.24		1.04	3.02		1.23	NS		2.98	5.00		0.033	NS	

Table 2. Effect of different rootstocks on physico-chemical qualities of ber fruits

Scion/ Root stock	Pulp stone ratio			TSS (%)			Acidity (%)			Fruit weight (g)			Fruit yield (kg plant ⁻¹)		
	Umran	Gola	Mean	Umran	Gola	Mean	Umran	Gola	Mean	Umran	Gola	Mean	Umran	Gola	Mean
<i>Z. nummularia</i>	12.80	6.89	9.84	18.91	15.50	17.20	0.116	0.141	0.128	20.28	10.62	15.45	8.85	27.81	18.33
<i>Z. rotundifolia</i>	10.59	6.30	8.44	16.83	16.08	16.45	0.120	0.158	0.139	16.56	10.05	13.30	22.09	39.46	30.77
<i>Z. mauritiana</i> var. Sukhawani	11.89	7.83	9.86	15.87	14.54	15.20	0.115	0.155	0.135	17.88	11.10	14.49	7.15	23.75	15.45
<i>Z. mauritiana</i> var. Tikadi	16.11	9.15	12.63	20.91	19.24	20.07	0.125	0.168	0.146	21.72	11.82	16.77	29.07	37.28	33.17
Mean	12.85	7.54		18.13	15.84		0.119	0.156		19.11	10.89		16.77	32.07	
	SEm±	CD at 5%		SEm±	CD at 5%		SEm±	CD at 5%		SEm±	CD at 5%		SEm±	CD at 5%	
Root stock (R)	0.24	0.71		0.24	0.70		0.0015	0.0043		0.39	1.13		2.87	8.34	
Scion (S)	0.17	0.50		0.17	0.49		0.0009	0.0027		0.27	0.79		2.03	5.90	
R x S	0.34	0.99		0.34	0.98		0.0019	0.0055		0.55	1.61		4.07	11.79	

other rootstocks. The stem girth below union (rootstock) in *Z. nummularia* was only 15.52 cm whereas stem girth above union (scion) was 19.21 cm, which resulted the stock/scion ratio less than one (0.79) as compared to more than one in other rootstocks. Thus, it forms an inverted bottle shape structure, as rootstock remains thinner because the growth rate of *Z. nummularia* is much slow as compared to the scions. Hence, there are more chances of breaking of plants at the union by strong wind particularly when the bud union is above the ground level (Vashishtha, 1987). Results similar to these findings were also reported by Prasad *et al.* (2004) in cv. Gola.

Fruit weight and yield of the plants differed significantly with different rootstocks (Table 2). Largest fruits (16.77 g) were found in the plants budded on *Z. mauritiana* var. Tikadi. Similarly maximum mean yield (33.17 kg plant⁻¹) was recorded in the plants budded on *Z. mauritiana* var. Tikadi followed by *Z. rotundifolia* (30.77 kg plant⁻¹). However cv. Umran exhibited highest yield (29.07 kg plant⁻¹) with *Z. mauritiana* var. Tikadi and cv. Gola produced maximum yield (39.46 kg plant⁻¹) with *Z. rotundifolia*. This is because of better growth and vigor of plants due to rootstocks. The better plant-growth might have resulted in more number and weight of fruits increasing the yield. Similar results were also obtained by Singh and Bal (1986) in cv. Umran.

The quality of fruits such as pulp/stone ratio, total soluble solids (TSS) and acidity differed significantly with different rootstocks (Table 2). *Z. mauritiana* var. Tikadi was found to be superior in these

aspects. The more pulp/stone ratio, high TSS and acidity of fruits might be due to efficient uptake of nutrients by the rootstock. Similar results have also been reported by Grace *et al.* (2005) in sweet orange grown on different rootstocks.

Based on the above results, it is concluded that *Z. mauritiana* var. Tikadi and *Z. rotundifolia* (both are very vigorous rootstocks) would be the suitable rootstocks for cv. Umran and Gola, respectively, under semi-arid conditions.

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