Note on Root Development of Bajra at Different Growth Stages*

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In Gujarat State *Bajra* (*Pennisetum typhoides* L.) is grown on an area of nearly 1.78 million hectares out of the total cultivated area of 10.1 million hectares. Prior to identification of high yielding hybrid varieties of *Bajra*, variety 'N-207' which was released from the Agriculture Research Station, Nadiad was under cultivation in most of the parts of the State. Hybrid 'HB-3' was released in 1968 from Agriculture Research Station, Jamnagar.

Plant roots absorb nutrients and water from the soil and transport these from the areas where the absorption takes place to the stems. Depth of rooting and the concentration of roots in a given volume of soil depend on soil conditions as well as on the genetic nature of the plant. Soil treatments—physical, chemical, or both - that will increase the rooting volume of the soil will make for better crop yields and more efficient water use. Similarly, increasing the depth, ramification and growth rate of plant roots by breeding procedures should result in increased water-use efficiency. There are striking differences in the rate of growth, depth, distribution and nutrient absorption capacity of roots of different varieties of a given crop.

It has been estimated that *Bajra* HB-3 gives about 70 per cent higher yields as compared to other varieties under conditions of low mositure stress. Apart from genetic characters, root growth pattern of HB-3 might be more favourable than other varieties. No study was, however, previously under taken to assess the root growth pattern of different *Bajra* varieties. The present preliminary investigation was, therefore, planned to study the root growth habit of *Bajra* N-207 and HB-3 using pot culture.

For conducting the study on root growth pattern of two *Bajra* entries, 40 earthen pots each having 50 cm height and 30 cm diameter were used. Each pot was uniformly filled up with 20 kg of representative farm soil collected from one of the plot of Agriculture Research Station, Jamnagar. It was a medium black soil. Urea and single superphosphate were added to the pot soil so as to apply nitrogen and phosphate at the rate of 75 kg N and 37.5 kg P_2O_5 per hectare.

All the pots were kept in the open field. Sowing was done on July 18, 1971. Initially four seeds were dibbled in each pot. After 10 days, thinning was done and only one plant was allowed to grow in each pot. Hybrid *Bajra* HB-3 and an improved strain N-207 were included in the study. Observations at (1) tillering, (2) flag-leaf, (3) flowering, (4) dough and (5) maturity stages were recorded for shoot and root length as well as green and air-dry weight of shoot and root of both the *Bajra* entries. For taking observations, intact plants were carefully removed from the

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TABLE—1

Root growth characteristics of two Bajra varieties at different growth stages.

Growth stage	*Length in Cm*				*Green weight in gm*				*Air-dry weight in gm*				*Shoot wt./Root wt. ratio*			
	Shoot		*Root*		*Shoot*		*Root*		*Shoot*		*Root*		*Green wt.*		*Air-dry wt.*	
	HB-3	*N-207*	*HB-3*	*N-207*	*HB-3*	*N-207*	*HB-3*	*N-207*	*HB-3*	*N-207*	*HB-3*	*N-207*	*HB-3*	*N-207*	*HB-3*	*N-207*
Tillering	34	26	94	68	38	17	7	3	6.1	2.7	3.1	1.8	5.4	5.6	2.0	1.5
Flag-leaf	70	77	70	72	76	81	14	13	20.0	19.0	7.0	6.2	5.4	6.2	2.8	3.0
Flowering	111	127	75	55	192	96	28	16	46.0	36.0	12.1	9.5	6.8	6.0	3.8	3.8
Dough	123	132	68	68	211	87	29	11	85.7	32.7	23.0	8.5	7.2	7.9	3.7	3.8
Maturity	120	130	70	59	110	98	41	29	68.3	43.7	28.0	19.7	2.7	3.4	2.4	2.2
Mean	92	98	75	64	125	76	24	14	45.2	26.8	14.6	9.1	5.5	5.8	2.9	2.9

pots by adding sufficient water in the pot and washing out the soil from each pot without damaging either the shoot or root. After taking observations of a set of characters at a particular growth stage, the observed plants were discarded. Treatment combinations, therefore, consisted of two seed entries and five crop growth stages employing 10 pots arranged in the field at random in one block and replicated four times.

Mean length, green weight and air-dry weight of root and shoot at different growth stages are presented in Table 1. Data show that shoot length of N-207 Bajra was greater than that of *Bajra* HB-3. On the contrary, HB-3 had greater root length than N-207. Average root length of *Bajra* HB-3 and N-207 was 75 and 64 cm, respectively. Green and air-dry weight of shoot and root of *Bajra* HB-3 was found to be greater than that of N-207. The data also indicated that the rate of root development of *Bajra* HB-3 was more than that of N-207 in the initial stages. There was no variation in the average air-dry shoot weight/root weight ratio of the two entries. This suggested that superiority of *Bajra* HB-3 over N-207 was expressed not only through higher weight of the shoot but also through the extensive root system of the former as evidenced by its greater root length and greater green and air-dry weight.