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INFLUENCE OF PLANT DENSITY ON YIELD AND QUALITY OF KM. 9 HYBRID BAJRA SEED*

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A field experiment was conducted to compare the spacings viz., (i) 30 x 10 cm, (ii) 30 x 20 cm, (iii) 45 x 10 cm, (iv) 45 x 15 cm, (v) 45 x 20 cm and (vi) 60 x 20 cm on the KM. 2 hybrid seed yield and quality Height of plant, number of total and productive tillers, yield of seed, field emergence and vigour index varied singnificantly among the treatments. A spacing of 30 x 10 cm recorded the maximum height but minimum number of total and productive tillers and the lowest seed yield. In contrast, spacing of 60 x 20 cm recorded the minimum height, maximum number of both total and productive tillers, and the highest field emergence. However, the highest seed yield was recorded in 45 x 20 cm spacing

In seed production, twin objectives of high yield and superior quality have to be achieved, without sacrificing one for the other. Seed yield is a complex character and influenced by a number of both external and internal factors. Among the external factors, availability of nutrients (Agrawal 1965), soil moisture (Shutt, 1935) and plant density (Austin and Longden, 1980) play a major role. Though considerable work has been carried out with a grain crop of bajra information on the effects of nutrients, soil moisture and plant density on a seed crop is very meagre Therefore it becomes important to undertake studies on these aspects and make available the information thus obtained to the seed growers.

MATERIAL AND METHODS

A field trial was carried out adopting randomised block design replicated five times during summer, 1980 to determine the optimum plant population for maximising the yield and quality of the KM 2 hybrid bajra seed. The net plot size was 5.4 m x 3.0 m Six spacings viz., 30 cm x 10 cm (S1); 45 cm x 10 cm (S3); 45 cm x 15 cm (S4); 45 cm x 20 cm (S5) and 60 cm x 20 cm (S6) were compared.

The plots were applied with standard fertilizers at the rate of 100:50 50 kg of N, P and K/ha. In each plot the male (K. 560.D.230) and the female (MS. 5141A) lines were sown in a ratio of 5:1 and the number of border rows planted with male parent was four.

In five randomly marked plants of the female rows, obseivations on the (i) height of plant; and (ii) number of total and productive tillers recorded, when the crop reached harvestable maturity.

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Earheads from the marked five plants and from remaining plants were harvested, dried and threshed separately. After cleaning, the seeds were dried to a uniform moisture content of 10±0.5 per cent and weighed. The seed yield of the plots was converted to hectare and expressed as kilograms.

The bulk hybrid seed from individual plots was size graded using 5/64" and 4/64" round perforated metal sieves and the weight of seeds remained in the above sieves was recorded and expressed as percentage to the total. The seed retained in the above sieves were designated as G1, G2 respectively, while that passed through 4/64" as G3.

The graded seeds from each replication were pooled treatmentwise, gradewise and mixed thoroughly. With the samples drawn, seed quality estimations viz., (i) thousand seed weight (ii) germination (iii) field emergence and (iv) vigour index were carried out.

RESULTS AND DISCUSSION

The plant height at maturity varied significantly due to spacing. S1 recorded the maximum height and was on par with S3. S6 recorded the minimum and was on with S5 and S4. In the present study, closer the spacing, the taller the plants (Stickler, 1961) which may bedue to the greater photosynthetic ability at the early to middle stages of growth resulting in increased growth and development of plant parts (Murata *et. al.*, 1957).

Wider spacing induced more number of both total and productive tillers than closer spacing which is in conformity with the reports of Reddy and Rao(1971) and Aswathaiah (1977) in bajra. S6 recorded the maximum number of both total and productive tillers, while S1, the minimum. Aswathaih (1977) concluded that the availability of more nutrients during tillering phase of the wider spaced crop favoured the production of more number of tillers. According to Taska and Navasero (1964), the active absorption and metabolism of nitrogen resulted in increased tillering in rice.

The difference in hybrid seed yield was significant among spacing treatments. Pal and Kaushik (1973) and Aswathaiah (1977) reported significant differences in grain yield due to spacing. A calculated hybrid seed yield of 2289 kg/ha was recorded in 45x 10cm spacing, while that of 1866 kg/ha was recorded in 36 x 10 cm spacing Reddy and Aswathaiah (1977) obtained higher yields under a spacing of 45 cm, while Rao (1971) obtained higher yield in a spacing of 30 cm between rows.

The extent of recovery of size grades of hybrid seed was practically the same among the spacings (Aswathaiah, 1977). In the present study, the thousand seed weight did not vary significantly among spacing treatments. Pal and Kaushik (1973) reported that spacing had no influence on seed weight, whereas Aswathaiah (1977) in bajra reported significant differeaces.

Though differences in the laboratory germination were not significat, the field emergence and seedling vigour were significant due to spacing. Aswathaiah (1977) arrived at similar results. The mean germination ranged from 81.5 per cent to 99.0 per cent, S6

recorded the maximum field emergence and S2, the minimum. The mean vigour index values were 3152, 2599 and 1681 for G1, G2 and G3, respectively. S3 recorded the maximum value and was no par with S4, S5 and S6. S3 recorded the maximum values and was on par with S1 and S6.

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Table 1 Plant characters and seed yield in MS 5141A as influenced by spacing

	Height (cm)	Tillers/plant		Seed yield (kg/ha)
		total	production	
S1	120.0	4.3	2.3	1836
S2	115.6	4.6	3.1	1896
S3	118.7	4.6	2.8	2228
S4	101.8	7.3	5.1	2276
S5	99.0	8.1	5.6	2289
S6	98.9	8.3	6.0	1926
CD (P—0.05)	7.6	1.2	0.9	334

Table 2. Influence of spacing on the quality of KM. 2 hybrid seed

	S1	S2	S3	S4	S5	S6	Mean
Recovery percentage							
G1	65.2	52.2	61.7	59.4	54.4	60.4	58.8
G2	27.2	42.2	34.7	37.1	43.6	37.0	37.0
G3	7.4	5.6	3.6	3.2	3.6	2.6	4.2
Thousand seed weight (g)							
G1	7.19	6.98	7.17	7.25	7.23	7.15	7.16
G2	4.11	4.37	4.23	4.52	4.62	4.56	4.40
G3	2.17	2.23	2.29	2.34	2.57	2.49	2.35
Mean	4.49	4.53	4.56	4.70	4.80	4.73	4.64
Germination (%)							
G1	99.0	98.0	98.6	98.0	97.0	97.0	97.9
G2	97.0	95.0	97.0	98.0	90.0	94.0	95.0
G3	86.0	87.0	81.5	82.5	85.0	84.5	84.4
Mean	93.7	93.3	92.3	92.8	90.7	91.8	92.5
Field emergence (%)							
G1	90.0	88.5	90.0	90.5	90.0	90.5	89.9
G2	70.5	76.5	82.5	83.0	79.5	86.5	79.8
G3	60.0	54.5	53.5	54.5	60.5	61.5	57.4
Mean	73.5	73.2	75.3	76.0	76.7	79.5	75.7
Vigour index							
G1	3164	3350	3013	3094	3221	3069	3152
G2	2367	2556	2530	2996	2658	2484	2599
G3	1573	1868	1507	1655	1752	1729	1681
Mean	2368	2591	2350	2581	2544	2427	2477

Comparison of significant effects

	Recovery percentage			Thousand seed weight			Germination		
	S	G	SxG	S	G	SxG	S	G	SxG
CD (P=0.05)	NS	6.8	NS	NS	0.20	NS	NS	4.1	NS

	Field emergence			Vigour index		
	S	G	SxG	S	G	SxG
CD (P=0.05)	2.5	1.8	4.4	164	116	-