

Effect of row spacing and seed rates on the yield of buckwheat (*Fagopyrum esculentum*)

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ABSTRACT

A field experiment on buckwheat (*Fagopyrum esculentum* Moench) was conducted during the rainy seasons (*kharif*) of 1990 and 1991 under rainfed conditions at Ranichauri. Sowing of buckwheat at 30 cm gave the maximum seed yield (18.35 q/ha), being 14.8 and 26.9% higher than 20 and 40 cm row spacings respectively. The highest stalk yield and harvest index (15.97%) were recorded with 30-cm row spacing. The sowing of seed @ 30 kg/ha gave the maximum seed yield (18.36 q/ha), followed by 20 kg seed/ha. The stalk yield (98.38 q/ha) and harvest index (15.73%) were highest with 30 kg/ha seed rate.

Buckwheat (*Fagopyrum esculentum* Moench) is an important unexploited crop of hills, occupying an area of more than 20,000 ha in the rainy season (*kharif*). It is a multi-purpose crop and used as food, vegetable, fodder, medicinal purpose and green-manure. It is cultivated on marginal land under rainfed conditions from 600 m to 3,500 m mean sea-level where very limited crops are grown. The yield potential of buckwheat crop under rainfed areas has been very low because of inadequate plant population and lack of good management practices. The productivity of buckwheat can be increased through the adoption of proper planting geometry.

MATERIALS AND METHODS

The field experiment was conducted at G. B. Pant University of Agriculture and Technology, Hill Campus, Ranichauri, during the rainy season (*kharif*) 1990 and 1991 under rainfed conditions. Treatment consisted of 3

row spacings (20, 30 and 40 cm) and 3 seed rates (20, 30 and 40 kg/ha) laid out in randomized block design with 3 replications. The experimental site was situated at 1,850 m mean sea-level on north facing in mid hills. The soil of experimental field was silty clay loam with acidic in reaction (pH 5.6–6.0), low in available N (125.0–135.0 kg/ha) and phosphorus (6.9–8.0 kg/ha) and rich in available potassium (390.0–410.0 kg/ha) during both the years. Crop was sown on 22 and 26 June and harvested on 8 and 11 November in 1990 and 1991 respectively. Rainfall received during crop season in 1990 was 711.5 mm and it was 523.9 mm in 1991. Uniform dose of 40 kg N/ha along with 20 kg P_2O_5 /ha was applied as basal dressing through urea and Mussooriephos. The estimates of correlation coefficients were made according to the methods described by Panse and Sukhatme (1967). Observations on plant height, number of plants, branches and grain weight/plant were recorded on 3 randomly

selected plants in the central 3 rows, while 1,000-grain weight was recorded from plot yields.

RESULTS AND DISCUSSION

Effect on growth and yield attributes

Row spacing affected the plant height and plant dry weight at harvest during both the years, and maximum plant height and plant weight were recorded higher with 20-cm row spacing, followed by 30-cm (Table 1). The number of plants/m was significantly affected by row spacing, and highest plants (19.5) were recorded with 20 cm row spacing. The maximum grain weight/plant (3.46 g) was recorded in 30-cm row spacing during both the years; while row spacing had no significant effect on number of branches/plant and 1,000-grain weight during both the years. Wider row spacing of 40 cm showed an adverse effect on all the growth and yield characters.

Row spacing had significant effect on stalk yield and the maximum stalk yield of 96.59 q/ha was recorded with 30-cm row spacing, followed by 20-cm row spacing. Similar trend was recorded with harvest in-

dex. Interaction effect was not found significant in any of the growth and yield-contributing characters on pooled basis.

The seed rate was also found to affect the various growth and yield parameters of buckwheat. The plant stand was significantly increased with every increase in seed rate from 20 to 40 kg/ha (Table 1) and the maximum plant stand/m (21.9) was recorded with 40 kg seed/ha, followed by 30 kg/ha (18.3). The plant height was also higher (164.2 cm) with 40 kg seed/ha. It may be due to competition among plants for light. The number of branches/plant was highest (5.6) with lowest seed rate (20 kg/ha), followed by 30 kg seed/ha (5.2). The plant dry weight and grain weight/plant were adversely affected when seed rate was increased beyond 30 kg/ha. However, the seed rate did not show any consistent results on 1,000-grain weight.

Sowing of seed at different rates showed a significant effect on stalk yield of buckwheat and maximum stalk yield (98.38 q/ha) was recorded with 30 kg seed/ha. Similar trend was observed in harvest index.

Table 1. Effect of row spacing and seed rate on growth, yield attributes and stalk yield of buckwheat (pooled data of 1990 and 1991)

Treatment	Plants/m	Plant weight (cm)	Branches/plant	Plant weight (g)	Grain weight/plant (g)	1,000-grain weight (g)	Stalk yield (q/ha)	Harvest Index (%)
<i>Row spacing (cm)</i>								
20	19.5	162.3	5.3	28.55	3.06	20.17	95.11	14.36
30	18.3	161.9	5.3	25.43	3.46	19.60	96.59	15.97
40	17.9	152.8	5.1	23.34	3.14	19.46	86.39	14.34
CD (P = 0.05)	1.7	6.7	NS	3.02	0.21	NS	6.87	
<i>Seed rate (kg/ha)</i>								
20	15.4	150.9	5.6	28.82	3.58	19.57	86.29	15.20
30	18.3	161.0	5.2	26.85	3.36	20.03	98.38	15.73
40	21.9	164.2	4.8	21.65	2.74	19.63	93.47	13.90
CD (P = 0.05)	1.7	6.7	0.3	3.02	0.21	NS	6.87	

Table 2. Effect of row spacing x seed rate on the seed yield of buckwheat

Seed rate (kg/ha)	Row spacing (cm)							
	1990				1991			
	20	30	40	Mean	20	30	40	Mean
20	11.42	13.12	17.59	14.04	17.74	18.13	14.66	16.85
30	17.90	20.22	16.44	18.19	18.91	21.22	15.43	18.52
40	15.05	18.91	9.11	14.35	14.82	18.52	13.50	15.61
Mean	14.79	17.41	14.38		17.16	19.29	14.54	
CD (P = 0.05)								
Row spacing				2.11		0.93		1.03
Seed rate				2.11		0.93		1.03
Interaction (R x S)				3.65		1.60		1.79

Effect on seed yield

The seed yield of buckwheat was found significantly affected by row spacing, seed rate and their interaction during both the years as well as on pooled basis (Table 2).

The maximum seed yield was recorded with 30-cm row spacing (18.35 q/ha) and 30 kg seed rate/ha (18.36 q/ha). Interaction effect also showed that highest seed yield of 20.72 q/ha was recorded with 30 cm row spacing x 30 kg seed rate/ha. The maximum seed yield recorded with 30-cm row spacing and 30 kg seed/ha may be attributed by maximum plant population and grain weight/plant. The next best treatment in this regard was 20 kg seed/ha sown at 30 cm spacing. The lowest seed yield of buckwheat was recorded with 40 kg seed/ha sown at 40-cm row spacing. This indicates that sowing of crop at 30-cm row spacing with 30 kg seed/ha was optimum for getting higher yield. These results are in conformity with the results of Campbell and Gubbels (1978), Joshi and Paroda (1991).

Correlation coefficient

The correlation coefficient indicated that seed yield of buckwheat was positively correlated with weight/plant and 1,000 seed weight. Stalk yield with plant height was also significant in both the years and on mean basis indicating that increase in seed and stalk yields was due to significant increase in these yield attributes

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