GAU. Res. J. 1978. 4 (1): 56-58

Studies on Response of Pearl Millet 'HB 3' to Spacing under Variable Rate and Time of Nitrogen Application

N. B. Mandviya and A. S. Patel

Gujarat Agricultural University, Junagadh

It is very necessary to provide optimum number of plants per unit area which will not create competition for light, moisture and nutrients for increased production potential of a crop. This is particularly important for a rainfed crop like pearl millet. The soils of Gujarat are very deficient in nitrogen and hence it is also pertinent to work out optimum dose and proper time of nitrogen application.

An investigation was conducted at the Central Experimental Research Station, Junagadh, during *kharif* season of the year 1971 under rainfed conditions to workout optimum spacing between and within rows and requirement of nitrogen with the proper time of its application for securing potential yield of pearl millet 'HB 3'.

There were 54 treatments consisting of combinations of three between-row spacings (30, 60 and 90 cm), and three within-row spacings (7·5, 15·0 and 22·5 cm) in the main plots and three nitrogen levels (60, 120 and 180 kg/ha) and two times of N application (single application at sowing and split application of half dose at sowing and half dose after one month of sowing) in the sub-plots. The experiment was conducted in split plot design with three replications. It was sown and harvested on 28-6-1971 and 24-9-1971, respectively.

The soil of the experimental plot was clayey in texture, low in organic matter, total nitrogen and available phosphate, but medium in potash content. It was slightly alkaline in reaction. The weather was more or less normal for the growth of pearl millet crop. The total rainfall during the *kharif* season in 1971 was 1023.6 mm distributed over 36 rainy days. Sufficient rain was received in the month of July and August. It resulted into good growth of the crop. There were heavy showers (373 mm in 3 days) during the first week of September coinciding with flowering which washed away pollens, resulting in slightly poor grain setting. During the fourth week of the same month due to early cessation of the monsoon, the grain formation was adversely affected. There was no attack of any serious pest or disease.

The mean data on effects of different treatments on growth and yield of pearl millet are presented in Table 1. There was increase in the effective tillers, stem thickness and test weight under the wider spacing of 90 cm between rows as com-

(Received on September 24, 1976)

TABLE 1

Main effect of different treatments on plant characters, yield and economics of pearl millet 'HB 3'.

Levels of treatments	*Plant height, cm*	*No. of effective tillers/plant*	*Stem thickness at maturity cm*	*1000 grain weight g*	*Grain yield kg/ha*	*Straw yield kg/ha*	*Net realization Rs/ha*
Spacing between rows							
B_1 (30 cm)	198·8	4·11	0·684	5·99	1369	4640	421
B_2 (60 cm)	196·8	5·00	0·685	6·21	1352	3773	354
B_3 (90 cm)	188·4	5·32	0·698	6·30	1455	3482	416
S. Em ±	2·5	0·15	0·004	0·06	36·4	86·0	—
C. D. at 5%	7·6	0·45	0·012	0·18	NS	259·0	—
Spacing within rows							
W_1 (7·5 cm)	193·1	4·65	0·698	5·97	1282	4079	337
W_2 (15·0 cm)	194·9	4·78	0·686	6·29	1448	3700	388
W_3 (22·5 cm)	195·4	5·00	0·703	6·14	1445	4115	465
S. Em ±	2·5	0·15	0·004	0·06	36·0	86·0	—
C. D. at 5%	NS	NS	0·012	0·18	109·0	259·0	—
Nitrogen							
N_1 (60 kg N/ha)	192·5	4·32	0·676	6·22	1186	3430	337
N_2 (120 kg N/ha)	194·8	4·81	0·687	5·97	1371	4070	388
N_3 (180 kg N/ha)	196·0	5·29	0·704	6·22	1618	4394	465
S. Em ±	1·0	0·12	0·006	0·13	34·0	112·0	—
C. D. at 5%	NS	0·36	0·017	NS	95·0	311·0	—
Time of N application							
T_1 (Single)	195·2	4·68	0·689	6·12	1304	3769	311
T_2 (Split)	193·6	4·94	0·688	6·15	1480	4160	463
S. Em ±	0·7	0·10	0·006	0·09	2810	82·0	—
C. D. at 5%	NS	0·24	NS	NS	78·0	237·0	—

pared to narrow spacings of 60 and 30 cm. These differences could not attain the level of significance in grain yield which was at par in all the three spacings tried. However, there was significant increase in the yield of straw under narrowest spacing of 30 cm.

The within-row spacings of 15·0 and 22·5 cm did not significantly influence grain yield but they were significantly superior in their effect to that of the narrowest spacing of 7·5 cm. Due to increased competition under 7·5 cm spacing, there was reduction in 1000 grain weight and earhead thickness which reduced the grain yield.

There was increase in grain and fodder yield with the increase in the level of nitrogen. The response function for nitrogen in respect of grain yield was estimated through regression analysis. The regression equation was worked out to be: $Y = a + bX + cX^2$, where Y indicated grain yield in kg/ha and X indicated nitrogen levels in kg/ha. The response was thus found to be of linear nature and gave increasing returns in terms of grain yield up to the highest level of 180 kg N/ha which was tried in the experiment.

Split application of nitrogen was significantly better than single appli-

cation in respect of grain and straw yield. This was on account of its favourable effect on number of effective tillers, earhead length and thickness.

The data of grain yield indicated significant effect of the interaction of between-row spacing and within-row spacing. The treatments B_3W_2 (90 cm between-row and 15 cm within-row) produced the highest yield of 1635 kh/ha which was at par with B_3W_3 (90 cm between row and 22·5 cm within row) yielding 1586 kg/ha. The lowest yields were obtained under B_3W_1 (90 cm between-row and 7·5 cm within-row) and B_1W_2 (30 cm between-row and 15 cm within-row). It was thus evident that decreased unit area per plant also decreased the grain yield due to increased competition under rainfed conditions. The rest of the two-factor interactions were not significant.

From economic point of view, drilling pearl millet 'HB 3' with a between-row spacing of 90 cm, thinned at 22·5 cm within-row and fertilized with nitrogen @ 180 kg/ha in split application of 50% at sowing and 50% at one month after sowing resulted in maximum net profit.