

## PERFORMANCE OF BLACK GRAM VARIETIES IN RICE FALLOWS

Pulses, in spite of being the most important source of protein in the average Indian diet, have remained more or less neglected as far as crop production and improvement are concerned. In Kerala, cultivation of pulses like black gram is relegated to the second crop rice fallows where the crop comes up utilizing the residual soil moisture. Identification of varieties that possess built-in tolerance to the moisture stress conditions thus assumes importance.

A study was undertaken to evaluate 20 varieties of black gram for moisture stress tolerance in second crop rice fallows at the Agricultural Research Station, Mannuthy, Kerala during February-April 1982 employing a randomised block design with three replications. Uniform cultural and manurial practices as per the recommendations of the Kerala Agricultural University (Anon., 1980) were followed. Two irrigations were given, one, soon after sowing and the second, a week later, after gap filling. The characters observed for analysis included vegetative and flowering attributes in addition to seed yield.

The means of six vegetative characters for which varietal differences were significant are presented in Table 1. The variety Velloor showed the highest mean plant height of 31.2 cm. The highest mean number of primary branches per plant and number of fruiting points per plant was for Pant U-19 (1.38 and 5.34 respectively). A great majority of the varieties showed a mean of less than one primary branch per plant thus indicating that the low soil

moisture regime had considerable adverse effect on branching. The variety T-9 had the highest number of leaves per plant with a mean of 14.0. Leaf production under the low moisture situation was in general poor with only five varieties showing a mean of more than 11 leaves per plant. This result is in agreement with that of Turk and Hall (1980). Most of the varieties showed a mean root length of more than 11 cm with Co 4 giving the highest mean value of 18.3 cm. The low soil moisture could have been responsible for deep penetration of roots as expressed by Elston and Bunting (1980) that the roots grow to deeper layers of the soil in search of moisture. More than 75 per cent of the varieties matured early (within 60 days) and escaped the ill effects of moisture stress.

The analysis of variance revealed significant differences among varieties for seed yield and its components viz., pod length, number of seeds per pod and 100 seed weight. Significant varietal differences were also observed for harvest index. The mean values are presented in Table 2. The variety Velloor showed the highest mean pod length of 4.51 cm and highest mean number of seeds per pod. With respect to 100 seed weight, the variety Co 4 had the highest mean value of 4.62 g and S-1 had the highest harvest index of 1.58. The number of fruiting points per plant was uniformly low for the varieties studied; only seven varieties had a mean value of more than 4. The pod production capacity of the plants was also found to be affected adversely by the low soil moisture and only four varieties produced a mean of above 10 pods per plant. Results in conformity with this

Table 1. Vegetative characters of black gram varieties

Variety	Plant height (cm)	No. of primary branches/plant	No. of leaves/plant	Leaf area index	Days to harvest*	Root length (cm)
1 KMU 3	22.7	0.63	10.4	1.24	60	14.0
2 M 3	25.8	0.37	8.3	0.97	60	17.0
3 UG 157	18.9	0.03	7.0	0.73	53	8.3
4 JU 1	26.3	0.27	10.1	1.26	60	12.0
5 4-5-2	16.5	0.17	9.2	0.98	58	8.0
6 Pant U 30	25.4	0.86	12.3	1.34	65	14.3
7 Pant U 19	25.3	1.38	12.6	1.24	66	15.5
8 T 9	25.4	0.93	14.0	1.36	66	13.9
9 S 1	18.9	0.27	7.9	1.03	56	7.7
10 Edakkad	19.8	0.50	9.0	0.80	53	10.5
11 Ajanoor	24.4	0.07	9.3	1.40	56	9.3
12 Peralamputhur	20.3	0.23	8.4	1.11	59	8.9
13 Velloor	31.2	0.20	7.6	1.39	54	14.2
14 Pulloor	26.1	0.27	8.7	1.20	61	12.4
15 BP 3	24.3	0.23	8.0	0.99	60	12.4
16 Co 2	27.6	0.83	12.4	1.33	66	13.9
17 UG 152	26.2	0.73	7.9	1.09	60	11.0
18 Culture 1	26.9	0.46	10.5	1.30	56	11.1
19 Co 3	29.5	0.80	11.4	1.78	60	12.6
20 Co 4	29.6	0.27	9.8	1.37	61	18.3
CD (0.05)	5.43	0.483	2.68	0.452	2.2	4.21

\* Days after sowing

Table 2. Performance of black gram varieties with respect to yield components

Variety	Pod length (cm)	No. of pods per plant	No. of seeds per pod	100 seed weight (S)	Harvest index	Seed yield per plant (g)
1 KMU 3	3.81	8	5	4.18	0.35	1.32
2 M 3	3.56	7	5	3.70	0.32	1.15
3 UG 157	3.68	7	5	3.93	0.37	1.23
4 JU 1	3.90	8	5	3.85	0.31	1.21
5 4-5-2	3.49	7	5	3.47	0.38	1.09
6 Pant U 30	3.91	9	5	3.35	0.30	1.36
7 Pant U 19	3.81	10	5	3.48	0.30	1.37
8 T 9	3.53	7	5	3.0	0.29	0.96
9 S 1	4.21	8	5	4.33	0.39	1.58
10 Edakkad	3.68	10	5	3.20	0.36	1.42
11 Ajanoor	3.86	7	5	3.85	0.32	1.05
12 Peralamputhur	3.69	7	5	3.75	0.36	1.16
13 Velloor	4.51	11	6	4.28	0.38	2.22
14 Pulloor	3.76	7	5	3.72	0.30	1.03
15 BP 3	3.64	6	5	3.72	0.30	1.03
16 Co 2	3.59	8	4	3.58	0.26	1.02
17 UG 152	3.74	9	5	3.85	0.33	1.41
18 Culture 1	4.30	9	6	4.13	0.36	1.81
19 Co 3	4.50	11	6	4.60	0.35	2.05
20 Co 4	4.23	8	6	4.62	0.33	1.54
CD (0.05)	0.54	NS	0.9	0.576	0.048	0.715

have been reported by Vidal *et al.*, (1981). Pod length and 100 seed weight were also found to be considerably influenced by the low moisture level. However, contrary to the findings of Saxena and Sheldrake (1976), the present investigation on balck gram revealed considerable stability for number of seeds per pod in the low moisture situation. A great majority of the varieties produced a mean of more than 5 seeds per pod. Harvest index was also not much affected by moisture stress; a large number of the varieties had a mean HI of 0.30. A decline in the performance of varieties with respect to the yield components ultimately results in a reduction in yield. The yield per plant and consequently the per hectare yield was very low in most of the varieties studied. Yield reduction under moisture stress has been reported by Burch *et al.*, (1978) and Constable and Hearn (1978).

Among the twenty varieties included in the study, the varieties Velloor, Co 3, Culture 1, S-1 and Co 4 were found to be better performers in terms of seed yield. The variety Velloor gave the highest mean yield per plant of 2.23 g which worked out to a per hectare yield of 593 kg. With respect to other

economic characters like the number of pods per plant, length of pod and number of seeds per pod, the variety Velloor had the highest mean value. It was also found to be better with respect to 100 seed weight, weight of bhuse per plant, HI, LAI, duration and root length. It can therefore be inferred that the high yield of this variety was due to greater number of pods per plant, seeds per pod and 100 seed weight. The superiority can also be attributed to its greater root length. Good root development and a short growing period are the characters that help plants to resist drought (Ravindranath and Mahaboobali, 1972). Since the variety Velloor showed superiority with respect to most of the economic characters, there is scope for utilizing it in further crop improvement programmes.

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