Annals of Arid Zone 31(4) 269–271 1992

Response of *Setaria italica* to Different Management Practices Under Dryland Farming

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Abstract An investigation on the response of dryland Setaria to intercropping, manuring and fertilizer levels revealed that growing Setaria with blackgram or field bean in 3:1 ratio in a replacement series with a basal application of 12.5 t FYM + 20 kg N + 10 kg P ha^{-1} gave 52.3% and 42% higher monetary returns and fodder to cattle population compared to the sole crop. The Land Use Equivalent was also greater by 11.2% in Setaria + blackgram combination and 4.9% in Setaria + field bean combination over sole Setaria. Among the intercrops, blackgram is comparatively less competitive and more of complimentary than field bean.

Key words Intercropping, *Setaria italica*, Management practices

Minor millets are grown in an area of 3.1 million ha in India with a production of 11.3 million tonnes. The fox tail millet or the Italian millet (*Setaria italica* (L.) Beauv) forms bulk of the area and production under minor millets and is cultivated in marginal lands with low nutrient status under limited moisture conditions.

Hosmani *et al.* (1975) reported 1320 kg grain ha^{-1} with 60 kg N and 20 kg P ha^{-1} compared with 680 kg ha^{-1} without NP in setaria. Chida Singh (1983) observed that the Italian millet is better to be manured with 5-10 t FYM + 40-60 kg N + 20-30kg P ha^{-1} as a basal application for higher yields. An investigation was undertaken to study the response of dryland Setaria to intercropping, manuring and fertilizer levels and results are reported in this paper.

Materials and Methods

The experimental site is situated at 9°54' N latitude and 78°50' E longitude at an elevation of 147 m above mean sea level. Annual rainfall of 862.5 mm recorded in 53 rainy days, 8.5 mean bright sunshine hours day^{-1}, 83 and 87% relative humidity respectively during South West monsoon and North East monsoon and 23.54 to 33.46° C are the average climatic features. An average maximum rainfall of 405.19 mm was received during North East monsoon (*rabi* season) in 24 rainy days which is usually the rainfed farming period. During the cropping periods a total rainfal of 360 mm distributed in 21 rainy days was received. The maximum and minimum temperatures were 34 and 21°C respectively. The relative humidity averaged 76%. The soil was sandy clay loam, neutral (pH 6.9), low in available N, medium in available P and K with an organic C content of 0.65%. The previous *rabi* crop was a pulse and kept fallow during *kharif*. The experimental crops Setaria, blackgram and field bean were sown on September 6th and were harvested after 100, 75 and 105 days respectively.

A field experiment was conducted with setaria (CO–5) as base crop and blackgram (CO–5) and field bean (CO–2) as intercrops at the Tamil Nadu Agricultural University, Madurai campus during *rabi* season of 1985. Treatments consisted of three cropping systems in one experiment and five manure and fertilizer levels in another, were replicated thrice in a randomised block design. The base crop of setaria was sown by adopting a spacing of 25 x 10 cm and the intercrops viz., blackgram and field bean have been grown in 3:1 ratio in replacement series. Entire doses of fertilizers were applied basally along with FYM.

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Table 1 *Growth characters of base crop at 60 days, yield attributes and yield of Setaria*

Treatments	Plant height (cm)	Leaf area index	Dry matter (t ha^{-1})	No. of tillers (m^{-2})	Earhead Length (cm)	Earhead Grith (cm)	Grain No.	Yield (kg ha^{-1}) Grain	Yield (kg ha^{-1}) Straw	Net income (Rs. ha^{-1})
Cropping stands										
C_1 - Setaria + Balckgram	80.2	2.6	1.5	103	14.1	3.5	1437	691	3064	2362
C_2 - Setaria + Field bean	77.4	2.4	1.3	92	13.1	3.3	1426	664	2720	2205
C_3 - Sole setari	86.9	3.1	2.8	141	15.9	3.9	1534	915	3630	1550
CD (P = 0.05)	0.9	0.1	0.1	4	0.1	00	11	58	42	–
Fertilizer levels										
F_1 - No manuring	76.9	2.2	1.6	89	11.2	3.3	1295	575	2731	1486
F_2 - FYM 12.5 t ha^{-1}	78.9	2.6	1.8	106	12.8	3.5	1494	766	2974	1673
F_3 - FYM 12.5 t + 10 kg N + 10 kg P ha^{-1}	83.6	2.9	2.0	129	16.0	3.6	1534	823	3439	1915
F_4 - FYM 12.5 t + 20 kg N + 10 kg P ha^{-1}	88.5	3.1	2.1	167	18.2	4.1	1644	881	3585	2058
F_5 - 20 kg N + 10 kg P ha^{-1}	79.6	2.7	1.8	102	13.2	3.5	1360	740	2961	1763
CD (P = 0.05)	0.5	0.1	0.1	3	0.1	0.1	12	61	27	–

Results and Discusion

The growth characters recorded at 60 days of base crop showed negative influence to the introduction of intercrops but positive influence for the combined application of FYM 12.5 t + 20 kg N + 10 kg P ha^{-1} (Table 1). Among the intercrops, field bean offered more aggressivity than blackgram on the growth and development of Setaria due to the smothering effect with its climbing tendrils. Such a competition by intercrops and favourable effect of organic manure in physical improvement of soil and increased N and P availability for better growth were observed by Enyi (1973).

The sole crop of Setaria was found to be superior in the production of all yield attributes and economic yields (Table 1). Among the intercrops, blackgram is comparatively less competitive and more of complimentary than field bean, as the yield reduction in sole Setaria was reported to be 24.5 and 27.5% respectively. Similary, the F_4 (manure fertilizer level) was able to register higher grain and straw yields under identical moisture conditions due to the better availability of applied nutrients (Singh & Jha 1984). Umrani and Bhoi (1982) observed a linear response in Setaria to N under normal moisture conditions.

The land equivalent ratio was greater than 1.0 in both the intercropping systems, i.e., 1.112 for C_1 and 1.049 for C_2. The land use efficiency was greater (11.2%) in Setaria + balckgram, while in Setaria + field bean, it was only 4.9% over crop of Setaria.

Since the economic consideration is of primary importance under dryland farming, an appraisal of partial budgetting as suggested by Johl and Kapur (1981) under intercropping situations was worked out. Eventhough Setaria as a sole crop had produced higher grain yield than that of intercrops, the net return was higher by 52.3% when intercropped with blackgram and 42% with field bean.

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(Received May 1991 Accepted November 1992)