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SORGHUM YIELD AND NUTRIENT UPTAKE UNDER VARYING LEVELS OF N IN A SORGHUM - BLACKGRAM INTERCROPPING SYSTEM

P. MUTHUVEL, R. SIVASAMY, V. SUBRAMANIAN C. UDAYASOORIAN AND U. S SREE RAMULU

Field experments conducted under rainfed condition at the Agricultural Research Station, Kovilpatti during rabi seasons of 1984—85, 85—86 and 86—87 revealed that the grain yields of sorghum under sorghum — blackgram intercropping were comparable to that of solid sorghum which received an additional dose of 10 Kg of nitrogen/ha. N uptake by sorghum crop at flowering phase indicated that under 40 Kg N/ha intercrop blackgram adds about 10 Kg N/ha to the sorghum crop.

Under dryland situation, it is reported that sole sorghum fails once in 8 yeers whereas intercropped sorghum fails once in 36 years only (Rao end Willey, 1980). Benefical effects of intercropping sorghum with pulses in increasing the yield and nutrient content of the crop produce have been reported by several wokers (Singh, 1982; Balasubramanian et al. 1982). Subbarao (1974) has reported varing amoudts of nitrogen contributed by the legume component in cereal pulse intercropping system. However, the quantum of N contributed by blackgram to sorghum under the rainfed vertisol tract of Kovilpatti is yet to be assessed. Hence, field experiments were conducted at the Agricultural Researche Stratian, Kovilpatti during rabi seasons of 1984-85, 85-86 and 86-87.

MATERIALS AND METHODS.

There were nine treatments (Table 1) each replicated thrice in a randomised block design. Uniform dose of P_2O_5 at 40 Kg/ha (optimum recommended for pulse) through DAP was applied to all the plots. Balance of N as per the schedule was applied through urea to sorghum lines alone, entire dose of N and P being added basally. Since the soils are rich in available K_2O the same dose not find a place in fertilizer schedule. While the sole sorghum was raised in the normal pattern, intercropped sorghum was raised in paired rows 60:30 cm at 148000 plants/ha) each pair alternating with one row of blackgram which had a spacing of 10 cm between plants in the row (111000/ha). Routine cultural practices were followed in raising the crop. At flowering phase blackgram and sorghum plant samples were evaluated for total N, P and K contents and the uptake of these nutrients was computed. At maturity the crops were harvested and grain yield recorded plotwise. Post harvest soil samples were analysed for available N, P and K and total N content.

The experimental soils were neatral in pH and free from salinity

Soil and crop management studies, TNAU, Coimbatore.

hazards. The available N and P contents were low while the available K_2O content was high. During 1984-85, Sorghum variety Co. 25 was the test crop and since its performance was poor under Kovilpatti condition, variety Co. 23 was iuclued in the subsequent years. In all the three years the intercrop was blackgram Co. 5. The amount of rainfall received and the number of rainy days during the cropping period are furnished below

Years of study	Rainfall (mm)	No. of rainy days
1984–85	357.6	14
1985–86	193.1	13
1986–87	300.9	14

RESULTS AND DISCUSSION

Gratn yield (Table 1) was very much reduced during 1984-85 and 85-86. Reduced grain yield during 1984-85 was due to the poor performance of the variety Co.25 under Kovilpatti tract. During 1985-86 only 193 mm of rainfall as against a normal rainfall of 450 mm during the cropping season was received. Duriug 1984-85 higher grain yield was recorded under 50 Kg N level whereas in the subsequent two years the difference between 40 and 50 Kg N levels (100 and 125 per cent of recommended optimum dose) was not significant. During the first year yield difference due to intercropping could not be observed whereas in the subsequent two years significant influence of intercropping on the grain yield could be noticed During 1985–86 grain yield of sorghum from intercropping treatments was comparable to that of sole sorghum which received an additional dose of 10 Kg N. During 1986–87 grain yield of sorghum under sorghum blackgram intercrop treatment which received N at 20, 30 and 40Kg N/ha was on par with sole sorghum receiving 50 Kg N/ha. Beneficial effects of legumes in the intercropping system in enhancing the yield of main crop are attributed to the improvement in soil fertility (wetselaar *et al.* 1973), enhancement in the soil physical status, more particularly the soil structure(Biswas,1982) and efficient moisture csnservatron (Bhatia *et al.*, 1980).

Nutrient uptake by sorghum at flowering phase revealed that there was a general trend of increased N uptake unter intercropping treatment as compared to sole sorghum. Pooled mean data revealed that the increase in N uptake due to intercropping was about 10 Kg under 100 percent of recommended N addition (40 Kg N/ha) and about 20 Kg under 50 Kg N addition. with regard to the uptake of P and K much variation could not be observed though there was a general trend of increased uptake due to intercropping. Muthuvel *etal.* (1984) also observed enhanced N content of sorghum grain as a result of intercropping with blackgram

Table 2 NPK uptake By sorghum at flowering phase and total N content of post harvest soil (kg/ha)

Treat ment	Uptake of N				P				K				Total N of soi l	
	84-85	85-86	86-87	Pooled	84-85	85-86	86-87	Pooled	84-85	85-86	86-87	Pooled	85-86	86-87
T1	–	–	–	–	–	–	–	–	–	–	–	–	448	653
T2	58	57	54	56	6.6	6.6	7.1	6.8	164	181	70	138	392	625
T3	63	55	60	60	7.3	6.4	9.1	7.6	197	175	107	160	383	597
T4	64	51	68	60	7.2	6 0	7.1	6 8	203	162	78	148	443	607
T5	69	59	70	69	7.6	6 5	8 9	7.7	208	178	117	168	439	646
T6	72	63	79	71	7.7	6.7	10.5	8.3	226	182	89	166	439	616
T7	82	73	91	82	8,3	7.4	12 0	9.2	207	200	112	173	439	653
T8	81	72	68	74	8.2	7.4	10.2	8.6	222	202	123	184	439	667
T9	103	90	93	95	9.6	7.7	10.9	9.4	227	210	93	190	438	663
C D	5.4	7.3	20 5	8.9	0.5	0.4	2.6	1.3	38	14.4	16.4	30.3	NS	NS

Table. 1. Grain yield of sorghum + blackgram (kg/ha)

Treatments	Sorghum			Blackgram		
	1984–85	85–86	86–87	84–85	85–86	86–87
T_1 Blackgram–Sole	–	–	–	441	137	601
T_2 Sorghum–Sole at 20 N	365	319	656	–	–	–
T_3 Sorghum+Blackgram at 20 N	365	399	1088	126	25	82
T_4 Sorghum–Sole at 30 N	407	392	683	–	–	–
T_5 Sorghum+Blackgram at 30 N	434	445	1318	110	17	77
T_6 Sorghum+Sole at 40 N	530	469	867	–	–	–
T_7 Sorghum+Blackgram at 40 N	525	465	1343	61	18	51
T_8 Sorghum–Sole at 50 N	834	491	975	–	–	–
T_9 Sorghum+Blackgram at 50 N	862	587	1470	67	15	52
CD	103	31	159	64	62	84

Available N P K status of post harvest soils in all the three years showed a non significant difference. Total N content of post harvest soils evaluated during 1985-86 and 1986-87 also did not show marked variation which implies that the increased N uptake by sorghum under intercropping was due to the contribution by the blackgram to sorghum crop.

From the present studies it could be concluded that blackgram coutributes about 10 kg of N to the base crop of sorghum at the optimum level of recommended N application. As such 10 Kg of N could reduced without causing adverse effect to the crop yield.

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