Madras Agric. J. 79 (9) : 511 - 517 September 1992
https://doi.org/10.29321/MAJ.10.A01787

EFFECT OF PLATING PATTERN AND NITROGEN FERTILIZATION ON SORGHUM +BLACKGRAM INTERCROPPING UNDER DRYLAND CONDITIONS

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ABSTRACT

Intercropping of blackgram and sorghum with various planing patterns and nitrogen levels were tried at Agricultural Research Station, Aklera (Jhalawar) Rajasthan during Kharif, 1977, 78 and 1979. Alternate planting of sorghum and urd at 22.5 cm or paired planting of sorghum at 35 cm and one row of urd in between pairs of sorghum were found equally good and proved better than other ried systems of intercropping or sole cropping. Application of nitrogen to the sorghum crop in intercropping was as good as sole sorghum. However, nitrogen application to sorghum crop reduced the yield of intercrop.

Mixed cropping of legumes with non-legumes crop is a common practice among the farmers of semi-arid and tropics (SAT) in India. In a subsistence farming situation with uncertain rainfall, which is characteristics of SAT region, very little attention has been paid in past to improve soil productivity. Even though nitrogen is most limiting plant nutrient in these soils, intercropped legume might have been responsible for maintaining soil productivity (Palaniappan et al., 1976) at least at a subsistence level. Meager data are available on response of nitrogen by the non legumes in the presence of legume, it is, therefore, an experiment was planned to assess the response of sorghum to nitrogen in the presence of legume as intercrop.

MATERIALS AND METHODS

The experiment was conducted for three consecutive years in Kharif of 1977, 1978 and 1979 at Agricultural Research Sub-Station, Rajasthan Agricultural University, Aklera (Jhalawar), which is situated in south-eastern part of Rajasthan. The soil of experimental fields was clay having pH 7.4 and Ec. 0.98 mmhos/cm. The organic matter content was 0.6 per cent. The available nitrogen and P_2O_5 being 261 and 44.6 kg/ha respectively. The first year (1977) was wet with well distributed rainfall (856.5 mm), in second year (1978) 699.9 mm rainfall was received while in third year (527.8 mm) there was late break of monsoon with early withdrawal (33rd week). The average rainfall of the area is about 1000 mm/year, most part of which is received from last week of June to first week of September.

The experiment conducted comprised of the treatments : Sole sorghum

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at 45 cm -T_1 : Alternate row of sorghum and blackgram at 22.5 cm - T_2 : Four rows of sorghum at 35 cm and one row of blackgram in between two sets which were 75 cm apart (35 x 4/75,1 blackgram) - T_3: Three rows of sorghum at 35 cm and one row of blackgram in between two sets which were 6.5 cm apart (35 x 3/65, 1 blackgram) T_4 : Two rows of sorghum at 35 cm and one row of blackgram in between two pairs which were 55 cm apart (35 x 2/55, 1 blackgram) - T_5. These treatments were super imposed by four levels of nitrogen to sorghum crop i.e. 0, 30, 60 and 90 kg/ha. Sole blackgram sown at 30 cm (T_6) was also included as a treatment. These twenty one treatment combinations were laidout in randomised block design with three replications. The gross plot size was 5.4 x 5 cm. Phosphorus at the rate of 40 kg/ha was drilled uniformly at the time of final field preparation. Half dose of nitrogen as per treatment, was applied as basal to sorghum rows at the time of sowing. The remaining half dose of nitrogen was applied to sorghum in two splits, i.e. at knee high and flag leaf stages. However, in the year 1979 nitrogen at flag leaf stage could not be applied due to lack of moisture. The dates of sowing and harvesting for main and intercrop were as follows :

In results sorghum equivalent has been calculated on the price value basis and land equivalent ratio (Table 2) has been calculated by taking sorghum yield of respective nitrogen level.

Crop	Date of sowing			Date of harvesting		
	1977	1978	1979	1977	1978	1979
Sorghum	3/7	22/6	11/7	20/10	9/10	26/10
Blackgram	4/7	11/7	17/7	25/9	25/9	3/10

RESULTS AND DISCUSSION

Grain yield sorghum

The yield data (Table 1) reveal that intercropping of blackgram has no significant effect on grain yield of sorghum when it was planted in between normal rows (T_2) and in between two pairs of sorghum (T_5). This shows that the short height plant like blackgram have no competition for sorghum. Such effects of intercropping has also been reported by Rathore (1981). It was also observed from mean data that there was reduction in the grain yield of sorghum when 3 or 4 rows of sorghum were planted at 35 cm (T_3 and T_4) to the tune of 2.35 and 1.54 q/ha, respectively. This shows the competition with in sorghum crop when planted at closer spacing.

Data presented in Table 1a also show that grain yield of sorghum increased progressively with successive levels of nitrogen application upto 90 kg/ha. Mean data show that application

of 30, 60 and 90 kg N/ha gave an increase of 71.3, 123.0 ad 182.7 per cent grain yield over control (7.98 q/ha). Since the interaction was not significant blackgram did not seem to contributing any nitrogen to its companion sorghum.

BLACKGRAM

Mean data in Table 1a show that there was reduction in the grain yield of blackgram when it was interplanted with sorghum in comparison to its sole planting. This may be due to reduction in the plant population of the normal sown blackgram crop. However, the highest yield by 40 and 33 per cent of normal yield (2.60 q/ha) of blackgram among intercropping treatments was obtained when blackgram was intercropped in between the normal rows of sorghum (T_2) and paired rows (T_5) respectively, without any reduction in the grain yield of main crop. Mean data in Table 1 further reveal that the highest yield of blackgram (1.18 q/ha) was obtained when nitrogen was not applied to the main crop. Reduction in the yield

TABLE 1a : Grain yield of Sorghum and Blackgram under different inter-croppings and N levels.

Treatments	Sorghum & Blackgram yield (q/ha)			
	1977	1978	1978	Mean
T_1 Sole sorghum	21.64	19.29	8.49	16.47
T_2 Alternate sorghum & Blackgram at 22.5 cm	22.05 (1.23)	17.71 (1.05)	7.88 (0.07)	15.88 (0.99)
T_3 Sorghum 35 x 4/75, 1 row of blackgram	20.00 (0.79)	17.59 (0.62)	7.20 (0.50)	14.93 (0.63)
T_4 Sorghum 35 x 3/65 1 row of blackgram	17.99 (0.98)	15.96 (0.87)	8.41 (.049)	14.12 (0.78)
T_5 Sorghum 35 x 2/55, 1 row of blackgram	22.19 (1.08)	19.50 (0.97)	7.54 0.65	16.41 0.90
T_6 Sole blackgram	- (0.07)	- (0.03)	- (0.72)	- (0.60)
CD (0.05)	NS (0.23)	NS (-)	NS (-)	- (-)
N kg/ha				
N_0 = no nitrogen	10.47 (1.56)	9.80 (1.34)	3.68 (0.64)	7.98 (1.18)
N_{30} = 30	19.24 (1.06)	15.59 (0.85)	6.08 (0.49)	13.67 (0.80)
N_{60} = 60	24.09 (0.70)	20.53 (0.67)	8.80 (0.59)	12.80 (0.65)
N_{90} = 90	29.20 (0.69)	26.00 (0.68)	12.50 (0.59)	22.56 (0.65)
CD (0.05)	2.99 (0.23)	2.42 (0.32)	1.91 (-)	- (-)

* Figures in parenthesis represents blackgram yield (q/ha).

TABLE :1(b) Sorghumn equivalent and return under different inter-croppings and N levels

	Treatments	Sorghum equivalent (q/ha)				Returns (Rs/ha)			
		1977	1978	1979	Mean	1977	1978	1979	Mean
T_1	Sole sorghum	21.64	19.31	8.49	16.48	4110	3239	20.25	3158
T_3	Altemate sorghum & blackgram at 22.5 cm	22.02	19.89	8.42	17.61	4376	3367	2134	3292
T_3	Sorghum 35 x 4/75, 1 row of blackgram	21.43	18.88	7.51	15.94	3952	3124	1974	3017
T_4	Sorghum 35 x 3/65, 1 row of blackgram	19.45	17.76	8.09	15.10	3699	3052	2055	2936
T_5	Sorghum 35 x 2/55, 1 row of blackgram	24.30	21.49	7.94	17.91	4248	3507	2087	3292
T_6	Sole blackgram	4.15	4.07	7.44	5.22	664	606	930	733
	C.D. (0.05)	3.05	2.71	NS	-	-	-	-	-
	N kg/ha								
	N_o = no nitrogen	12.55	1.02	4.09	9.55	2490	2183	1386	2020
	N_{30} = 30	21.03	17.02	6.35	14.80	3856	2958	1848	2888
	N_{60} = 60	25.21	21.72	9.10	18.51	4655	3555	2199	3470
	N_{90} = 90	30.33	27.10	12.83	23.42	5371	4335	2806	4171
	CD (0.05)	2.72	2.43	1.00	-				

of intercrop (blackgram) was observed with the application of nitrogen to the main crop. Reduction in the yield of legumes when nitrogen was applied to the base crop has also been reported by Narain et al. (1980) and Chang (1981).

SORGHUM EQUIVALENT

Data presented in Table 1b show that highest sorghum equivalent (17.91) was obtained from paired planting of sorghum and intercropping and blackgram (T_5). This was closely followed by alternate planting of sorghum and blackgram (T_2-17.61 q/ha). Other practices, however, did not show any improvement in sorghum equivalent in comparison to sole sorghum (16.48 q/ha). Sole sorghum and intercropping systems gave higher sorghum equivalent as compared to sole blackgram in all the three years. But significant differences were not observed in the year 1979. Higher sorghum equivalent in intercropping in comparison to sole sorghum and legumes has also been reported by Waghmare and Singh (1982).

MONETARY RETURN

Data in Table 1b. further show that intercropping of blackgram in between normal rows (T_2) and paired row of sorghum (T_5) gave the highest monetary return. The mean increases was Rs. 134/-over sole sorghum and Rs. 2559/- over sole blackgram. Date (Table 1b) further show that the monetary return successively increased with the increasing levels of nitrogen to sorghum crop.

LAND EQUIVALENT RATIO (L E R)

Data in Table 2. show that increase in total LER was recorded with all the systems of intercropping at all the levels of nitrogen. It was, however, noted that due to blackgram the LER decreased with the increasing levels of nitrogen under all the systems of intercropping. This suggested that intercropping may be advantageous at low fertility levels (Reddy et al., 1980), Highest mean LER to the tube of 2.26 was obtained when alternate planting of sorghum and blackgram was done without application of nitrogen (T_2 No). It was followed by planting of blackgram between paired rows of sorghum at the same level of nitrogen (T_5 No. 1.71). These two the same level of nitrogen (T_5 No. 1.71). These two treatment held the superiority at all the levels of nitrogen.

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TABLE 2 : Land equivalent ratio under different treatments.

	Intercropping pattern	Nitrogen levels															
		1977				1978				1979				Mean			
		N_0	N_{30}	N_{60}	N_{90}	N_0	N_{30}	N_{60}	N_{90}	N_0	N_{30}	N_{60}	N_{90}	N_0	N_{30}	N_{60}	N_{90}
T_2	Alternate sorghum & blackgram at 22.5 cm	2.78	1.91	1.16	1.29	2.50	1.29	1.16	1.37	1.52	1.20	1.01	0.97	2.26	1.47	1.11	1.21
T_3	Sorghum 35 x 4/75 1 row of blackgram	1.76	1.54	1.02	1.07	2.15	1.01	0.92	1.36	0.98	0.82	1.20	0.84	1.63	1.18	1.05	1.09
T_4	Sorghum 35 x 3/65 1 row of blackgram	1.76	1.23	1.04	1.27	1.76	1.10	0.98	1.19	1.20	0.96	1.22	0.88	1.50	1.10	1.08	1.11
T_5	Sorghum 35 x 2/55 1 row of blackgram	1.90	2.19	1.18	1.26	2.17	1.36	1.16	1.49	1.07	0.89	0.98	1.03	1.71	1.48	1.11	1.26

Note : LER has been calculated by taking sorghum yield of respective nitrogen levels.

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Madras Agric. J. 79 (9) : 517 - 523 September 1992

CANOPY MANAGEMENT OF KARUNGANNI COTTON UNDER RAINFED CONDITIONS

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ABSTRACT

An experiment was conducted at Agricultural Research Station, Kovilpatti under rainfed during 1984 and 1985 rabi seasons to find out the effect of clipping Cotton terminal nodes as well as cycocel spray on the yield of seed cotton under different levels of spacing. The first year of the study was with normal rainfall during crop growth period, while it was deficit in the second year. The result revealed the suitability of the treatment 60 x 15 cm spacing with Cycocel spray on 65 DAS for both different rainfall situations.

Desi Cotton (G. arboreum) popularly known as Karuganni Cotton is very prominent for cultivation among dryland farmers of southern districts of Tamil Nadu. This is because, even under severe moisture stress condition, this Karuganni Cotton would yield seed cotton satisfactorily. Further among different species of cotton under cultivation at this tract this cotton is also found suitable for late sowing during rabi season as well as highly suitable for submarginal black soils. Padaki et al (1977) observed that cultivation of ar-

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