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PRODUCTIVITY AND PROFITABILITY OF INTERCROPPING IN SUMMER COTTON AND ITS NITROGEN MANAGEMENT

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ABSTRACT

Field experiments were conducted at the Agricultural College and Research Institute, Tamil Nadu Agricultural University Killikulam for two years (1990, 1991) to find out the effect of crop geometry, intercropping and nitrogen management in summer irrigated cotton Results indicated that, seed cotton yield was influenced by geometry, intercropping and nitrogen management Sole crop of cotton planted in uniform row with a spacing of 75 x 30 cm recorded higher seed cotton yield Intercropping of black gram reduced the seed cotton yield to the tune of 12 to 18 per cent. Seed cotton yield was higher at 80 kg N/ha but it was comparable with 60 kg N + *Azospirillum*. Highest net monetary return of Rs. 17,208/ha and cost benefit ratio o f 3.38 was recorded under paired row geometry of cotton with two rows of black gram as intercrop applied with 60 kg N + *Azospirillum* resulting in a saving of 29 kg N/ha.

KEY WORDS : Summer Cotton, Intercropping, Nitrogen Management, Productity, Profitability

Pressure on irrigated area for crop production increases with diminishing irrigation potentials. Summer cotton is mostly raised as a pure crop. The slow growing nature of cotton does not utilise the resources efficiently in the early stages. This facilitates growing of black gram as intercrop. Nehra *et al.* (1990) also reported that black gram was the best pulse crop suitable for inter-cropping in cotton in terms of giving higher monetary returns. Fertilizers are not only in short supply but also expensive. At this juncture, use of fertilizer in conjunction with biofertilizer assumes significance in fertilizer management. Purushothaman *et al.* (1981) reported that *Azospirillum* inoculation brought significant increase in drymatter and the yield of cotton with a saving of 25 to 30 kg N/ha. The information on intercropping and N management in summer cotton is meagre and hence the present study was taken up.

MATERIALS AND METHODS

Field experiments were conducted during 1990 and 1991 at the Agricultural College and Research Institute, Tamil Nadu Agricultural University, Killikulam in order to assess the effect of geometry, intercropping and N management in summer cotton sown during the month of March. The experiments were conducted in split plot design replicated four times in typic ustropept soil having low available N, medium available P and K with neutral soil reaction. The varieties used were MCU.5 cotton and ADT 3 black gram. During both years, geometry and intercropping *viz.*, cotton sole crop in uniform row (I_1), cotton in uniform row + 1 row black gram (I_2) and cotton in paired row + 2 rows of black gram (T_3) were assigned in the main plots and N management was assigned to the sub plot. During 1990, three levels of N *viz.*, 40, 60 and 80 kg were tested and during 1991 to augment N economy *Azospirillum* was added along with 40 and 60 Kg N. Cotton was sown in uniform row at 75 x 30 cm spacing and in paired row at 60/90 x 30 cm spacing. Intercrop black gram was sown with a plant to plant spacing of 10 cm. *Azospirillum* was applied by seed treatment (600 grams/ha) and soil application (2.00 kg/ha). Half N and full P and K were applied as basal and the remaining half N was top dressed on 45 days after sowing to cotton alone. Need based plant protection measures were adopted. Data on plant height, drymatter production, sympodial branches, number of bolls per plant and yield of cotton and black gram were recorded.

RESULTS AND DISCUSSION

Effect of geometry and intercropping on cotton

Significant variation due to geometry and intercropping was noticed in the growth of cotton (Table 1). The plant height, drymatter production

Table 1. Growth and yield attributes and yield of cotton and black gram as influenced by cropp geometry. intercropping and nitrogen

	1990 Cotton (at 120 DAS)				Seed cotton yield (kg/ha)	Yield of black gram (kg/ha)	1991 Cotton (at 120 DAS)				Seed cotton yield (kg/ha)	Yield of black gram (kg/ha)
	Plant height (cm)	DMP (kg/ha)	Symp. branches / plant	Bolls/ plant			Plant height (cm)	DMP (kg/ha)	Symp. branches / plant	Bolls/ plant		
Geometry and intercropping												
Cotton sole crop	128.5	5862	14.50	16.55	2127	-	137.9	5318	14.78	18.32	2240	-
Cot. UR + 1 row BG	119.2	5294	11.57	12.96	1826	405	128.3	4938	13.21	15.22	1894	425
Cot. PR + 2 row BG	121.5	5376	12.00	13.23	1899	484	130.3	4960	13.34	15.50	1963	549
SEd	2.1	162	0.23	0.10	73.2	13	1.9	99	0.09	0.91	41.7	10
CD (P=0.05)	4.5	345	0.50	2.12	156	39	4.6	242	0.22	2.23	102	32
Nitrogen (kg/ha)												
40	118.1	5137	12.28	12.96	1771	445	113.6	4598	12.53	12.77	1783	470
40 + A	-	-	-	-	-	-	128.9	4938	12.81	16.44	1987	518
50	124.0	5512	12.74	14.25	1964	485	132.4	4960	13.55	16.93	2054	523
60 + A	-	-	-	-	-	-	140.8	5282	15.00	17.60	2123	501
80	129.5	5884	13.06	15.53	2122	404	145.4	5363	15.21	18.01	2192	425
SEd	2.5	164	0.26	0.75	73.5	17	3.1	155	0.41	0.72	46.8	23
CD (P=0.05)	5.2	133	0.53	1.52	149	35	6.4	314	0.83	1.45	95	47

Note : A - Azospirillum : PR - Paired Row : UR - Uniform row : B.G. - Black gram : Cot. - Cotton.

and yield attributes were higher in sole crop of cotton grown under uniform row. Under intercropping situation, the plant height, drymatter production and yield attributes were similar for uniform row planting. Cotton sown as sole crop recorded higher number of sympodial branches (14.50 to 14.78) whereas under intercropped situation it ranged from 11.57 to 13.34 only. Similarly, number of bolls per plant recorded ranged from 16.85 to 18.32 for the sole cotton grown under uniform row.

Seed cotton yield was reduced by intercropping black gram in cotton in both the years. Sole crop of cotton yielded 228 to 301 kg more of seed cotton yield than intercropped cotton during 1990 and 277 kg to 345 kg/ha during 1991. The reduction ranged from 12 to 18 per cent. Among the two planting patterns of intercropping, the seed cotton yield was comparable. Cotton sole crop planted in uniform row accounted for enhanced growth parameters like, plant height and drymatter which might have resulted in production of increased yield attributes *viz.*, sympodial branches and number of bolls per plant ultimately leading to increased seed cotton yield. Presence of intercrop might have also competed with the cotton for light and below ground resources resulting in reduction of growth and yield attributes under intercropping situation. Desphande

Table 2. Interaction effects of N and system of cropping on the yield of cotton

Geometry and intercropping	Nitrogen									
	40	60	80	Mean	40	40+A	60	60+A	80	Mean
Cotton sole crop	1828	2142	2410	2127	1950	2197	2222	2395	2438	2240
Cot. UR + 1 row BG	1718	1840	1920	1826	1705	1843	1932	1970	2018	1894
Cot. PR + 2 row BG	1767	1910	2019	1899	1695	1920	2006	2074	2120	1963
Mean	1771	1964	2122		1783	1987	2054	2123	2192	
Intercrop			SEd	CD (P=0.05)		SEd		CD (P=0.05)		
Nitrogen			73.2	156		41.68		102		
Intercrop at N			73.5	149		46.84		95		
N at intercrop			99.0	200		83.70		205		
			127.3	258		83.00		170		

Table 3. Economic of intercropping under N levels

Geometry and intercropping	Nitrogen									
	1990				1991					
	40	60	80	Mean	40	40+A	60	60+A	80	Mean
Cotton sole crop	8369	10781	12829	10660	11605	13919	14069	15680	16001	14225
	(2.34)	(2.70)	(2.99)	(2.68)	(2.67)	(3.00)	(2.99)	(3.21)	(3.23)	(3.02)
Cot. UR + 1 row BG	10719	12079	11631	11476	12648	14418	15160	15343	14845	14483
	(2.71)	(2.70)	(2.80)	(2.80)	(2.80)	(3.04)	(3.12)	(3.14)	(3.04)	(3.03)
Cot. PR + 2 row BG	11697	13199	13037	12644	13616	15992	16773	17208	17141	16146
	(2.85)	(3.06)	(3.00)	(2.97)	(2.92)	(3.25)	(3.33)	(3.38)	(3.34)	(3.24)
Mean	10262	12020	12499		12623	14776	15334	16077	15994	
	(2.63)	(2.89)	(2.93)		(2.80)	(3.10)	(3.15)	(3.24)	(3.20)	

* Data statistically not analysed.

** Figures in parenthesis indicate benefit cost ratio.

et al. (1989) and Mukerji *et al.* (1987) also observed reduced seed cotton yield under cotton + black gram intercropping situation.

Effect of nitrogen

Profound influence on the growth of cotton due to N levels was observed. During 1990, N at 80 kg/ha registered increased plant height and DMP and it was significantly superior to 60 and 40 kg N. In the year 1991 also, 80 kg N recorded increased plant height and drymatter but it was comparable with 60 kg N applied along with *Azospirillum.*

In respect of yield attributes in the first year sympodial branches and number of bolls per plant recorded were 13.06 and 15.33 respectively for 80 kg N. During the second year, it was 15.21 and 18.01 for 80 kg N and 15.00 and 17.60 when 60 kg N was applied along with *Azospirillum* and these were compared.

Nitrogen influenced the seed cotton yield positively. During 1990, 80 kg N recorded increased seed cotton yield and it was significantly superior to 60 and 40 kg N following the similar trend of growth and yield attributes. In the year 1991 also, 80 kg N recorded higher seed cotton yield and was on par with 60 kg N was applied along with *Azospirillum* but significantly superior to the rest of the treatments. Increased plant height and dry matter coupled with higher number of sympodial branches and bolls might have contributed for higher seed cotton yield at 80 kg N and 60 kg N + *Azospirillum. Azospirillum* was also effective in increasing the above attributes when applied in combination with fertilizer N due to fixation of atmospheric N. Similar findings were also reported by Ramamoorthy *et al.* (1991).

Interaction effect

Significant interaction was observed between system of cropping and N during both the years (Table 2). In the first year at all levels of N, sole crop of cotton registered significantly higher seed cotton yield and the highest yield of 2410 kg/ha was recorded at 80 kg N level under sole cropping system and this was comparable with 60 kg N + *Azospirillum.* The levels of N showed a pronounced effect only in the sole crop of crop of cotton whereas in the intercrop system only an overlapping trand between the levels was observed due to N supplement by the legume intercrop.

Effect of geometry and N on intercrop

In both the years, higher blackgram grain yield (484 and 549 kg/ha) was recorded when it was grown in two rows under paired row system of cotton than black gram sown in between uniform row cotton. Growing two rows of black gram as intercrop in cotton under paired row faced less competition from cotton as compared to cotton under uniform row for resources, thereby causing reduction in growth, yield attributes and ultimately the yield. Higher grain yield was recorded at 60 kg N and was comparable, when 60 and 40 kg N was applied alongwith *Azospirillum.* Higher dose of N *viz.,* 80 kg was detrimental to black gram due to excessive vegetative growth which resulted only in higher haulms yield.

Economics

The economics analysis of t he study was made by computing the net monetary return and benefit cost ratio (Table 3) Though there was a reduction in seed cotton yield under intercropped situation, it was well compensated by additional yield from intercrop thereby registering higher economic returns. Higher net return of Rs.17208/ha besides a higher benefit cost ratio of 3.38 was recorded under paired row planting of cotton with two rows of black gram as intercrop and applied with 60 kg N + *Azospirillum*. This practice resulted in a sawing of 20 kg fertilizer N to cotton .

From the present study, it can be concluded that raising summer cotton (MCU 5) in paired row geometry with the rows of black gram (ADT 3) as intercrop and applied with 60 kg N + *Azospirillum* was found to be more advantageous and profitable.

REFERENCES

DESPHANDE, R.M., KHARCHE, S.G. and RAWANKAR, H.N. (1989) Studies on intercropping with various legumes in relation to planting pattern of hybrid cotton. **PKV Res.J.,13** : 100-104

MUKERJI, N., VERMA, B.L. and PRAKASH, R. (1987) Possibility of intercropping of early maturing greengram with irrigated summer cotton in north western Rajasthan. **J.Indian Soc. Cott.Imp.,12** : 1-5

NEHRA, D.S., VIRESHWAR SINGH, KAIRON M.S. and SINGH, K.P. (1990) Inter cropping of pulses in cotton **Haryana J. Agron.,** 6: 33-37.

PURUSHOTHAMAN, D., GUNASEKARAN, S. and OBLISAMY, G. (1981) Nitrogen fixation by *Azospirillum* in some tropical plants. **Proc. Nat. Acad. Sci., India Part-B 46** : 713-717

RAMAMOORTHY, R, JAYAPAUL, P. and KARIVARATHA RAJU, T.V. (1991) Effect of biofertilizer on yield and quality parameters in cotton. **Orissa J.agric Res., 4** : 173-175.

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UTILISATION OF COIR PITH AS POT CULTURE MEDIUM FOR *Begonia semperflorens*

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ABSTRACT

The efficacy of coir pith in the preparation of potting medium was evaluated using a rose-coloured clone of *Begonia semperflorens* Link and Otto as test crop in a pot culture experiment. The coir pith was combined in a soil breeding experiment with shola leaf mould and sand and these were compared with the conventional medium consisting of shola leaf mould, sand and laterite soil. The physico-chemical properties of the media combinations were analysed. The growth and flowering parameters were recorded at monthly intervals for 3 months. The results indicated that coir pith can be effectively utilised as a potting medium to raise *B. semperflorens* in containers. The indications were clear that 60 per cent coir pith: 20 per cent shola leaf mould: 20 per cent sand encouraged growth and flowering of the container - grown *B.semperflorens*. This improvement in growth and flowering can be attributed to the increase in WHC and CEC and low bulk density and particle density of the medium.

KEY WORDS : Coir pith, Potting Medium, *Begonia*

Container - grown plants require growing medium with good physical and chemical environment for their growth. An efficient medium must be sufficiently firm and dense to hold plants, sufficiently retentive of moisture and porous (Hartmann and Kester, 1978). Considerable research has been carried out on the use of organic waste such as saw dust, manure, sludge, date palm leaves (Aborady *et al.*, 1987), pecan shells (wang and Pokorry 1989) and pine bark (Asron, 1991) in the preparation of pot mixtures. Coir pith is a nondisposable waste product of the coir industry. In the process of investigation on the disposal of certain waste products, this has also received research attention. Its use as a soil conditioner in tropical farming is well established (Nagarajan *et al.*, 1990). *Begonias* as a group love organic matter, a constant supply of moisture without