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EFFECT OF ADVANCE SOWING OF INTERCROPS IN COTTON

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ABSTRACT

Field experiments were conducted at the Tamil Nadu Agricultural University, Coimbatore from 1991 - 92 to 1993 - 94 during the winter seasons, to study the effect of advance sowing of intercrops in MCU 11 and MCU 5 cotton. The results revealed that advance of sowing of green gram 20 days earlier in cotton (MCU 11) + green gram (Co 3) system gave better economic returns. For cotton var. MCU 5, cowpea performed better in the same system and gave maximum net return.

Key Words : Cotton, Intercropping, Net income, Benefit - Cost Ratio.

There is a shortage of pulse production in India though the country stands first in area and production. Efforts are being made to increase the production of pulses to meet the requirement either by increasing the area under the crop or by introducing a pulses component in the cropping system (Mansur *et al.*, 1993). *Gossypium hirsutum* cotton requires wider plant spacing, although there is a very little lateral spread of plants until 65 - 75 days of sowing (Mukerji *et al.*, 1987), and cotton is highly amenable for intercropping. Intercropping of cotton has adverse effect on the main crop but it is adequately compensated by extra yield it produces. There is a possibility of reduction of adverse effect, if the intercrops are sown few weeks earlier before the sowing of the cotton crop. Hence, the present study was undertaken to find out the benefit of advance sowing of intercrops in cotton.

MATERIALS AND METHODS

Field experiments were conducted at the Tamil Nadu Agricultural University, Coimbatore under All India Co-ordinated cotton improvement project on clay loam soil under irrigated conditions during 1991, 1992 and 1993 to study effect of intercropping of grain legumes in cotton on total yield and economics of intercropping system. The soil of the experimental site had neutral pH with low in available N, medium in available P_2O_5 and high in available K_2O during all the three years.

The treatments comprise of two time of sowing of intercrops *viz.*, sowing of intercrops 20 days before the sowing of maincrop and simultaneous sowing of intercrop and cotton. The intercrops tried are black gram (Co 3), green gram (Co 3), soybean (Co 1) and cowpea (Co 4). During 1991 - 92 and 1992 - 93. Cotton variety MCU 11 and during 1993 - 94 cotton variety MCU 5 were used as main crop. During 1991 - 92, simultaneous sowing of intercrops with cotton was not tested. The experiment was laid out in a randomised blocks design with three replications. The advance sowing of intercrops and cotton was carried out on 9 July and 29 July during 1991, 22 July and 15 August during 1992, and 19 July and 10 August in 1993. A uniform row spacing of 75 x 30 cm was adopted for cotton and one row of intercrop was sown between two rows of cotton. A fertilizer dose of 80 : 40 : 40 kg NPK ha^{-1} were applied. Half of N and full dose of P and K were applied as basal to the cotton crop. After the application of basal fertilizers in bands, cotton crops were sown in different years. Remaining half of N was applied during earthing up at 45 days after sowing of the cotton crop. Necessary irrigation and need based plant protection were given to the crop. The intercrops were harvested at the time of maturity.

RESULTS AND DISCUSSION

The results revealed that intercropping of green gram (Co 3) in cotton (MCU 9) recorded maximum seed cotton yield and the yield was on par with sole crop of cotton during 1991 - 92 and 1992 - 93 when the intercrop was sown 20 days in advance (Table 1). In simultaneous sowing of intercrop during 1992 - 93, the same trend was observed as far as seed cotton yield was concerned. However, a slight reduction of yield was observed in simultaneous sowing when compared to the advance sowing. During 1993 - 94, seed cotton in cotton MCU 5 + cow pea

Table 1. Effect of time of sowing of intercrop in cotton on yield, net income and benefit cost ratio

System	Advance sowing of intercrops				Simultaneous sowing of intercrops			
	Seed cotton yield q/ha	Inter crop yield q/ha	Net return Rs/ha	Benefit cost ratio	Seed cotton yield q/ha	Inter crop yield q/ha	Net return Rs/ha	Benefit cost ratio
				1991-92				
Cotton + Black gram	16.78	3.71	11980	2.41				
Cotton + Green gram	17.47	6.60	15570	2.83				
Cotton + Soybean	16.00	8.67	14230	2.67				
Cotton + Cowpea	16.35	1.85	9330	2.09				
Cotton alone	17.71	-	10210	2.36				
CD (P = 0.05)	1.14							
				1992-93				
Cotton + Black gram	17.78	3.97	13250	2.56	16.80	3.48	11780	2.39
Cotton + Green gram	18.42	7.20	17120	3.01	17.60	6.40	15000	2.82
Cotton + Soybean	16.76	8.76	15308	2.80	15.20	7.68	12844	2.51
Cotton + Cowpea	16.80	2.80	10540	2.24	16.36	2.55	9900	2.16
Cotton alone	18.68	-	11180	2.49	18.90	-	11400	2.52
CD (P = 0.05)	1.02				1.02			
				1993-94				
Cotton + Black gram	13.54	5.60	6460	1.59	15.20	4.40	7280	1.66
Cotton + Green gram	15.31	6.20	8650	1.79	15.75	5.20	8390	1.76
Cotton + Soybean	14.59	6.40	8210	1.71	12.93	5.40	5750	1.50
Cotton + Cowpea	18.11	7.90	12640	2.14	16.59	5.90	9720	1.88
Cotton alone	13.71	-	5710	1.25	12.49	-	4490	1.14
CD (P = 0.05)	2.76				2.76			

(Co 4) system and it is significantly higher than the sole crop of cotton in both the time of sowing. The change of yield trend in the year 1993 - 94 might be due to the change of cotton variety from MCU 11 to MCU 5. The seed cotton yield was lowest when it was intercropped with soybean (Co 1) with MCU 11 cotton variety in both the time of sowings. However, the seed cotton yields of MCU 5 cotton were higher than sole crops of cotton during 1993 - 94 in both the time of sowings.

Among the intercrops, soybean (Co 1) recorded higher grain yield when it was intercropped with cotton MCU 11 in both the sowing times during the first two years. The next best intercrop was green gram which recorded more grain yield. Cowpea (Co 4) recorded the lowest grain yield when it was intercropped with cotton (MCU 11) whereas the trend was reversed when it was intercropped with cotton (MCU 5). Reduction in grain yield of intercrops was observed in all years with simultaneous sowing when compared to the advance sowing. This might be due to the higher competition of main crop when the intercrop

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The economic analysis revealed that advance sowing of green gram (Co 3) in cotton (MCU 11) - green gram intercropping gave maximum net income of Rs.15, 570 and Rs.17,120 during 1991 - 92 and 1992 - 93 respectively. The benefit cost ratios of the system works out to be Rs.2.83 and Rs.3.01 during the respective years. Simultaneous sowing of green gram (Co 3) and cotton (MCU 11) also recorded higher net income and benefit cost ratio than other systems during 1992 - 93. The next best system during the first two years was cotton (MCU 11) + soybean (Co 1) system. During 1993 - 94, Cotton (MCU 5) + cowpea (Co 4) gave a maximum net income and benefit - cost ratio in both the sowings. All the systems recorded more net income when compared to sole crop of cotton in all the years except during 1992 - 93 in cotton (MCU 11) + cowpea (Co 4) system with simultaneous sowing.

It can be concluded that sowing of green gram (Co 3) 20 days in advance in cotton + green gram intercropping system can be practiced for better economic returns when the cotton variety MCU 11 is used. For cotton variety MCU 5, cowpea (Co 4)

(intercrop) proved better for higher economic returns with advance sowing.

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WATER AND NITROGEN MANAGEMENT FOR LOWLAND TRANSPLANTED RICE UNDER LIMITED WATER SUPPLY

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ABSTRACT

Under conditions of limited water supply, intermittent irrigation instead of continuous flooding is necessitated in rice cultivation. To assess the response of lowland transplanted rice to intermittent irrigation *vis-a-vis* continuous submergence, field experiments were conducted at the Agricultural College, Killikulam during *rabi* seasons (Oct-Feb) of 1990 and 1991. The effect of partial substitution of inorganic nitrogen through bio fertilizers-azolla and blue green algae (BGA) - was also evaluated. The results indicated that rice yield was reduced by 3 to 19 per cent by intermittent irrigation compared to continuous submergence. The practice of irrigation immediately after disapperance of ponded water was most suitable under limited water supply. With this practice, the yield reduction was only marginal (3-5%) but it helped to save about 28.7 per cent of irrigation water compared to continuous submergence. Substitution of 25 per cent of inorganic nitrogen through inoculation of azolla or BGA maintained the grain yield of rice on par with the application of 100 per cent of N through inorganic fertilizers.

KEY WORDS : Lowland Rice, Limited Water, Nitrogen, Water, Management

Sixty per cent of total available irrigation water in India and about 80 per cent in Tamil Nadu is utilised for rice cultivation (Sheik Dawood *et al.*, 1990). with water becoming a scarce input, its economic use is of utmost importance today. In the Tambiraparani command area of Tamil Nadu, the *rabi* rice (Pishanam Oct-Feb) frequently suffers due to inadequate water availability caused by early closure of canal water due to insufficient storage in the reservoir. Very often, irrigation water is made available under a turn system of supply in the canals, making it difficult to practise the usual system of continuous submergence. Past research elsewhere suggests that continuous submergence may not be always essential for higher grain yield and the practice of intermittent flooding gives yield comparable to continuous submergence (Wann, 1978). The response of rice to such intermittent flooding at varying intervals and the potential yield of rice under such limited water supply need to be assessed for making meaningful recommendations on water management under limited water supply.

Another aspect of concern for the rice farmers is the long term effect of continuous and exclusive use of inorganic fertilizers on crop productivity. Partial substitution of inorganic fertilizers through biofertilizers is a strategy recommended under such conditions. This study was therefore programmed to evaluate different water management regimes and integrated use of biofertilizers with inorganic nitrogen in *rabi* rice of Tambiraparani command area of Tamil Nadu.

MATERIALS AND METHODS

The experiment was conducted during *rabi (Pishanam)* season (Oct-Feb) of 1990 and 1991, at the College Farm, Agricultural College and Research Institute, Killikulam. The soil of the experimental field was red sandy loam, neutral in reaction, low in available N and medium in available P and K. The bulk density of the soil was 1.45 g cm^{-3}. Rice variety IR 20 was used for the study. The crop was planted at a spacing of 20 x 10