

INTERCROPPING COTTON WITH MUNG AND SUNFLOWER

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Cotton intercrop system with mungbean (*Phaseolus aureus*) and sunflower (*Helianthus annuus*) was evaluated for three consecutive years at Cotton Research Institute, Sakrand. Seedcotton yield for cotton alone (non-intercropped treatment) was higher than intercropped cotton (*Gossypium hirsutum* L.). But, the total economic return was higher in the intercropped treatments, in all the years, due to additional yield of intercrops (mung and sunflower). Plant population per hectare of cotton was significantly different in both the intercropped and non-intercropped treatments but the plant height and number of bolls per plant remained unaffected due to intercropping. Cotton, whether sown alone or intercropped, when planted in mid April gave comparatively more economic returns than mid-May sown. Sunflower was comparatively a better intercrop than mung.

Key words: Intercropping, Cotton, Mung, Sunflower.

Introduction

Compatible intercrops like soybean, mung bean, sunflower, sorghum etc., with cotton offer promising prospects to increase the per hectare returns of farmer. Rangaswami [1] reported that intercropped cotton with rala (*Setaria italica*) at Gokak, India, was better than cotton alone, but disadvantageous at Hegari. The author further stated that at Guntur and Dharwar, groundnut in between cotton rows was much better than cotton alone. A similar practice in Sudan was reported unsuitable and unprofitable by Crowther [2].

Sheikh and Ahmed [3] suggested that the growth of mixed cropped cotton was seriously affected with respect to height and branching and consequently seedcotton yield was reduced by 53 to 83 % irrespective of the type of intercrop and seed-rate of the fodder.

Sheikh *et al.* [4] in their further work reported that the yield of seedcotton was reduced by mixed cropping with jowar fodder, the severity of reduction being dependant upon the fodder seed rates.

Rao and Sadaphal [5] studied intercropping cotton with green gram and cowpea and reported increased seedcotton yields from 0.65 t/ha in pure stands to 0.72 t/ha by intercropping with green gram, but were reduced by intercropping with cowpeas (0.48 - 0.55 t/ha).

Beltrao *et al.* [6] intercropped grain sorghum and forage sorghum with cotton in various configurations. The economically advantageous was a double row of cotton with spacing 0.75 x 0.2 m and a row of grain sorghum 1 m away from cotton.

Birajdar *et al.* [7] reported that in intercropping of hybrid cotton with blackgram (*Vigna mungo*), cotton hybrid-4 grown at 27,777 plants/ha at different spacings in uniform or paired rows gave similar yield. Cotton intercropped with blackgram

was superior to that intercropped with pigeonpea or sorghum in terms of cotton equivalent yield, land equivalent ratio and gross returns.

Keeping in view the importance of intercropping, an experiment was conducted at Cotton Research Institute, Sakrand, to evaluate intercropping of cotton with sunflower and mung beans at two sowing dates. This paper comprises the results of three years of such studies.

Material and Methods

A sowing date-cum-intercropping experiment on cotton was conducted at Cotton Research Institute, Sakrand, from 1985 to 1987 to study the feasibility of intercropping cotton with short season crops by substituting every two cotton rows with an intercrop and to compare the overall economic returns. The experiment was laid out in split plot design with four replications and plot size of 48' x 100'. The sowing dates 15th April and 15th May were the main plots and three intercrop patterns were treated as sub-plots. Treatments were (i) cotton alone, (ii) two rows of cotton and three rows of mung bean in sequence, and (iii) two rows of cotton and three rows of sunflower in sequence.

The sowing was done in lines 75 cm apart and thinning was done to maintain 18-22 cm plants to plant distance. Sunflower and mung as intercrops, were seeded in the sequence already mentioned at the seed rate of 9.8 and 7.4 kg/ha respectively. Cultural operations like weeding, hoeing, irrigation and plant protection were followed as and when required and 75 kg nitrogen, (25 kg at 1st irrigation and 50 kg/ha at preflowering stage in the form of urea) was applied to the crop by line methods. Data on seedcotton yield and other plant characters were collected and statistically analysed using of variance technique of Gomez and Gomez [8].

Results and Discussion

The seedcotton yield and the yield of intercrops from 1985 to 1987 together with the economic returns of intercropped cotton compared with non-intercropped cotton are given in Table 1. Due to intercropping, 50% of the area of experimental plot was occupied by intercrops (mung and sunflower) and remaining 50% by cotton, as every alternate two rows of cotton were replaced by mung and sunflower in a sequence; whereas the seedcotton yield in the intercrop treatments was only 25–30% less than non-intercropped cotton. However, there was additional yield of mung and sunflower obtained from intercrop treatments. The total economic return was

higher from intercropped than the nonintercropped cotton. During 1985 cotton season, soybean was also included as intercrop with cotton [9], but due to high mortality of young soybean seedlings during scroching temperatures of May and June (cotton was sown in the middle of May) the crop failed and therefore was not included subsequent years.

If non-intercrop cotton treatments are compared with each other, to determine the best planting date (Table 1), it is obvious from the total economic return that 15th May sown crop gave more benefit than 15th April sown. The results of Mithaiwala [10], Karim *et al.* [11] and Khan *et al.* [12] support higher yield of seedcotton with earlier sowings

TABLE 1. COMPARISON OF INTERCROPPING COTTON WITH MUNG AND SUNFLOWER VERSUS NON-INTERCROPPED COTTON DURING 1985–1987 AT COTTON RESEARCH INSTITUTE, SAKRAND.

Treatments	Yield of seedcotton (kg/ha)			Yield of intercrops (kg/ha)			*Economic returns per hectare in Rs.		
	1985	1986	1987	1985	1986	1987	1985	1986	1987
<i>Sowing date 15th April</i>									
Cotton alone	1545 a	755 b	730 a	—	—	—	7970	3907	4288
Cotton + Mung	1101 a	584 b	821 a	614	333	114.48	8767	4517	5395
Cotton + Sunflower	902 a	543 b	870 a	847	698	742.44	8467	5952	8266
<i>Sowing date 15th May</i>									
Cotton alone	1659 a	619 a	1154 a	—	—	—	8617	3205	6781
Cotton + Mung	762 c	452 b	1043 a	337	283	127.39	5628	3610	6765
Cotton + Sunflower	1036 b	438 b	874 b	566	520	575.66	7860	4608	5784

Figures followed by similar letter are not significantly different from each other according to the DMR test

*Rate per kg of seedcotton, mung and sunflower was considered on the basis of prevailing local market rates at that particular time.

TABLE 2. PLANT CHARACTERS AS AFFECTED BY INTERCROPPING COTTON WITH MUNG AND SUNFLOWER DURING 1985–1987 AT COTTON RESEARCH INSTITUTE, SAKRAND.

Intercrop treatments	Plant population per ha			Number of open bolls/plant			Plant height in cm		
	1985	1986	1987	1985	1986	1987	1985	1986	1987
<i>Sowing date 15th April</i>									
Cotton alone	68389 a	59555 a	47172 a	23.5 a	23.0 a	13.4 a	138.4 a	119.0 a	130.1 a
Cotton + Mung	34356 b	33587 c	24974 b	28.0 a	26.0 a	21.7 ab	131.5 ab	109.0 a	161.8 ab
Cotton + Sunflower	37668 b	30667 cd	24646 c	22.5 a	25.0 a	16.7 b	123.4 b	112.5 a	147.1 a
<i>Sowing date 15th May</i>									
Cotton alone	45162 a	54468 b	41787 a	24.0 a	20.0 a	13.1 a	119.0 a	117.7 a	160.8 a
Cotton + Mung	21567 b	31851 cd	25593 b	22.0 a	20.0 a	14.2 a	108.8 ab	110.3 a	146.1 ab
Cotton + Sunflower	25154 b	29958 d	26411 c	23.0 a	23.0 a	10.3 a	113.9 b	112.7 a	129.2 b
cdi	173.80	835.72	219.75	5.57	7.73	6.48	9.49	13.13	24.23
cdii	235.50	407.18	403.38	7.55	9.37	11.89	12.85	15.29	44.60
C.V. %	16.41%	13.16%	7.14%	15.53%	22.58%	33.62%	5.22%	7.75%	12.82%

Means followed by similar letter are not significantly different from each other in the DMR test.

of cotton. If we compare the intercrop treatments, cotton-sunflower gave more economic returns than cotton-mung in comparatively April sown crop. Cotton, sunflower and mung were planted on the same date. Sunflower and mung are short season crops and mature within 90 days of sowing and therefore can be harvested when cotton is either in active flowering or initial boll-formation stage. This allows sufficient time and extra space for cotton to develop and mature. Similar opinions have been held by Rao and Sadaphal [5] while intercropping cotton with green gram and cowpea and by Birajdar *et al.* [7] in intercropping sorghum and pigeon-pea with cotton.

Cotton intercropped with Kharif (summer) fodder crops failed to give economic seedcotton yields [3,4] due to different seed rates of fodder used by the authors. It has also been gathered from the reports cited here that in intercropped cotton with any of the summer crop, whether for fodder or for grain purpose, the economic returns have been profitable due to additional/supplementary income from the yield of the intercrop. Thus conflicting results have been obtained depending upon varied environmental and soil conditions and the type of intercrop used with cotton.

In the present studies, planting date showed major impact on the yield of seedcotton irrespective of the intercrop used, though sunflower gave comparatively more economic return on the basis of three years average. It is suggested that 15th April would be suitable for planting cotton alone or intercropped (sunflower and mung) to achieve more economic returns.

Plant population per ha was significantly different due to intercrop treatments. Number of bolls per plant and plant height did not change due to intercrop treatments, though [3,4] have reported that plant height and number of bolls per plant

were affected due to intercropped cotton with jowar. Since jowar was used as fodder also with varying seed rates, it affected the boll number and boll weight.

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