

EFFECT OF NUTRIENT BLENDING WITH FYM ON BIOMASS PRODUCTION AND ECONOMICS UNDER HYBRID COTTON-SOYBEAN INTERCROPPING SYSTEM

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Abstract: The field experiment was conducted during *kharif* season of 2004 and 2005 at the Instructional Farm, Indira Gandhi Agricultural University, Raipur (C.G.) to study the effect of nutrient blending with FYM and intercropping on biomass production and economics of hybrid cotton - soybean intercrops under irrigated condition. The growth characters of cotton like-plant height, number of branches, number of leaves, dry matter accumulation, LAI, CGR, and RGR were the highest with sole cotton with 100% RDF. In case of soybean, the growth parameters like-plant height, number of branches, number of leaves, dry matter accumulation, LAI, CGR, and RGR were the highest under sole soybean with 100% RDF. The bolls per plant in cotton were the highest under sole cotton with 100% RDF. Similar trend for yield components were observed in case of soybean. Sole cotton with 100% RDF resulted in maximum seed cotton and stalk yield as compared to other intercropping treatments. Similar trend was also noted with sole soybean with 100% RDF, which recorded significantly the highest seed and stover yield as compared to others. The maximum values of LER, cotton equivalent yield, monetary advantage gross realization, net realization ha^{-1} and B: C ratio were recorded under C+S (2:4) + 100%RDF, which was closely followed by treatment C+S (2:4) + 1 t FYM ha^{-1} + 75% RDF (BL).

Key words: Nutrient blending, Intercropping, Biomass production, Economics, Hybrid cotton, Soybean.

INTRODUCTION

Sound nutrition is one of the major ingredients of high yields in cotton. Nutrition affects the yields of cotton to greater extent than its quality. No doubt chemical fertilizers increase productivity, but the increasing costs of fertilizer, associated environmental hazards and lack of sustainability in yields under chemical fertilization are raising concerns in cotton production. The low soil organic matter and multiple nutrient deficiencies are the main reason for lack of sustainability. This has renewed the interest in the use of organics. It is also the need of the hour in view of poor resource base of the Indian farmer. Integration of organics, inorganic and indigenous material and methods needs to be emphasized in cotton nutrition.

In Chhattisgarh, cotton can be successfully grown under upland heavy soils locally known as Bharri (Vertisols). Cotton is a long duration crop; cultivated in widely spaced rows. Its growth habit allow enough time and space for short-duration intercrops, which help better utilization of resources and input, leading to increased production. Cotton grows slowly during the early growth period and its grand growth period begins 70-90 days after sowing. Enough inter row space therefore remain vacant during early stage that could be utilized profitably for growing short duration crop. It may help to avoid competition between the main crop and the intercrop for available resources or inputs and can increase total productivity and

profit in the system. Soybean builds up the soil fertility by fixing large amounts of atmospheric nitrogen through the root nodules and also through leaf fall on the ground. Being a short duration crop, it fits well in various multiple and intercropping system.

MATERIALS AND METHODS

The field experiment was conducted during *Kharif* season of 2004 and 2005 at the Instructional Farm, Indira Gandhi Agricultural University, Raipur (C.G.). The physico-chemical composition of experimental field soil was pH 7.24, electrical conductivity 0.16 dsm^{-1} , available N $217.50 \text{ kg ha}^{-1}$, available P_2O_5 12.86 kg ha^{-1} and available K_2O $364.54 \text{ kg ha}^{-1}$. The experiment was laid out in randomized block design with three replications. The treatments consisted of fourteen intercropping treatments in combination with nutrient management viz., T₁- Sole cotton (C) + 100% RDF (60 cm), T₂- Sole soybean (S) + 100% RDF (30 cm), T₃- C + S (2:2) + 100% RDF, T₄- C + S (2:2) + 1 t FYM ha^{-1} + 75% RDF(Blended), T₅- C + S (2:2) + 2 t FYM ha^{-1} + 50% RDF(BL), T₆- C + S (2:2) + 2 t FYM ha^{-1} + 50% RDF(BL) + 0.5 t FYM ha^{-1} with urea (top dressing), T₇- C + S (2:4) + 100% RDF, T₈- C + S (2:4) + 1 t FYM ha^{-1} + 75% RDF(BL), T₉- C + S (2:4) + 2 t FYM ha^{-1} + 50% RDF(BL), T₁₀- C + S (2:4) + 2 t FYM ha^{-1} + 50% RDF(BL) + 0.5 t FYM ha^{-1} with urea (top dressing), T₁₁- C + S (1:4) +100% RDF, T₁₂- C + S (1:4) + 1 t FYM ha^{-1} + 75% RDF(BL), T₁₃- C + S (1:4) + 2 t FYM ha^{-1} + 50% RDF(BL), T₁₄- C + S (1:4) + 2 t FYM ha^{-1} +

50% RDF(BL) + 0.5 t FYM ha⁻¹ with urea (top dressing). The hybrid cotton cultivar NCS-145 (Bunny) was sown at spacing (60x60 cm) and soybean variety JS-335 at a spacing of (30x10 cm). The hybrid cotton and soybean was planted in 2:2, 2:4 and 1:4 rows ratio. The crops were sown during third week of June. N, P₂O₅ and K₂O were applied to cotton @ 100, 60 and 40 kg ha⁻¹ and soybean received N, P₂O₅ and K₂O @ 30, 60 and 40 kg ha⁻¹ respectively. In nutrient blending treatments required quantity of urea, single super phosphate and muriate of potash was thoroughly mixed with exact quantity of air dried FYM with sprinkling of light water followed by incubation for 48 hours prior to its application and for top dressing blended urea was applied. The seed rate used was 3 kg ha⁻¹ for hybrid cotton and 80 kg ha⁻¹ for soybean. First picking of cotton was done in the first week of January and subsequently the second and third pickings were done in at an interval of 25 days. The soybean was harvested by the third week of October.

RESULTS AND DISCUSSION

Effect on growth of cotton

The significantly higher plant height was recorded under sole cotton with 100% RDF which was statistically at par with C+S (2:2) + 100% RDF and C+S (2:4) + 100% RDF. Whereas, lowest plant height was recorded under C+S (1:4) + 2 t FYM ha⁻¹ + 50% RDF (BL). This might be due to adequate nutrient and light availability, the sole cotton must have been in a better position to photosynthesis. Similar results have been reported by Solaiappan and Dason (1995). There was a decline in plant height of cotton in different intercropping treatments with soybean. This might be due to the fast growing with spreading nature and ultimately smothering effect of soybean in the early stages of cotton. The results confirm the finding of Solaiappan *et al.* (1991). During all growth stages, sole cotton with 100% RDF produced significantly higher number of branches plant⁻¹ as compared to other treatments. Whereas, lowest number of branches plant⁻¹ was recorded under C+S (1:4) + 2 t FYM ha⁻¹ + 50% RDF (BL). This might be due to balanced use of nutrients which resulted in higher physiological efficiency and photosynthetic rate. Similar results were also reported by Sethi *et al.* (1988). Whereas, in other intercropping treatments, there was decrease in number of branches plant⁻¹ of cotton. Similar results were also reported by Padhi *et al.* (1988). Sole cotton with 100% RDF produced significantly the highest number of leaves plant⁻¹, followed by C+S (2:2) + 100% RDF, C+S (2:4) + 100% RDF and C+S (2:2) + 1 t FYM ha⁻¹ + 75% RDF (BL), although these treatments were at par, but, proved significantly superior over others. Whereas, lowest number of leaves plant⁻¹ was recorded under C+S (1:4) + 2 t FYM ha⁻¹ + 50% RDF (BL). This might be due to no competition effect for space, nutrient, light and other requirement of crop which facilitated optimum condition

for proliferation of leaves of cotton. The similar finding was observed by Solaiappan and Dason, 1995. Sole cotton with 100% RDF recorded significantly higher dry matter accumulation plant⁻¹ followed by C+S (2:2) + 100% and C+S (2:4) + 100% RDF, although these treatments were at par, but, proved significantly superior over others. While, lowest dry matter accumulation was observed in the treatment C+S (1:4) + 2 t FYM ha⁻¹ + 50% RDF (BL). This might be due to adequate nutrient and light availability, the sole cotton with 100% RDF must have been in better position for photosynthesis and produced higher dry matter. Similar results were also reported by Dodamani *et al.* (1990). Different intercropping treatments accumulated significantly lesser dry matter than the sole crop. More competition for nutrients, moisture and environmental resources with consequently reduction in stem elongation, leaf number and area, might have contributed in decreasing the dry matter of cotton under intercropping situation. Similar findings were reported by Krishnaswamy (1993). Leaf area index increased with the advancement of age of cotton. Maximum leaf area is responsible for maximum photosynthetic activities. Photosynthetic food material is synthesized during vegetative stage, which get deposited in leaves and others plant parts leading to enlargement and development of meristematic tissue at growing points, causing faster growth of growing point and ultimately the plant height, number of branches, dry matter accumulation plant⁻¹ are increased. Sole cotton with 100% RDF produced significantly higher leaf area index as compared to others. It might be due to less competition for space and nutrients leading to higher growth rate and resulting in high leaf area index. It confirms the finding of Ramamoorthy *et al.* (1995). Reduction of leaf area of cotton in intercropping might be due to spreading habit and faster growth habit of soybean which covers the cotton crop at an early growth stage and also reduced the crop growth and leaf area. Similar results were also reported by Solaiappan and Dason (1995). Crop growth rate showed an increasing trend with the advancement in the age of cotton and declined thereafter. The crop growth rate of cotton was recorded significantly higher under the treatment sole cotton with 100% RDF at all crop growth period. It might be due to less competition in sole crop for natural resources i.e. nutrient, light and space for crop growth. Similar trends also were reported by Ramamoorthy *et al.* (1995). Relative growth rate was decreased with the advancement of crop age. Highest value of relative growth rate was registered at initial stage of crop, but the values did not show any significant variation by different treatments. Similar results have been also reported by Ramamoorthy *et al.* (1995). Net assimilation rate of cotton decreased with the advancement of crop age. Increasing value of net assimilation rate was registered in initial stage of crop under sole cotton with 100% RDF. This finding was with the agreement of Ramamoorthy *et al.* (1995).

Effect on growth of soybean

The plant height increases progressively with the advancement of crop age. Throughout the growing period higher plant height of soybean was recorded with the sole soybean + 100% RDF, followed by C+S (1:4) + 100% RDF, which remained at par with C+S (2:4) + 100% RDF and proved significantly superior over other treatments. Whereas, lowest plant height was recorded under C+S (2:2) + 2 t FYM ha⁻¹ + 50% RDF (BL). It might be due to availability of more uniform light distribution throughout the canopy, which increases photosynthesis, absorption and assimilation of nitrogen to plant. These results are similar with the findings of the Tomar *et al.* (1989). Sole soybean with 100% RDF registered the highest number of branches plant⁻¹ at all growth stages followed by C+S (1:4) + 100% RDF and C+S (2:4) + 100% RDF, however, these treatments were statistically similar, but proved significantly superior over others. Whereas, the lowest number of branches plant⁻¹ were recorded under the treatment C+S (2:2) + 2 t FYM ha⁻¹ + 75% RDF (BL). Readily available nutrients through inorganic fertilizers might have caused higher number of branches under sole soybean. Results corroborate the finding of Singh *et al.* (1985). Sole soybean gave significantly maximum number of leaves plant⁻¹ followed by C+S (1:4) + 100% RDF, C+S (2:4) + 100% RDF and C+S (1:4) + 1 t FYM ha⁻¹ + 75% RDF (BL), although these treatment were at par, but, proved significantly superior over others. Whereas, the lowest number of leaves plant⁻¹ was recorded under the treatment C+S (2:2) + 2 t FYM ha⁻¹ + 50% RDF (BL). This might be due to open space having less competition for growth. The reduction in leaves of soybean under intercropping system could be due to reduction in area which determines the photosynthetic ability and growth. Similar results were also reported by Dubey *et al.* (1994). Soybean crop accumulated biomass consistently till harvest. Sole soybean with 100% RDF recorded significantly higher dry matter accumulation plant⁻¹ as compared to other treatments. The lowest dry matter accumulation in soybean was recorded under C+S (2:2) + 2 t FYM ha⁻¹ + 50 % RDF (BL). This might be due to sufficient light interception by soybean and additional supply of nutrients, which increased photosynthetic ability. Dry matter accumulation of intercrops reduced due to more competition among the different intercropping treatment. The results were in agreement with the findings of Pujari and Sheelavantar (2001). Leaf area index increased with the advancement of age of soybean and then declined slightly. Significantly higher leaf area coverage of ground was observed in sole soybean with 100% RDF which was statistically similar with C + S (1:4) + 100% RDF. The lowest leaf area index was recorded under C + S (2:2) + 2 t FYM ha⁻¹ + 50% RDF (BL) at all growth stage of crop. This might be due to development of senescence in older leaves at maturity which resulted in shedding of leaves plant⁻¹ and decreased number of leaves plant⁻¹ ultimately reducing leaf area index as well as dry

matter accumulation rate plant⁻¹. The similar results were also observed by Rajput, (1998). Crop growth rate (CGR) increased sharply upto 60-90 DAS and declined thereafter. Higher crop growth rate value was recorded in sole soybean with 100% RDF as compared to other intercropping treatments. Initially an increased crop growth rate noted due to more dry matter in above ground part during vegetative phase of plant. It might be due to sufficient light interception by soybean. Declined crop growth rate (CGR) after 90 DAS was due to senescence of older leaves. General trend was observed that the relative growth rate (RGR) was gradually decreased with the advancement of the crop age. During all the growth stages of crop RGR did not show any significantly variation due to different treatments. The net assimilation rate of soybean at initial stage 0-30 DAS, was lower, but at 30-60 DAS, net assimilation value increased gradually and then decreased with crop age. It is obvious due to senescence of soybean plant and decrease in number leaves plant⁻¹.

Yield and yield attributes of cotton

The number of bolls plant⁻¹ increased with the advancement of crop age. Sole cotton with 100 % RDF recorded significantly the maximum number of bolls plant⁻¹ as compared to other intercropping treatment. Whereas, lowest number of bolls plant⁻¹ was recorded under the treatment C+S (1:4) + 2 t FYM ha⁻¹ + 50% RDF. This might be due to no competition for space, light and nutrients under wider spacing. Similar results were also reported by Sethi *et al.* (1988). Number of bolls plant⁻¹ decreased with soybean intercropping. This might be due to the fast growing nature and smothering effect of soybean in the early stage of cotton. This is in conformity with the finding of Solaiappan *et al.* (1991). Seed cotton yield increased significantly under sole cotton with 100% RDF followed by C+S (2:2) + 100% RDF, C+S (2:4) + 100% RDF and C+S (2:2) + 1t FYM ha⁻¹ + 75% RDF, although these treatments were at par, but, proved significantly superior over others. Whereas, lowest yield of cotton was recorded under the C+S (1:4) + 2t FYM ha⁻¹ + 50% RDF. Seed cotton yield is the function of number of bolls plant⁻¹, which was found the highest under sole cotton with 100% RDF as compared to other intercropped treatments. This might be due to more plant population with competition free environments. These results corroborate with the result recorded by Solaiappan *et al.* (1991). Considerable reduction in seed cotton yield due to intercropping with soybean would be due to lesser plant population of cotton per unit area. This would be also due to profused growth of soybean as compared to cotton, which showed higher degree of competition with cotton for natural resources *i.e.* space, light, nutrient and moisture causing reduction in cotton yield. These results are in agreement with the findings of Padhi *et al.* (1988). Among the different treatments, sole cotton with 100% RDF recorded significantly higher stalk yield followed by C+S (2:2) + 100% RDF, C+S (2:4) + 100% RDF, C+S (2:2) +

1t FYM ha⁻¹ + 75% RDF and C+S (2:4) + 1t FYM ha⁻¹ + 75% RDF, although these treatments were at par, but, proved significantly superior over other treatments. Whereas, the lowest stalk yield of cotton was recorded under treatment C+S (1:4) + 2t FYM ha⁻¹ + 50% RDF. This might be due to higher growth characters like number of leaves, branches and height of plants. These results are similar with the findings of the Sethi *et al.* (1988). The relatively higher harvest index was recorded in sole cotton with 100% RDF, which was at par with C + S (2:2) + 100% RDF and C + S (2:4) + 100% RDF. Whereas, lowest harvest index was recorded under treatment C + S (1:4) + 2 t FYM ha⁻¹ + 50% RDF (BL). It might be due to higher economic yield under this treatment. Similar findings were also noted by Dayal and Kumar (1994).

Yield and yield attributes of soybean

The significantly more number of pods plant⁻¹ were noted under the treatment sole soybean with 100% RDF, which was statistically at par with C + S (1:4) + 100% RDF. However, the lowest number of pods plant⁻¹ was recorded under treatment C + S (2:2) + 2 t FYM ha⁻¹ + 50% RDF (BL). It might be due to crop competition and less congenial situation for growth and development of soybean. This result confirmed with the findings of Nayak *et al.* (1989). The higher number of seeds pod⁻¹ was recorded under sole soybean with 100% RDF than others, but different treatments did not show any significant variation. Number of seeds pod⁻¹ is an inherent character of soybean variety. No significant difference was noticed in 100- seed weight due to various treatments. In general, test weight is a genetic character of the variety and it is hardly influenced due to various treatments. Similar results have been also reported by Panneerselvam and Lourduraj (1998). Significantly maximum seed yield of soybean was recorded under sole soybean with 100% RDF followed by C + S (1:4) + 100% RDF, C + S (2:4) + 100% RDF and C + S (1:4) + 1 t FYM ha⁻¹ + 75% RDF (BL), although these treatments were at par, but, proved significantly superior over others. Whereas, the lowest seed yield of soybean was recorded under C + S (2:2) + 2 t FYM ha⁻¹ + 50% RDF (BL). Under sole soybean there was less competition effect for nutrient, light and space, which led to higher yield. Similar results were also reported by Joshi *et al.* (1994). The yield reduction of soybean under different intercropping treatments may be due to inter-specific competition in intercropping, which was more than intra-specific competition of sole stand. Similar findings have been reported by Singh and Singh (1995). Stover yield was observed to be maximum in sole soybean with 100% RDF followed by C + S (2:4) + 100% RDF, C + S (2:4) + 100% RDF, C + S (1:4) + 1 t FYM ha⁻¹ + 75% RDF (BL) and C + S (2:4) + 1 t FYM ha⁻¹ + 75% RDF (BL), although these later treatments were at par, but, proved significantly superior over others. This might be due to comparatively higher growth of sole soybean plant under these treatments. Whereas, lowest stover yield of

soybean was recorded in C + S (2:2) + 2 t FYM ha⁻¹ + 50% RDF (BL). The variation in stover yield could be attributed to the variation in growth component of soybean. The harvest index was significantly higher in sole soybean with 100% RDF, which was statistically similar to that of C + S (1:4) 100% RDF. Whereas, lowest harvest index was recorded under C+S (2:2) + 2 t FYM ha⁻¹ + 50% RDF (BL). Harvest index reflects the dry matter partitioning behaviour between grain and rest of the biomass of the plant as influenced by different treatments. Similar observations in soybean were also reported by Bablad (1999).

Land equivalent ratio (LER), cotton equivalent yield (CEY) and monetary advantage

All the treatments with intercrop combinations proved superior over sole crop with regards to LER. The highest LER value (1.64) was recorded under C + S (2:4) + 100% RDF, which implies that this intercropping pattern was most biologically efficient in utilization of land area compared to other intercropping pattern. Similar results have been also reported by Padhi *et al.* (1988). Significant difference was obtained in cotton equivalent yield (CEY) due to different intercropping pattern of cotton and soybean. All the intercropping pattern had more cotton equivalent yield compared to sole crop. Cotton equivalent yield are the function of crop yields and their per unit price of the produce. Thus a crop yielding less may surpass other higher yielder if its unit is relative quite high. It was observed that cotton equivalent yield under C + S (2:4) + 100% RDF was the highest. However, sole cotton produced lower seed cotton equivalent than all the intercropping treatments. Similar result was also obtained by Prasad *et al.* (1992). The maximum monetary advantage (Rs. 12525 ha⁻¹) under C+S (2:4) + 100% RDF were due to higher yield of component crops and also due to less competition among component crops. Whereas, lowest monetary advantage (Rs. 3637 ha⁻¹) was noted in C+S (1:4) + 2 t FYM ha⁻¹ + 50% RDF (BL). Similar results were also noted by Sethi *et al.* (1988).

Economics

All intercropping treatments resulted in more profit in term of monetary returns as compared to sole crops. The highest gross realization, net realization and B: C ratio was noticed under C+S (2:4) + 100% RDF which was excelled over all other intercropping treatments. Whereas, the lowest B: C ratio was observed under sole cotton with 100% RDF. This is due to higher total productivity under this treatment. Similar result was also reported by Prasad *et al.* (1992). The higher economic returns were obviously due to higher seed and stalk yield production of component crops. Similar results were also noted by Rajput *et al.* (1989).

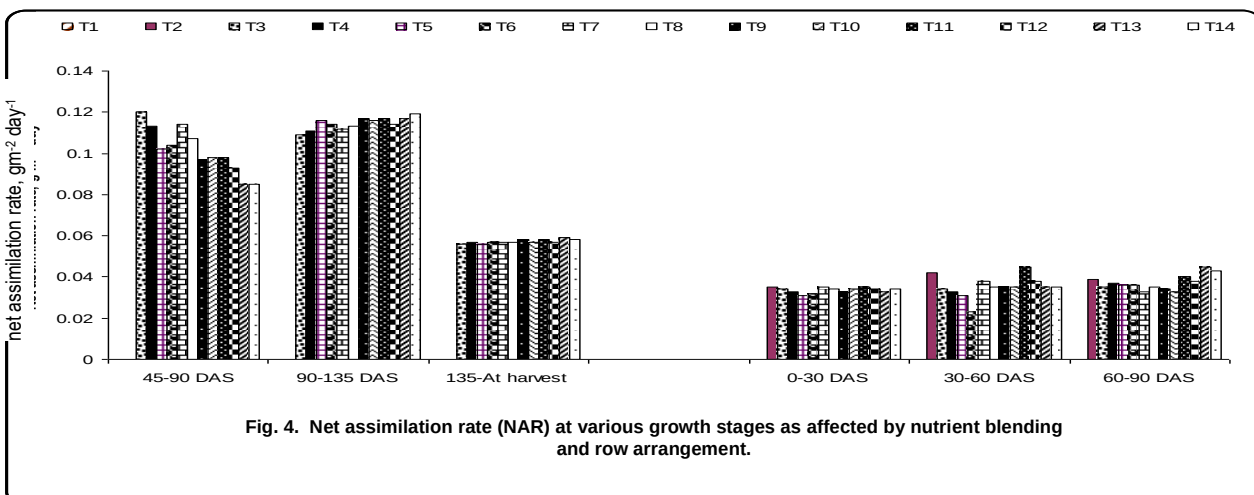
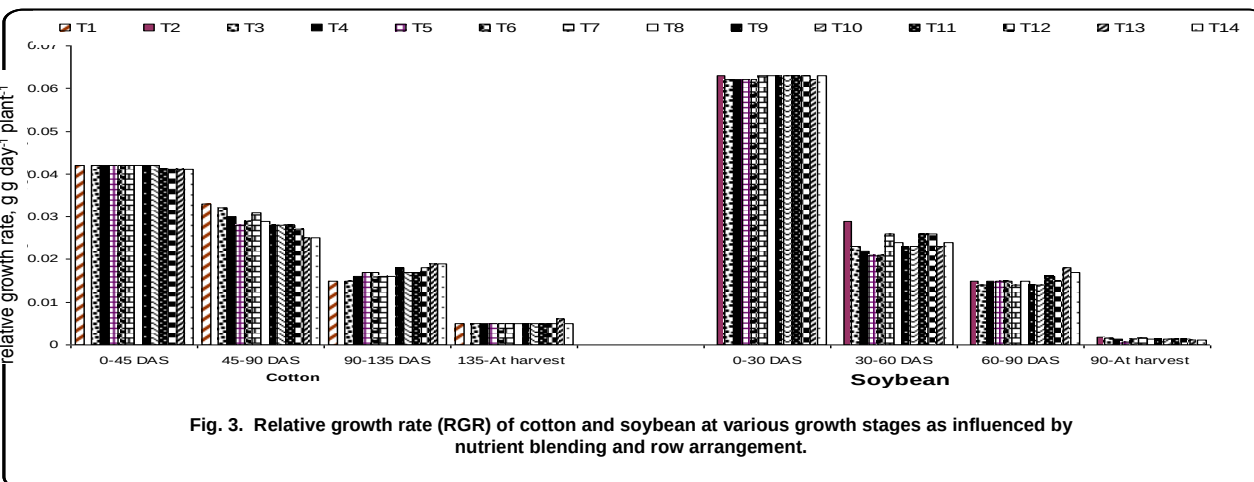
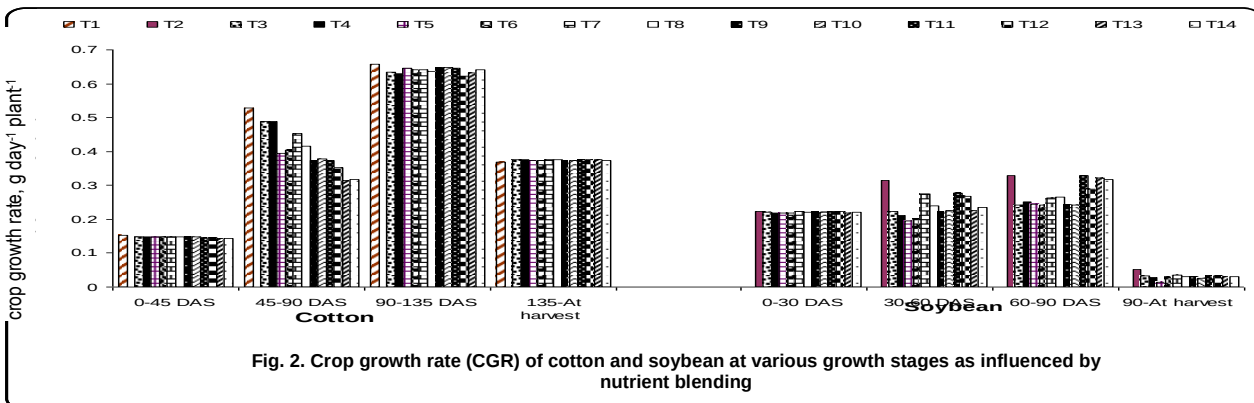
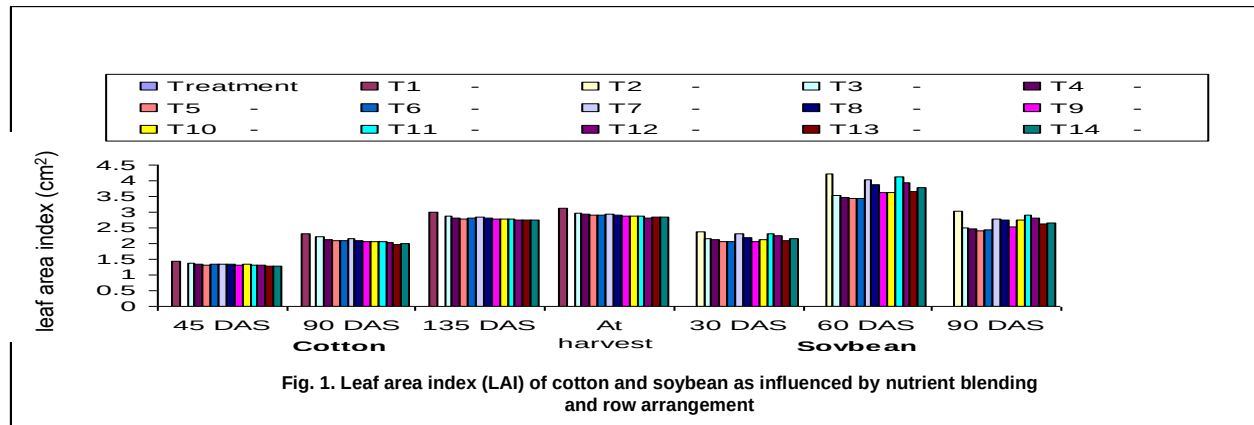


Table 1: Growth of hybrid cotton-soybean as influenced by nutrient blending and intercropping

Treatment	Cotton				Soybean			
	Plant height (cm.)	Branches plant ⁻¹ (No.)	Leaves plant ⁻¹ (No.)	Dry matter accumulation (g plant ⁻¹)	Plant height (cm.)	Branches plant ⁻¹ (No.)	Leaves plant ⁻¹ (No.)	Dry matter accumulation (g plant ⁻¹)
T ₁ - Sole cotton (C) + 100 % RDF	80.69	17.56	79.52	98.71	-	-	-	-
T ₂ - Sole soybean (S) + 100 % RDF	-	-	-	-	42.53	4.97	42.67	27.67
T ₃ - C + S (2:2) + 100 % RDF	78.38	14.90	77.68	96.72	36.26	3.52	36.09	21.64
T ₄ - C + S (2:2) + 1 t FYM ha ⁻¹ + 75 % RDF(BL)	77.58	13.78	75.11	94.37	35.77	3.41	35.33	21.40
T ₅ - C + S (2:2) + 2 t FYM ha ⁻¹ + 50 % RDF(BL)	76.24	13.22	73.35	92.52	34.37	3.29	34.57	20.24
T ₆ - C + S (2:2) + 2 t FYM ha ⁻¹ + 50 % RDF(BL) + 0.5 t FYM ha ⁻¹ with urea (top dressing)	76.79	13.75	73.72	92.61	34.91	3.31	34.69	20.81
T ₇ - C + S (2:4) + 100 % RDF	77.60	14.11	76.33	95.21	39.33	4.11	38.68	24.04
T ₈ - C + S (2:4) + 1 t FYM ha ⁻¹ + 75 % RDF(BL)	76.90	13.11	74.12	93.21	38.31	3.87	37.33	22.80
T ₉ - C + S (2:4) + 2 t FYM ha ⁻¹ + 50 % RDF(BL)	75.16	12.66	72.45	91.59	36.27	3.53	36.21	21.57
T ₁₀ - C + S (2:4) + 2 t FYM ha ⁻¹ + 50 % RDF(BL) + 0.5 t FYM ha ⁻¹ with urea (top dressing)	75.42	12.77	72.67	91.75	36.97	3.73	36.90	21.66
T ₁₁ - C + S (1:4) + 100 % RDF	75.03	12.29	72.13	91.55	40.31	4.31	39.45	26.05
T ₁₂ - C + S (1:4) + 1 t FYM ha ⁻¹ + 75 % RDF(BL)	74.25	12.23	71.85	89.58	39.07	3.93	38.12	24.58
T ₁₃ - C + S (1:4) + 2 t FYM ha ⁻¹ + 50 % RDF(BL)	73.57	11.11	70.13	88.47	37.33	3.73	37.33	24.03
T ₁₄ - C + S (1:4) + 2 t FYM ha ⁻¹ + 50 % RDF(BL) + 0.5 t FYM ha ⁻¹ with urea (top dressing)	73.75	11.46	70.62	88.53	37.47	3.77	37.77	24.17
SEm±	1.13	0.25	0.86	0.38	0.38	0.09	0.49	0.26
CD (P= 0.05)	3.31	0.74	2.53	1.13	1.13	0.27	1.44	0.77

C- Cotton, S- Soybean, BL- Blending

Table 2: Yield and yield attributes of hybrid cotton-soybean as influenced by nutrient blending and intercropping

Treatment			Cotton				Soybean					
			Bolls plant ⁻¹ (No.)	Seed cotton yield (q ha ⁻¹)	Stover yield (q ha ⁻¹)	Harvest index (%)	Pods plant ⁻¹ (No.)	Seeds pod ⁻¹ (No.)	100-seeds weight (g)	Seed yield (q ha ⁻¹)	Straw yield (q ha ⁻¹)	Harvest index (%)
T ₁	-	Sole cotton (C) + 100 % RDF	29.66	10.07	15.63	39.18	-	-	-	-	-	-
T ₂	-	Sole soybean (S) + 100 % RDF	-	-	-	-	32.23	2.54	12.97	20.94	26.27	44.35
T ₃	-	C + S (2:2) + 100 % RDF	27.87	8.14	13.56	37.51	25.21	2.03	12.21	15.30	21.21	41.90
T ₄	-	C + S (2:2) + 1 t FYM ha ⁻¹ + 75 % RDF(BL)	26.86	7.80	13.12	37.28	24.22	2.01	12.13	14.87	20.80	41.68
T ₅	-	C + S (2:2) + 2 t FYM ha ⁻¹ + 50 % RDF(BL)	25.26	6.87	12.19	36.04	23.42	1.82	12.07	13.76	19.72	41.09
T ₆	-	C + S (2:2) + 2 t FYM ha ⁻¹ + 50 % RDF(BL) + 0.5 t FYM ha ⁻¹ with urea (top dressing)	25.91	7.08	12.22	36.68	23.85	1.95	12.11	13.98	19.88	41.28
T ₇	-	C + S (2:4) + 100 % RDF	26.98	7.90	13.26	37.33	28.63	2.35	12.51	18.04	24.15	42.75
T ₈	-	C + S (2:4) + 1 t FYM ha ⁻¹ + 75 % RDF(BL)	25.90	7.62	12.99	36.97	27.17	2.23	12.31	17.50	23.88	42.29
T ₉	-	C + S (2:4) + 2 t FYM ha ⁻¹ + 50 % RDF(BL)	24.33	6.68	11.98	35.79	25.51	2.06	12.23	16.14	22.38	41.90
T ₁₀	-	C + S (2:4) + 2 t FYM ha ⁻¹ + 50 % RDF(BL) + 0.5 t FYM ha ⁻¹ with urea (top dressing)	24.44	6.92	12.10	36.38	25.64	2.10	12.27	16.38	22.60	42.02
T ₁₁	-	C + S (1:4) + 100 % RDF	24.10	5.08	10.50	32.60	30.95	2.43	12.57	18.34	24.35	42.96
T ₁₂	-	C + S (1:4) + 1 t FYM ha ⁻¹ + 75 % RDF(BL)	23.66	4.84	10.14	32.30	28.32	2.30	12.35	17.83	23.91	42.71
T ₁₃	-	C + S (1:4) + 2 t FYM ha ⁻¹ + 50 % RDF(BL)	22.22	3.97	9.46	29.56	26.11	2.08	12.31	16.53	22.66	42.17
T ₁₄	-	C + S (1:4) + 2 t FYM ha ⁻¹ + 50 % RDF(BL) + 0.5 t FYM ha ⁻¹ with urea (top dressing)	22.53	4.16	9.69	30.03	26.81	2.15	12.33	16.80	22.85	42.37
SEm±			0.29	0.15	0.20	0.63	0.53	0.28	0.18	0.25	0.27	0.53
CD (P= 0.05)			0.87	0.45	0.59	1.85	1.57	NS	NS	0.73	0.79	1.55

C- Cotton, S- Soybean, BL- Blending

Table 3: Land equivalent ratio (LER), cotton equivalent yield (CEY), Monetary advantage Gross realization, Net realization and Cost : Benefit ratio as affected by nutrient blending and row arrangement

Treatment	LER	Cotton equivalent yield (q ha ⁻¹)	Monetary advantages	Gross realization (Rs ha ⁻¹)	Net realization (Rs ha ⁻¹)	Cost : Benefit ratio
T ₁ - Sole cotton (C) + 100 % RDF	1.00	10.07	-	18504.70	10185.70	1:1.22
T ₂ - Sole soybean (S) + 100 % RDF	1.00	11.89	-	22253.50	15599.70	1:2.34
T ₃ - C + S (2:2) + 100 % RDF	1.54	16.83	10363.46	31364.90	23952.20	1:3.23
T ₄ - C + S (2:2) + 1 t FYM ha ⁻¹ + 75 % RDF(BL)	1.48	16.24	9327.11	30294.00	22887.80	1:3.09
T ₅ - C + S (2:2) + 2 t FYM ha ⁻¹ + 50 % RDF(BL)	1.34	14.68	6544.85	27446.70	20047.00	1:2.70
T ₆ - C + S (2:2) + 2 t FYM ha ⁻¹ + 50 % RDF(BL) + 0.5 t FYM ha ⁻¹ with urea (top dressing)	1.37	15.02	7140.94	28045.80	20396.10	1:2.66
T ₇ - C + S (2:4) + 100 % RDF	1.65	18.15	12525.15	33814.50	26401.80	1:3.56
T ₈ - C + S (2:4) + 1 t FYM ha ⁻¹ + 75 % RDF(BL)	1.59	17.56	11482.41	32754.70	25348.50	1:3.42
T ₉ - C + S (2:4) + 2 t FYM ha ⁻¹ + 50 % RDF(BL)	1.43	15.85	8429.38	29614.80	22215.50	1:3.00
T ₁₀ - C + S (2:4) + 2 t FYM ha ⁻¹ + 50 % RDF(BL) + 0.5 t FYM ha ⁻¹ with urea (top dressing)	1.47	16.22	9117.94	30294.20	22644.50	1:2.96
T ₁₁ - C + S (1:4) + 100 % RDF	1.38	15.50	7497.76	29023.30	21610.60	1:2.91
T ₁₂ - C + S (1:4) + 1 t FYM ha ⁻¹ + 75 % RDF(BL)	1.33	14.97	6552.45	28050.90	20644.70	1:2.78
T ₁₃ - C + S (1:4) + 2 t FYM ha ⁻¹ + 50 % RDF(BL)	1.18	13.36	3637.91	25123.20	17723.50	1:2.39
T ₁₄ - C + S (1:4) + 2 t FYM ha ⁻¹ + 50 % RDF(BL) + 0.5 t FYM ha ⁻¹ with urea (top dressing)	1.22	13.70	4268.43	25748.60	18098.90	1:2.36
SEm±	0.02	0.22				
CD (P= 0.05)	0.06	0.64				

C- Cotton, S- Soybean, BL- Blending

Price of produce

Seed

Stalk

a. Cotton	@ Rs. 1760 q ⁻¹	@ Rs. 50.00 q ⁻¹
b. Soybean	@ Rs. 1000 q ⁻¹	@ Rs. 50.00 q ⁻¹

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