by T6, T3 and T5 (Table 5) as reported by Lakha Sreekanthan (1987).

Economics

Highest net return (Rs.12,094/ha) was obtained for the treatment S_3P_3) 100% recommended P + 2% DAP spray given at flag leaf, 50% flowering and post-milk stages), followed by S_3P_2 and S_3P_1 (50% recommended P + 2% DAP spray given at boot leaf stage and 50% flowering or at post milk stage). The same trend was also observed for B/C ratio (Table 3).

From this study, it is concluded that considering the yield and net return, application of P at recommended dose (38 kg P_2O_5/ha) with 2 per cent DAP spray thrice at boot leaf, 50 per cent flowering, and post-milk stages would result in higher rice grain productivity and profitability. Considering the soil health and increase in P fertilizer price, the farmer may choose to apply P at 50 per cent of the recommended dose (19 kg P_2O_5/ha) with 2 per cent DAP spray twice at boot leaf stage and 50 per cent flowering or at post-milk stages, if capital is a constraint for the farmer.

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BENGAL GRAM INTERCROPPING UNDER RAINFED CONDITION

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ABSTRACT

Experiment was conducted over a period of three *rabi* seasons of 1990-1992 at the Tamil Nadu Agricultural University, Coimbatore. The study revealed that the intercropping system *viz.*, bengal gram + sesamum 4:2 ratio was found to give higher mean net returns of Rs.900/ha and LER value of 1.56 under rainfed condition.

KEY WORDS : Chickpea, Intercropping, Rainfed Condition.

Bengal gram occupies an important place among the pulses grown in India. It accounts for about 36 per cent of the total area and 48 per cent of the total production of grain legumes in the country. The country's requirement of pulses is going up while its production is not increasing to that extent. Hence production of pulses has to be increased either by increasing the area or increasing the yield/unit area/day to meet the protein requirement of growing population. Since the cultivated area is limited, increase in area under pulses is practically impossible. The only alternative is to push up the yield/ha per unit of time. This cannot be achieved unless the available land is intensively cropped by raising two or more crops per year through multiple, relay and intercropping and by utilising the available resources more efficiently. The main objective of such cropping systems is to reduce the risk of total crop failure due to uncertain monsoon, to have a variety of produce for the food requirement of farmers' family feeding the animal, improvement of soil fertility, minimising the damage caused by insect pests diseases and weeds and finally to meet the cash requirement (Palaniappan, 1984). Research has established that intercropping can give more stable yields than sole crops. But resea rch data on the bengal gram based cropping system is very meagre and hence this study was taken up at the Department of Agronomy, Agricultural College and Research Institute, Coimbatore, Tamil Nadu.

MATERIALS AND METHODS

The study consisted of 11 treatments *viz.*, bengal gram sole crop (T1); sorghum sole crop (T2); *cumbu* sole crop (T3); sesamum sole crop

Table 1. Influence of bengal gram based intercropping on yield, economic returns and land eqivalent ratio

Treatment	Yield kg/ha (Mean of three replications)						Monetayr value (Rs/ha) Mean of three plications			Mean monetary returns (Rs/ha)	Bengal gram grain equivalent (mean of 3 years) kg/ha	Land equivalent ratio
	1990-91		1991-92		1992-93							
	Bengal gram	Inter-crop	Bengal gram	Inter-crop	Bengal gram	Inter-crop	1990-91	1991-92	1992-93			
T1	363	-	669	-	855	-	1474	2676	3421	2324	631	-
T2	-	200	-	236	-	492	200	236	492	309	77	-
T3	-	238	-	836	-	468	238	836	468	514	128	-
T4	-	125	-	450	-	210	1309	4721	2209	2746	686	-
T5	-	72	-	855	-	262	433	5132	1570	2378	594	-
T6		70	-	1000	-	497	309	2999	1490	1599	399	-
T7	534	104	514	113	601	247	2554	2168	2652	2458	614	1.49
T8	390	136	577	153	465	255	1696	2462	2115	2091	528	1.26
T9	541	83	559	139	786	111	3040	3691	4070	3600	900	1.56
T10	444	57	466	100	593	108	2121	2463	3019	2534	644	1.31
T11	340	53	644	328	539	130	1519	3559	2586	2555	638	1.32
SED							332.016	492.59	285.781			
CD(5%)							677.976	1027.54	596.14			

Market value : Bengal gram Rs.4.00/ha; Sorghum Rs.1/kg; *Cumbu* Rs.1/ha
Sesamum Rs.10.60/kg; Mustard Rs.6/kg; Soybean Rs.3/kg

T4); mustard sole crop (T5); soybean sole crop (T6); bengal gram + sorghum 4:2 (T7); bengal gram + *cumbu* 4:2 (T8) ; bengal gram + sesamum 4:2 (T9); bengal gram + mustard 4:2 (T10) and bengal gram + soybean 4:2 (T11). A common fertilizer dose of diammonium phosphate at 50 kg/ha was applied basally to all the plots uniformly. Intercultural operations were given to the crop at the appropriate stages. The design adopted was randomised block design with three replications.

RESULTS AND DISCUSSION

The yield data obtained in the various treatments were converted to the corresponding monetary value based on the then prevailing market value of the produce. The monetary value thus obtained was subjected to the statistical analysis. The yield obtained in the various treatments, monetary returns, bengal gram grain equivalent and land equivalent ratio are presented in Table 1.

The yield data revealed that the sole crop of bengal gram had recorded the highest grain yield in three years of experimentation as compared to the yield of bengal gram under intercropped situations. Regarding the monetary returns, the intercropping system *viz*., bengal gram + sesamum 4:2 ratio was found to record significantly higher mean returns of Rs.3600/ha as against the monetary returns obtained from the sole cropping of bengal gram. Similarly when bengal gram grain equivalent was considered, it was observed that the intercropping system *viz*., bengal gram + sesamum in 4:2 ratio had recorded the highest value of 900/kg/ha as against the sole crop of bengal gram (631 kg/ha) grain equivalent value. Based on the land equivalent ratio (LER) it could be seen that bengal gram + sesamum in 4:2 ratio had recorded the highest mean LER of 1.56 which was closely followed by bengal gram + sorghum in 4:2 ratio, bengal gram + soybean 4:2 ratio and bengal gram + mustard 4:2 ratio which had recorded the LER values of 1.49, 1.32 and 1.31 respectively. Gangasaran and Giri (1985) obtained higher advantage in 6:1 ratio of bengal gram and mustard. Similarly Keshwa *et al*., (1988) reported that higher total grain yield and monetary returns were recorded in the mixed cropping system of bengal gram and mustard in 2:1 ratio, than the sole cropping. Sarma and Kakati (1991) found that intercropping of green gram + sesamum gave the higher mean net income. Singh (1991) reported that bengal gram + mustard (3:1) recorded the highest net return followed by sole crop of bengal gram

and mustard. The intercropping system *viz.*, bengal gram + *cumbu* in 4:2 ratio had recorded the lowest mean land equivalent ratio of 1.26 indicating the incompatability of *cumbu* in the intercropped situations. Singh *et al.*, (1991) found that linseed as an intercrop with bengal gram has recorded the lowest land equivalent ratio of 0.85 showing its incompatability nature of the intercropped situation. So it may be concluded that intercropping system *viz.*, bengal gram + sesamum in 4:2 ratio was found to be the best for getting the increased monetary returns under rainfed condition.

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A SUSTAINABLE INTEGRATED FARMING SYSTEM FOR DRYLANDS

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ABSTRACT

Field experiments were conducted at the Department of Agronomy, Tamil Nadu Agricultural University, Coimbatore during 1988-1993 to study the economics of integrated farming system in 1.0 ha area of dryland. The treatments includes cropping *viz.*, sorghum + cowpea - grain, sorghum + cowpea - fodder, *Leucaena leucocephala* + *Cenchrus ciliaris* tree and grass fodder, *Acacia senegal* - tree fodder, and *Prosopis cineraria* tree fodder. The animal component include 5 female goat and 1 male goat during the first year. This system was compared with conventional cropping system sorghum + cowpea - grain. The results of the study revealed that an additional net income of Rs.3754 ha^{-1} yr^{-1} can be obtained under integrated farming system over conventional cropping system. It also generated additional employment of 113 man days ha-1 Yr-1.

KEY WORDS : Integrated Farming System, Economics.

In India nearly 100 m.ha of land is under rainfed cultivation and rainfed cultivation shall continue to play an important role in Indian economy. The human population has already crossed 800 million mark and shall be in the vicinity of 1.0 billion by the end of the present century. In view of this, there is a need to give more emphasis on boosting the productivity of rainfed agriculture in coming years. Risk in dryland farming due to uncertain rainfall leads to adoption of diverse activities, otherwise called as farming system approach. A judicious mix of any one or more with cropping, complements cropping enterprise through effective recycling of residue/waste (Venkataraman *et al.* 1983; Throve and Gagolikar, 1985; Hart, 1987). Therefore, an experiment conducted to study the economics of integrated farming system (IFS) under drylands.

MATERIALS AND METHODS

Experiment was conducted in sorghum based IFS in the drylands at the Department of Agronomy, Tamil Nadu Agricultural University, Coimbatore during 1989-93. The components were cropping and goat rearing. An area of 1 ha was selected for IFS treatment considering the small