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

**Economics**

Highest net return (Rs.12,094/ha) was obtained for the treatment S3P3 (100% recommended P + 2% DAP spray given at flag leaf, 50% flowering and post-milk stages), followed by S3P2 and S3P1 (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 P2O5/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 P2O5/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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Coimbatore 641003

**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 research 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); ciimbu sole crop (T3); sesameum sole crop (T4); sesameum + bengal gram 3:1 (T5); sesameum + bengal gram 2:2 (T6); sesameum + bengal gram 1:3 (T7); sesameum + bengal gram 1:1 (T8); sesameum + bengal gram 3:3 (T9); sesameum + bengal gram 2:3 (T10) and sesameum + bengal gram 1:2 (T11).
Table 1. Influence of Bengal gram based intercropping on yield, economic returns and land equivalent ratio

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Bengal gram (kg/ha) 1990-91</th>
<th>Bengal gram (kg/ha) 1991-92</th>
<th>Bengal gram (kg/ha) 1992-93</th>
<th>Mean monetary returns (Rs/ha) 1990-91</th>
<th>Mean monetary returns (Rs/ha) 1991-92</th>
<th>Mean monetary returns (Rs/ha) 1992-93</th>
<th>Bengal gram grain equivalent (mean of 3 years) kg/ha</th>
<th>Land equivalent ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>363</td>
<td>669</td>
<td>855</td>
<td>1474</td>
<td>2676</td>
<td>3421</td>
<td>2324</td>
<td>.63</td>
</tr>
<tr>
<td>T2</td>
<td>200</td>
<td>236</td>
<td>492</td>
<td>200</td>
<td>236</td>
<td>492</td>
<td>309</td>
<td>.77</td>
</tr>
<tr>
<td>T3</td>
<td>238</td>
<td>836</td>
<td>468</td>
<td>238</td>
<td>836</td>
<td>468</td>
<td>514</td>
<td>.78</td>
</tr>
<tr>
<td>T4</td>
<td>125</td>
<td>450</td>
<td>210</td>
<td>1309</td>
<td>4721</td>
<td>2209</td>
<td>2746</td>
<td>.68</td>
</tr>
<tr>
<td>T5</td>
<td>72</td>
<td>855</td>
<td>262</td>
<td>433</td>
<td>5132</td>
<td>1570</td>
<td>2378</td>
<td>.94</td>
</tr>
<tr>
<td>T6</td>
<td>70</td>
<td>1000</td>
<td>497</td>
<td>309</td>
<td>2999</td>
<td>1490</td>
<td>1599</td>
<td>.39</td>
</tr>
<tr>
<td>T7</td>
<td>534</td>
<td>514</td>
<td>113</td>
<td>2554</td>
<td>2168</td>
<td>2652</td>
<td>2458</td>
<td>1.49</td>
</tr>
<tr>
<td>T8</td>
<td>390</td>
<td>577</td>
<td>463</td>
<td>1696</td>
<td>2462</td>
<td>2115</td>
<td>2091</td>
<td>1.32</td>
</tr>
<tr>
<td>T9</td>
<td>554</td>
<td>559</td>
<td>786</td>
<td>3040</td>
<td>3691</td>
<td>4070</td>
<td>3600</td>
<td>1.66</td>
</tr>
<tr>
<td>T10</td>
<td>444</td>
<td>466</td>
<td>100</td>
<td>2121</td>
<td>2463</td>
<td>3019</td>
<td>2534</td>
<td>1.31</td>
</tr>
<tr>
<td>T11</td>
<td>340</td>
<td>644</td>
<td>328</td>
<td>1519</td>
<td>3559</td>
<td>2856</td>
<td>2555</td>
<td>1.32</td>
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<tr>
<td>SED</td>
<td>332.016</td>
<td>492.59</td>
<td>285.781</td>
<td>677.976</td>
<td>1027.54</td>
<td>596.14</td>
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<td></td>
</tr>
</tbody>
</table>

[Market value: Bengal gram Rs. 4.00/ka; Sorghum Rs. 1.15/ka; Sesamum Rs. 10.00/ka; Mustard Rs. 6.60/ka; Soybean Rs. 3.50/ka]  

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/ka/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 Kesriwa 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 + *cumin* in 4:2 ratio had recorded the lowest mean land equivalent ratio of 1.26 indicating the incompatibility of *cumin* 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 incompatibility nature of the intercropped situation. So it may be concluded that intercropping system viz., bengal gram + sesame 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 included cropping viz., sorghum + cowpea - grain, sorghum + cowpea - fodder, *Leucaena leucocephala* + *Cedrela siliaris* 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