

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 incompatibility 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 incompatibility 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.

ACKNOWLEDGEMENT

The authors are grateful to the Indian Council of Agricultural Research, New Delhi for the financial assistance.

Madras Agric. J., 82(6,7,8): 458-460 June, July, August 1995
<https://doi.org/10.29321/MAJ.10.A01232>

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

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(Received : May 1994 Revised: July 1994)

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

Table 1. Economic of integrated farming system (IFS) and conventional cropping system (CCS)

	1988-89		1989-90		1990-91		1991-92		1992-93	
	IFS	CCS	IFS	CCS	IFS	CCS	IFS	CCS	IFS	CCS
Receipts (Rs.)										
Crop components	3384	2800	5455	3695	5872	4095	6420	4200	7229	4905
Animal Components	2970	-	4805	-	3895	-	11900	-	12375	-
Total	6254	2800	10260	3695	14757	4095	18320	4200	19604	4905
Expenditure (Rs.)										
Maintenance of Goat	1512	-	3625	-	5150	-	8400	-	9250	-
Cost of cultivation	1772	1547	2217	1840	2852	2115	33300	2150	2795	2450
Total	3284	1547	5842	1840	8002	2115	11700	2150	12045	2450
Net Income (Rs.)	2970	1253	4418	1855	6765	1980	6620	2050	7539	2455
Additional Income (Rs.)	1717		2563		4785		4620		5084	

and marginal farmers of Tamil Nadu State. The crop components under IFS treatment were (i) sorghum + cowpea both for grain purpose - 0.2 ha, (ii) sorghum + cowpea both for fodder purpose - 0.2 ha, (iii) *Leucaena leucocaphale* tree fodder + *Zenchrus ciliaris* - (grass fodder) - 0.20 ha, (iv) *Acacia senegal* tree fodder + Grass - 0.2 ha (v) *Prosonic cineraris* (tree fodder) + Grass - 0.2 ha.

Under animal component, Tellicherry goats numbering 6 (5 female + 1 male) were kept in the shed. (6m x 4m). The goats were stall fed from the cropping component. Two kg of dry fodder, 2 kg of green fodder and 100 gm of concentrate were given to each goat. At the end of the second year, all the male goats except one were disposed. From the end of third year onwards, 20 female + one male were retained in the system and the remaining animals were disposed. The litter from the great shed was composted and applied to the field.

For comparison, conventional cropping system (CCS), as practiced by farmers was taken up in area of 0.2 ha with sorghum + cowpea for grain purposes. Sorghum variety Co 26 and cowpea variety Co 4 were used in both IFS and CCS. The sorghum and cowpea crop was raised during the north east monsoon season (ie) between third week of September to first week of January. All the improved practices recommended for dry farming were adopted. A farm pond was dug in an area of 300 m² which could store about 240 m³ of water during monsoon period. The water so collected was used for pot watering the tree crops at critical stages. The water could be stored in the farm pond

for about 30-35 days under Coimbatore conditions. For grown up trees slopy basins are formed to collect rain water in the root zone. The tree and grass fodder was harvested and fed to the animals. In all the years sorghum was harvested as dry fodder as there was no grain set. Cowpea grain was harvested from IFS in all the years and only during 1991-92 and 1992-93 from the CCS.

RESULTS AND DISCUSSION

The economics of the IFS and CCS for different years is presented in Table 1. The total receipt from the IFS during 1988-89, 1989-90, 1990-91, 1991-92 and 1992-93 was Rs.6254, Rs.10260, Rs.14767, Rs.18320 and Rs.19604 respectively and the total expenditure during the corresponding period was Rs.3284, Rs.5842, Rs.8002, Rs.11700 and Rs.12045 respectively. The net income was Rs.2970, Rs.4418, Rs.6765, Rs.6620 and Rs.7539 during first, second, third, fourth and fifth year respectively. The corresponding net income under CCS was Rs.1253, Rs.1855, Rs.1980, Rs.2150 and Rs.2450 respectively.

The additional income obtained from IFS over CCS varied from Rs.1717 - Rs.5084 in different years. An increase of additional net income was noticed during each year and it was maximum during the fifth year. A mean additional net income of Rs.3754 ha⁻¹ yr⁻¹ was obtained from the IFS over the CCS and additional net income per day in IFS was over CCS was Rs.10.28. The employment generation under IFS was 153 man days ha⁻¹ yr⁻¹

and whereas it was only 40 man days ha⁻¹ yr⁻¹ under CCS thus generating an additional employment of 113 man days ha⁻¹ yr⁻¹ under IFS.

It can be concluded that by adopting integrated farming with cropping and goat rearing under dry lands will greatly enhance income of the small and marginal farmers.

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(Received: June 1994 Revised: August 1994).

EFFECT OF TIME OF NITROGEN APPLICATION, METHODS OF WEED CONTROL AND SOWING ON YIELD AND ECONOMICS OF MAIZE

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ABSTRACT

Field experiments were conducted at the Agricultural College and Research Institute, Coimbatore to study the yield and economics of methods of weed control (hand weeding twice at 20 and 40 days after sowing (DAS), atrazine pre-emergence spray @ 0.5 kg a.i./ha) and sowing (direct seeding and transplanting maize with 5 day old seedlings) and time of nitrogen application and their combined influence. Hand weeding twice at 20 and 40 DAS, transplanting of 5- day-old seedlings and application of nitrogen in three splits as 25% basal + 50% at knee high stage + 25% at tasseling stage recorded significantly higher yields, gross returns, net returns and benefit cost ratio.

KEY WORDS: Nitrogen, Weed Control, Sowing, Maize, Yield, Economics.

Increasing productivity per unit area through agronomic management is one of the important solutions to increase production of maize (*Zea mays* L.) grain. Keeping this view, an attempt was made to study the effect of methods of weed control, sowing and time of nitrogen application in yield and economic returns of maize.

MATERIALS AND METHODS

The field experiment was conducted during *kharif* and *rabi* 1986-87 under irrigated conditions at the Agricultural College and Research Institute, Coimbatore. The soil of the experimental site was clay loam with a pH, 8.3 and 0.8 m.mhos cm⁻¹ EC. The experiment was laid out in split plot design, methods of weed control (W₁ - hand weeding twice at 20 and 40 DAS; W₂ - atrazine pre-emergence spray @ 0.5 kg ai/ha) and sowing methods (S₁ - direct seeding, S₂ - transplanting 5 - day-old seedlings) in main plots and time of nitrogen

application (T₁-25% basal + +50% at knee high + 25% at tasseling; T₂-25% at knee high + 50% at grand growth + 25% at tasseling; T₃-50% at knee high + 50% tasseling; T₄-25% knee high+ 50% at grand growth +5% as foliar spray at tasseling; T₅-50% at knee high + 25% at grand growth + 25% at tasseling) in sub plots. CO 1 variety was sown at a spacing of 60 x 20 cm, nitrogen was applied @ 120 kg/ha as per treatment except in T₄ where 96 kg N/ha was applied. Phosphorus and potassium were applied @ 60 kg P₂O₅ and 10 kg K₂O/ha respectively. Atrazine was applied @ 0.5 kg a.i/ha on the third day of sowing.

RESULTS AND DISCUSSION

Weed control methods

Hand weeding twice at 20 and 40 DAS recorded significantly higher grain yield (Table 1), gross returns, net returns and net return per rupee invested than atrazine spray in *kharif* and *rabi*