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The Role of Agriculture and Allied Sector to Overcome Drought and Achieve Sustainable Agriculture

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ABSTRACT

Integrated farming system diversified components such as agriculture, animal husbandry sheep and poultry rearing have been proved to be economically viable, technically feasible environmentally sustainable and socially acceptable. There is a need to study the sustainable of the combination of different farming system under different agro climatic situation in the long run including value crops modeling to identify farming system options to suit a given agro-climatic and socio economics situation a better planning and utilization of the available resource with bright scenario for the farm community as well whole. Due to increasing population and declining in per capita availability of land and horizontal expansion of land for 7 F's-food, fodder, fuel, fiber, fruit flower and fish invention and vertical expansion by integration of different farming systems. Further, unique method of refining farmers to develop individual farm plan, to obtain continuous, maximum net returns (Sustainable income),with minimize the risk, efficient use of available resources, constant decision making method, labour intensive, technically feasible, environmentally sound, economically viable and socially acceptable, immediate goal increase net income and ultimate goal family welfare, sustaining ecosystem for future generation.

Key words : *Agriculture, Sustainable*

Introduction

The scope of livelihood security in rural areas covering both economic growth and human development has to be comprehensive and technology led in term of establishing and expanding the source of employment and income within and allied to the agriculture sector, rural non-farm sector food and nutritional security, better education health care, sanitation and other basic amenities and infrastructural facilities. Even in rural areas, targeting more vulnerable group. It is imperative that the developmental programmes on rural livelihood security are bottom–up, technology–driven with supportive institutions and polices the approach should be group based, eco-friendly and in ready- to -use package mode. The study was undertaken in Chickaballapur district of Karnataka state to assess impact of the different farming system adopted cluster of village Five major farming systems viz, *Crop+Dairy, Crop + Dairy + Sericulture, Crop + Dairy + Sheep, Crop + Dairy + Sheep + Piggery & Crop + Dairy + Sheep + Sericulture* were identified based on bench mark survey and previous studies in the area. The data was analyzed using Cobb-Douglas production function, Garret ranking and Gini co-efficient analysis. The study based on primary data from 150 farmers covering equal samples under major farming systems elicited for the period 2014-15 through interview Scheduled technique. The data was ana-

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lyzed using Gini co-efficient analysis Cobb-Douglas production function, Garret ranking and. Results found that the net income per annum realized by a household was highest in C+D+SH+P (Rs.101818) net income less realized in case of C+D (Rs 37,217). Area under vegetable crops (ha) was found C+D+SH+S (0.92) is highly significant against net annual income when comparing other farming systems Area under Field crops. Employment generation was found in C+D+SH+P (325 man days/year) where as in case of C+D (321 man days/year). From above study it can be concluded Integrated farming system approach helps to stable income from farm as well as whole. Thus, there is a great need for this approach to improve overall livelihood security was better among C+D+SH+P farm households.

Objectives

1. To analyse the economics different farming systems followed by farmers of selected resource poor farmers.
2. To assess the impact of different farming systems approach on the selected farm families.

Methodology

The benchmark survey was conducted in Chickballapur district of southern Karnataka from selected resource poor farming families involved in different farming activities combined with allied enterprise are being adopted by the farmers. Total of 150 farm families involved in integrated farming system viz. crop production, horticulture, dairy, sheep and goat rearing, piggery, bee keeping and kitchen gardening were taken for the study from each districts. In order to collect relevant information for the study, a structural interview schedule was prepared based on the objectives of the study.

The objective of this project was livelihood improvement and achieving food security of resource poor farm families through Integrated farming system. The technologies introduced by the scientists in the villages of the project areas were more of location specific. Attention was given to the introduction of sustainable, appropriate and profitable technologies. providing the animal husbandry components like, Holstein Friesian (HF) cow, bannur cross bread sheep, **Yorkshire** piggery, Giriraja and Girirani poultry birds in addition to providing high yielding varieties of seeds, improving soil health, insitu soil conservation, crop diversification, planting of dryland horticulture crops like mango, sapota, guava, coconut etc., particularly in the waste lands. Introduced sericulture practices and were also supplemented. Emphasis was also given for taking of subsidiary enterprises like the production of vermincompost, construction of farm ponds, bio-gas units, bee keeping units, farming system commodity groups, value addition centers etc., Need based capacity building training programmes for enhancing knowledge and skills on various improved farming system practices were organized. Convergence with different line departments were established for better coordination of developmental programmes.

In order to assess the objectives of the study, primary data was collected sources. Primary data: The five major farming systems identified for the study were Crop + Dairy, Crop + Dairy + Sericulture, Crop + Dairy + Sheep, Crop + Dairy + Sheep + Piggery & Crop + Dairy + Sheep+ Sericulture The primary data collected from the randomly selected farm households on the socio- economic characteristics, land holdings, asset position and cost and returns of field crops, income and other source of income derived through personal interview using pre-tested structured schedule. Results in (table1) revealed that, combining crop enterprises with that of livestock to take advantage of complementary

Table 1. Economic viability of farmers practiced integrated farming systems under dry land farming situation.

Sl. No.	Farming system	Cost of production (Rs.)	Gross return (Rs.)	Net return (Rs.)	BC ratio
1	Crop production	12456	28956	16500	2.32
2	Mixed farming + Cow	34268	79658	45390	2.42
3	Mixed farming with + Sheep	29856	58961	29105	1.97
4	Mixed farming with + Cow+ sheep	32641	89741	57100	2.75
5	Mixed farming with Sheep+ Cow+ Mulberry practices	42163	103261	61098	2.45

Source: Field survey data (2014-15)

and supplementary relationship between them, would increases the labour requirement tremendously and can help in solving the problem of underemployment to a great extent. IFS provide enough scope to employ family labour round the year. Economic viability of farmers practiced integrated farming systems in dry land farming was practiced agriculture alone net return (Rs.16500 per year). Further, in case of mixed farming dairy net return (Rs.45390 per year) similarly mixed farming with sheep rearing net return (Rs.29105 per year) in case of mixed farming with sheep+ cow + mulberry practices farmers are earning highest net return (Rs.61098 per year). The value of benefit cost ratio

Table 2. Employment generation of farmers practicing integrated farming systems under dry land.

Sl. No.	Integrated farming system	*Kharif* (rainy season in days)	*Rabi* (winter season in days)	Summer season (in days)	Grand Total (days)
1	Agriculture	125	78	41	244
2	Mixed farming +1 Cow	132	82	62	276
3	Mixed farming with + 4 Sheep	107	153	62	322
4	Mixed farming with +2 Cow+2 sheep+ poultry	142	132	67	341
5	Mixed farming with 2 Sheep+1 Cow+ Mulberry practices+ poultry	138	125	80	343

Source: Field survey data (2014-15)

*The agricultural operation start from the month of May to June Months have been mentioned different farming system employment required A=Agriculture, D=Dairy, H=Horticulture, S=Sericulture, P=poultry, G=goat rearing, F=forestry

Table 3. Different farming system-wise regression results in Chickaballapur district of Karnataka

Sl. No.		Different Farming systems				
		C+D	C+S+D	C+D+SH	C+D+SH+PG	C+D+SH+S
1	No of observation	60	60	60	60	60
2	Intercept	8.51(79.01)	81.61(18.47)	8.86(29.oo)	9.43(21.30)	10(23.12)
3	Area under Field crops (ha)	0.006 # (0.081)	0.002#*(0.08)*	0.08#(2.16)	0.82**(6.13)	0.92**
4	Area under Vegetable(crops ha)	0.26(13.00)	0.05**(5.10)	0.19**(6.13)		0.14**(4.01)
5	Area under Perennial crops(ha)	0.02#(0.29)	0.05#(0.65)	o.15*(3.10)	0.19**(6.97)	-
6	Number of milching dairy animals	0.60**(4.13)		0.32(3.62)	-	-
7	Number of Disease Free laying's reared	-	0.83**(13.64)	0.59*(13.30)	-	-
8	Size of the flock (sheep)	-	-	-	0.45**(3.17)	-
9	R^2	0.92	0.95	0.94	0.93	0.95
10	R^2 - (adjusted)	0.91	0.94	0.93	0.92	0.94
11	F ratio	69.45	68.81	62.34	62.06	67.02

Note: Figures in parentheses indicate t-values of the coefficients

** Significant at 1 per cent, * Significant at 5 per cent and # Non significant

Table 4. Gini Co efficient for distribution of annual income among farm households in different farming systems

Sl No.	Different farming system model	Gini Co-efficient
1	Crop production + Dairy enterprises	0.42
2	Crop production + Dairy enterprises+ Sericulture	0.43
3	Crop production + Dairy enterprises+ Sheep rearing	0.46
4	Crop production + Dairy enterprises+ Sheep rearing+ Piggery	0.48
5	Crop production + Dairy enterprises+ Sheep rearing+ Sericulture	0.49

Note: C+D: Crop +Dairy, C+D+S: Crop+ Dairy +Sericulture, C+D+SH: Crop production + Dairy enterprises+ Sheep rearing, .C+D+SH+PG: Crop production + Dairy enterprises+ Sheep rearing+ Piggery and C+D+SH+S: Crop production + Dairy enterprises+ Sheep rearing+ Sericulture

which indicates the income per rupee invested in crop production (2.32), mixed farming +cow (2.32), mixed farming with sheep (1.97), mixed farming with +cow+ sheep (2.75) mixed farming with sheep+ cow+ mulberry practices (2.45) respectively.

Results in (Table 2) revealed that, employment generation of farmers in dry land showed that in case highest employment generation was found in Agriculture (244 man days/year) mixed farming with cow (276 man days/year) + Mixed farming with +2 Cow+2 sheep+ Poultry (341 man days/year). In case of Mixed farming with 2 Sheep+1 Cow+ Mulberry practices (343 man days/year). The probable reasons may be that under dry land conditions, the labour requirement will be less because of less no. of crops and also the requirement of labour is restricted only to monsoon season. Further, maintenance of one or two dairy animals may not require additional labour except the family labour which is not productively utilized in the system. Even Though Sericulture demands more labor, they can take only two or three crops in year because of scarcity of water. Further, cultivation of vegetables with bore well irrigation might have contributed for further generation of employment opportunities. Whereas, highest employment generation was found in Mixed farming with Sheep+ Cow+ Mulberry practices+ poultry. The probable reasons may be that the big farmers by virtue of their large land holding, high socio economic status the capability of these farmers to adopt the enterprise on large scale is quite possible. Similar study was found Shwetha, (2012).

Results and Discussion

Result in (Table 1) found that, combination of different farming systems like, crop enterprises with that of livestock to take an advantage of complementary and supplementary relationship between them, would increases the labour requirement immensely and can help in solving the problem of underemployment to a great extent. IFS provide enough scope to utilize family labour round the year. The net income of different farming system followed by by farmers C+D net return (Rs.34217 per year). Further, in C+D+S net return (Rs.83394 per year) similarly C+D+SH net return (Rs.62374 per year) in case of C+D+SH+P practices farmers are earning highest net return (Rs.101818 per year). In case of C+D+SH+S, farmers earning net income per year (Rs.83467) The value of benefit cost ratio which indicates the income per rupee invested in C+D (2.86), C+D+S (3.08), in case of C + D + SH (2.44), in case of C+D+SH+P (3.50) similarly in case of C+D+SH+S (2.98) respectively. Similar study was found Behera, (2007).

Farming systems wise regression results

The ordinary least square of Cobb- Douglas production function with respect to under different farming system describes in Table 3 Co- efficient was highly significant for the Crop+ Diary + Sericulture farming the elasticity of production functions representing one percent increasing in case of area under vegetable crops increased net income ranging from (0.19), in case of crop+ Sericulture farming net income ranging from (0.05), in case of Crop+ Dairy +Sheep and Sericulture (0.14) respectively (Table 3). The elasticity for area under perennial crops Co- efficient was significant for the crop+ sheep and Crop+ Dairy + Sheep+ piggery farming the elasticity of production function representing one percent increasing in case of perennial crops increased net income ranging from (0.19) in case of Crop+ Dairy + Sheep the net income ranging from (0.05) respectively. The non significant Co efficient of area under field crops in Crop+ Sericulture +Dairy and Crop + Dairy + Sericulture farming system representing that the impact of field crops of farm income is less. The elasticity of coefficient was found highly significant disease free laying's (DLF's) reared in case of crop+ sericulture (0.83) and crop+ Dairy + Sericulture (0.59) respectively (Table 2). In respect to R^2 was more than 0.9 which means the different farming model is good fit, with high F ratios 95.10 respectively.

The Gini Co- efficient is often used to measure income inequality. Here, 0 corresponds to perfect income equality (i.e. everyone has the same income) and 1 corresponds to perfect income inequality (i.e. one person has all the income, while everyone else has zero income). The inequality is more (0.49) in case of Crop production + Dairy enterprises+ Sheep rearing+ Sericulture in case of Crop production + Dairy enterprises relatively less (0.42) in case of Crop production + Dairy enterprises+ Sericulture (0.43) in case of Crop production + Dairy enterprises+ Sheep rearing+ Piggery (0.48) respectively. Similar study was found Atibudhi *et al.,* 1992 and Samal *et al.,* (Table 4).

Conclusion

Integrated farming system diversified components such as agriculture, animal husbandry sheep and poultry rearing have been proved to be economically viable, technically feasible environmentally sustainable and socially acceptable. There is a need to study the sustainable of the combination of different farming system under different agro climatic situation in the long run including value crops modeling to identify farming system options to suit a given agro-climatic and socio economics situation a better planning and utilization of the available resource with bright scenario for the farm community as well whole. Due to increasing population and declining in per capita availability of land and horizontal expansion of land for 7 F's-food, fodder, fuel, fiber, fruit flower and fish invention and vertical expansion by integration of different farming systems. Further, unique method of refining farmers to develop individual farm plan, to obtain continuous, maximum net returns (Sustainable income),with minimize the risk, efficient use of available resources, constant decision making method, labour intensive, technically feasible, environmentally sound, economically viable and socially acceptable, immediate goal increase net income and ultimate goal family welfare, sustaining ecosystem for future generation.

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