

RESEARCH ARTICLE :

Livelihood impact of farm diversification in dryland ecosystem

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SUMMARY : Integration of one more enterprises with farming decides the economic wellbeing under dryland farming. Sustainable development in terms of income and employment generation is quite possible with suitable mix of crop, animal husbandry and non-farm enterprises. Livelihood impact of farm diversification was measured among 100 small and 100 big dryland farmers from Namakkal district of Tamil Nadu. While big farmers generated maximum income of Rs. 19.75 (ten thousands/year) from crop + animal husbandry + non-farm activities, small farmers reported an income generation of Rs.13.91 (ten thousands/year) from crop + animal husbandry + non-farm activity. Nearly, 50.00 per cent of the total income earned by the dryland farmers was from the non-farm sector. Among the diversification patterns, crop + animal husbandry + non-farm activities generated more (619.1) mandays. While, small farmers generated 574.4 mandays of work from crop + animal husbandry + non-farm activities, big farmers gained 678.4 mandays from the same.

KEY WORDS:

Farm diversification,
Livelihood impact

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BACKGROUND AND OBJECTIVES

Dry farming is marked by more quantum of risk and coping strategies to avoid risks. India has about 47.00 million ha of drylands out of 108.00 million ha of total rainfed area. The dryland farm families were reported to be employed only for one-third part of the year. Changes in crops and cropping pattern and inclusion of other enterprises are considered as suitable avenues to generate additional employment to the dryland farm families. Therefore, the economic viability of a farm is determined by the number of

agricultural activities it possesses (*i.e.* the combination of varied crops and livestock components). Integration of varied enterprises in dryfarming situations has become a mandate for sustainable development. It visualizes changes in the farming techniques for achieving maximum productivity in farming by judicious utilization of various resources, thereby minimizing risk and uncertainty in cultivation aiming at stable and regular income throughout the year. Hence, judicious mix of agricultural crops and other enterprises suited to a particular agro-climatic condition and socio- economic status of the farmer would

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elevate the performance of the dryland farming. It includes practice of diverse crops and cropping systems, dependence on livestock and other non-farm rural income and technology adoption.

According to Njue (2009), just as diversification seems to be the key to softening economic losses in other sectors, diversifying farm enterprises could soften the impact of economic risk, offset commodity price swings, exploit profitable niche markets, improve local economy and strengthen rural communities. Reijntjes (2009) suggested that supporting diversity-based small farming would strengthen the economic, social and ecological functions of agriculture.

Diversification as a means for livelihood improvement in dryland ecosystem :

Diversification of agriculture is advocated as one of the important strategies to stabilize and enhance farm income, increase employment opportunities and conserve natural resources. The true benefit of diversification will come if more emphasis is given on allied activities like animal husbandry and fisheries. However, the return from diversification depends on the availability of such infrastructural facilities as irrigation, electricity, transportation, storage, markets, etc. (Bala and Sharma, 2005). Upon analyzing the importance of farm diversification as a tool for sustainable development in dryland ecosystem, the present study was formulated to identify the possible livelihood impacts of farm diversification among dryland farmers.

RESOURCES AND METHODS

The study was conducted among small and big farmers of Namakkal district of Tamil Nadu using *ex post facto* design during the year 2009-10. Namakkal district, being a dryland district of Tamil Nadu was selected purposively based on the percentage of unirrigated area (56.41%) and presence of more diverse combination of enterprises such as dairy, goat, sheep, desibirds and turkey along with several non-farm enterprises as source of livelihood for the farmers. Out of the total 15 blocks, 10 blocks were selected based on percentage of unirrigated area. Initially, it was thought to pre-stratify the respondents into marginal, small and big farmers. But the pre-test and pilot survey experiences revealed that, marginal and small farmers could not be differentiated significantly in their diversification patterns

and as such engaged in similar type of activities and occupations. Hence, to avoid stereotypic reporting of findings, the marginal farmers category was excluded.

For selection of villages, the list of revenue villages in each of the ten selected blocks was collected. Two revenue villages from each of the selected blocks were identified purposively based on the cultivation of dryland crops in larger extent, more area under dryland conditions and scope for farm diversification. Five farmers each from small and big farm categories for each of the selected revenue villages have been randomly identified from the details of farmers collected from the extension officials of State Department of Agriculture. Thus, the total sample constituted 100 small and 100 big farmers.

Livelihood impact is operationalized as the actual impact in terms of income and employment generation of the dryland farmers by integrating many activities at a time. For this different patterns of diversification in dryland ecosystem were identified such as crop + animal husbandry, crop + non-farm activities, crop + animal husbandry + non-farm activities and animal husbandry + non-farm activities. The total income and employment generated in terms of rupees and mandays out of each activity was considered as the livelihood impact.

The actual impact has been worked out as follows:

Income generation :

This refers to the sum of actual income obtained by the respondents in terms of rupees from all the diversified activities. Logical ranges of income have been fixed to have different categories of income level for grouping the dryland farmers according to their income distribution.

Employment generation :

The data on employment generation has been collected in terms of number of mandays of employment generation from each of the activities from crop, animal husbandry and non-farm components. Similar to that of income generation, appropriate logical ranges have been fixed for grouping the respondents so as to have meaningful presentation and interpretations.

OBSERVATIONS AND ANALYSIS

The results obtained from the present study as well as discussions have been summarized under following heads :

Livelihood impact of diversification :

Income and employment generation were the two livelihood impact items measured in the study. Income earned from crop, animal husbandry and non-farm activities by each farmer was obtained to arrive at the total income earned. Similarly, data on employment generation in terms of mandays were collected and also worked out.

Income generation :

The income generated as a result of diversification has been worked out by assessing the value of major and by-products and the cost of production for all activities. The results obtained on income earned by the respondents are presented under the following sub-sections.

- Analysis of variance of net income obtained in diversification patterns
- Component-wise income distribution
- Activity-wise income distribution.

Analysis of variance of net income obtained in diversification patterns :

Different diversification patterns in the dryland ecosystem were identified to know whether there existed any significant differences in income generated from all

identified patterns such as crop + animal husbandry, crop + non-farm activities, crop + animal husbandry + non-farm activities and animal husbandry + non-farm activities. For this purpose, analysis of variance (ANOVA) was used and the results have been presented hereunder. From Table 1, it could be inferred that 'F' value was found to be significant at one per cent level of probability which indicated that there existed significant differences between the income generated from the four diversification patterns. The estimated mean value indicated that crop + animal husbandry + non-farm activities secured the maximum mean value of Rs. 23.41 (ten thousands/year) followed by crop + non-farm activities (Rs. 16.85 ten thousands/year) and animal husbandry + non-farm (Rs. 9.08 ten thousands/year) diversification patterns. The crop + animal husbandry pattern was the least among four categories in terms of mean income level (Rs. 7.20 ten thousands/year)

Further significant differences in income levels was also observed among small and big farmers in all the four patterns. For big farmers, crop + animal husbandry + non-farm activities had generated a maximum income of Rs. 19.75 (ten thousands/year) followed by animal husbandry + non-farm activities (Rs. 12.27 ten thousands/year). It was little bit different for small farmers, for whom the crop + animal husbandry + non-farm activity

Table 1 : Analysis of variance of income generation in different diversification patterns

Sr. No.	Diversification pattern	Income generation											
		Small farmers (n=100)				Big farmers (n=100)				Overall respondents (n=200)			
		Estimated mean value of net income (Ten thousand rupees/yr)	Std. Error	Mean square	'F' value	Estimated mean value of net income (Ten thousand rupees/yr)	Std. Error	Mean square	'F' value	Estimated mean value of net income (Ten thousand rupees/yr)	Std. Error	Mean square	'F' value
1.	Crop + Animal husbandry	7.85	2.78	299.552	3.59*	5.51	3.86	2243.79	4.53**	7.20	2.74	2307.88	7.89**
2.	Crop + Non-farm activities	16.85				0				16.85			
3.	Animal husbandry +	4.63				12.27				9.08			
4.	Non-farm activities	13.91				19.75				23.41			
	Crop + Animal husbandry + Non-farm activities												

* and ** indicate significance of values at P=0.05 and 0.01, respectively

reported an income of Rs.13.91 (ten thousands/year) followed by crop + non-farm activities with Rs. 16.85 (ten thousands/year).

From Table 1, it is quite clear that as the number of enterprises increases, the mean income also increases. And the patterns namely animal husbandry + non-farm activities and crop + animal husbandry activities had more or less similar income ranges than the other categories. Hence, the income generation from these patterns did not exhibit much difference. Another observation was

that, diversification patterns which included non-farm activities obtained more income well than the other patterns. The detailed discussion with respect to activity-wise and component-wise income generation are presented in the following heads.

Component-wise income distribution :

The share of income generated by components such as crop, animal husbandry and non-farm activities towards the total income of respondents were further

Table 2 : Component-wise income distribution

Sr. No.	Diversification components	Income share		
		Small farmers (n=100)	Big farmers (n=100)	Total (n=200)
		%	%	%
1.	Crop	10.57	17.62	14.10
2.	Animal husbandry	36.56	39.49	38.03
3.	Non-farm activities	52.86	42.89	47.87

Table 3 : Activity-wise income distribution

Sr. No.	Diversification activities	Income share		
		Small farmers (n=100)	Big farmers (n=100)	Total (n=200)
		%	%	%
1.	Business sector	12.71	20.81	20.19
2.	Cow	10.18	19.97	15.08
3.	Goat	10.43	9.73	10.08
4.	Service sector	15.87	8.11	9.01
5.	Professionals	2.72	11.97	8.52
6.	Sheep	7.60	5.30	6.45
7.	Labourer	17.22	0.50	5.80
8.	Groundnut	3.38	4.17	3.77
9.	Rent / hire business	3.94	1.07	3.34
10.	Desibird	4.01	2.36	3.18
11.	Sorghum	3.23	2.73	2.99
12.	Buffalo	3.49	1.95	2.72
13.	Fodder sorghum	1.60	2.78	2.19
14.	Ailanthus	-	2.56	1.28
15.	Agri-related enterprises	0.90	1.21	1.04
16.	Tapioca	0.51	1.21	0.86
17.	Pathinugam	-	1.48	0.74
18.	Castor	0.17	1.01	0.59
19.	Green gram	0.35	0.72	0.53
20.	Turkey	0.86	0.18	0.52
21.	Mango	0.46	0.47	0.46
22.	Maize	0.16	0.39	0.28
23.	Tamarind	0.28	0.02	0.15
24.	Banana	0.23	-	0.12
25.	Red gram	0.06	0.09	0.07
26.	Samai	0.14	-	0.07
27.	Black gram	0.01	-	0.005

analyzed and presented in Table 2.

The data presented in Table 2 revealed that nearly 50.00 per cent of the total income earned by the dryland farmers was from the non-farm sector followed by 38.03 per cent from animal husbandry sector. A critical observation was that, the crop sector contributed the least share (14.10 %) towards the total income of the respondents in dryland ecosystem. Farmers engaged in non-farm activities as labourers, service providers, and professionals expressed that these activities yielded significant income as these were non-season bound. Sale of value added products like milk, ghee, eggs, and sale of animals for remunerative prices contributed more income share from animal husbandry activities towards the total income of the dryland farmer. Crop sector contributed the least share to the total income due to less benefit cost ratio obtained as a result of irregular rainfall, poor crop performance and less remunerative price for their products.

Activity-wise income distribution :

The data presented in Table 3 revealed that, business sector (20.19 %), cow rearing (15.08 %), goat rearing (10.08 %), service sector (9.01 %) and professional sector

(8.52 %) were the diversified activities which contributed higher share to the total income. Business sectors like, owning and hiring transport services and textile sectors generated more returns to the investment made. Respondents who worked as supervisors, managers, marketing executives, workers in textile mills, food processing industries had earned a monthly income of Rs.8,000 on an average.

Sale of milk, calves, and milch animal served as a dependable source of additional income for farmers. Sale of goat was remunerative for farmers as an adult goat was found to fetch a price at Rs. 3,000 in local markets. Few respondents working as professionals (teachers, engineers) earned a high income of Rs.10,000 to 20,000 per month. Crops like tamarind, banana, red gram, samai and black gram contributed a negligible share due to lesser market prices fixed for such products. Comparison of income share of different enterprises among small and big farmers found that small farmers working as labourers (17.22 %), service providers (15.87 %) and business providers (12.71 %) were found to have got more income share than big farmers. On the contrary, big farmers engaged as business man (20.81 %), breeding cow (19.97 %) and professionals (11.97 %) earned more

Table 4 : Analysis of variance of employment generation in different diversification patterns

Sr. No.	Diversification pattern	Income generation											
		Small farmers (n=100)				Big farmers (n=100)				Overall respondents (n=200)			
		Estimated mean	Std. Error	Mean square	'F' value	Estimated mean	Std. Error	Mean square	'F' value	Estimated mean	Std. Error	Mean square	'F' value
1.	Crop + Animal husbandry	37.34	6.31	1671.60	5.140**	52.16	15.68	2971.97	8.54**	47.78	6.79	2465.26	6.812**
2.	Crop + Non-farm activities	32.70				0.00				32.70			
3.	Animal husbandry +	55.73				63.87				60.48			
4.	Non-farm activities Crop + Animal husbandry + Non-farm activities	57.47				67.84				61.91			

* and ** indicate significance of value at P=0.05 and 0.01, respectively

Table 5 : Component-wise employment generation

Sr. No.	Diversification components	Employment share		
		Small farmers (n=100)	Big farmers (n=100)	Total (n=200)
		%	%	%
1.	Crop	17.37	23.88	20.62
2.	Animal husbandry	27.47	22.85	25.16
3.	Non-farm activities	55.17	53.27	54.22

income. Strong educational profile and economic background of big farmers were responsible for getting more income from business and professional sectors.

Employment generation from different diversification patterns :

The employment generation as a result of integrating different components had been calculated in terms of mandays. Operation-wise employment generated was worked out to get total employment generation in terms of mandays and the results are presented under the following sub-sections.

- Analysis of variance of employment generated in diversification patterns
- Component-wise employment generation
- Activity-wise employment generation.

Analysis of variance (ANOVA) of employment generated in diversification patterns :

The analysis of employment generation among the diversification patterns in the Table 4 indicated the existence of significant difference in the number of mandays generated which is confirmed by the significant 'F' value at one per cent level of probability. Among the diversification patterns, crop + animal husbandry + non-farm activities generated more (619.1) mandays followed by animal husbandry + non-farm activities with 604.8 mandays. It could be noticed that both these patterns almost had nearer mean score which means that almost equal mandays of employment had been generated. This was due to the demand of heavy labour in both animal husbandry and non-farm activities throughout the year. Similarly, significant difference in employment generation was observed among all the patterns for small and big

Table 6 : Activity-wise employment generation

Sr. No.	Diversification components	Employment share		
		Small farmers (n=100)	Big farmers (n=100)	Total (n=200)
		%	%	%
1.	Cow	24.00	32.75	28.37
2.	Goat	16.02	11.61	13.82
3.	Ailanthus	8.00	9.61	8.80
4.	Service providers	12.25	5.28	8.76
5.	Labourer	8.30	3.87	6.08
6.	Sheep	7.35	4.20	5.78
7.	Business providers	2.90	5.91	4.40
8.	Professionals	1.67	6.36	4.04
9.	Buffalo	5.08	2.96	4.02
10.	Sorghum	4.57	3.44	4.01
11.	Fodder sorghum	1.63	3.54	2.59
12.	Tamarind	0.98	4.04	2.51
13.	Desibird	1.81	1.35	1.58
14.	Rent / hire business	1.42	1.00	1.21
15.	Red gram	0.68	1.33	1.00
16.	Agri-related enterprises	0.93	0.43	0.68
17.	Turkey	0.91	0.41	0.66
18.	Maize	0.38	0.27	0.32
19.	Banana	0.09	0.43	0.26
20.	Mango	0.43	0.06	0.25
21.	Pathimugam	0.04	0.40	0.22
22.	Green gram	0.34	0.00	0.17
23.	Castor	-	0.35	0.17
24.	Tapioca	-	0.28	0.14
25.	Black gram	0.04	0.11	0.07
26.	Samai	0.09	-	0.05
27.	Groundnut	0.09	-	0.05

farmers. Small farmers were able to get 574.4 mandays of work from crop + animal husbandry + non-farm activities while big farmers gained 678.4 mandays from the same pattern. In general, big farmers were employed more than the small farmers from all the diversification patterns. The detailed discussion on component and activity-wise employment generation is presented in the following sub-sections.

Component-wise employment generation :

From Table 5, it is clear that, non-farm activities provided more employment (54.22 %) for the dryland farmers. Almost an equal share of employment was observed from animal husbandry (25.16 %) and crop cultivation (20.62 %) components. The employment generated from non-farm sector for the whole year, and integration of many livestock components like cow, goat, sheep, desibird and turkey were the reasons for such outcomes. Comparison among farmers further revealed that non-farm (55.17 %) and animal husbandry activities (27.47 %) generated more employment to small farmers than their counterparts. Small farmers who got less number of mandays of work from agriculture had engaged in other animal husbandry and non-farm activities for securing additional employment and income.

Activity-wise employment generation :

Table 6 infers that the top five activities that contributed more employment share to the total number of mandays were cow rearing (28.37 %), goat rearing (13.82 %), ailanthus, cultivation (8.80 %), service providers (8.76 %) and working as labourers (6.08 %). Cow and goat as enterprises, demands heavy labour for doing operations such as feeding, disease management, cleaning and marketing. Ailanthus, a tree species demanded and exhausted more labour for planting,

maintenance, harvest, processing and marketing. Three hundred mandays on an average was generated for respondents working as service providers, managers and executives.

Conclusion :

Income and employment generation was on the higher edge while integrating different components in dryland ecosystem. The rate of integrating different components / activities by small and big farmers varied depending on the resources available. In general, non-farm enterprises played crucial roles in diversification status in augmenting increased income and employment. So there is a much scope for non-farm enterprise with additional off-farm opportunities in dryland ecosystems. Appropriate non and off-farm employment avenues such as preparation of vermicompost and biofertilizer, could be introduced and popularised among the rural youth so as to provide additional income and employment and decline the rate of distress migration of dryland farmers.

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