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Food and Non-Food Production in Unirrigated Agriculture: A Study in Perambalur District, Tamil Nadu

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Abstract

The paper examines the economics of unirrigated agricultural production in Perambalur district, Tamil Nadu. The study attempts to analyse the cost of cultivation, productivity and the relationship between farm size and productivity in unirrigated agricultural field. Perambalur district is selected as a study district where 94.28 per cent of gross sown area is used for cultivating food crops and remaining 5.72 per cent for non-food crops.

Veebanthattai and Veeppur blocks are selected as a food and non-food crop cultivating blocks at the second stage. Anukkur, Tondamandurai, Venbavur and Vengalam are sleleted as representative food crop villages in Veebanthattai block.

Further, Andhur, Assor, Odiyam and Perali are selected as representative non-food crop villages in Veppur block.

In each of the representative food and non-food cultivation villages, 10 farm households are surveyed from each farm categories, i.e., Marginal, Small, Medium and Large through the disproportionate stratified random sampling method. In each block, 160 sample respondents were surveyed and the total sample households stood at 320.

From the analsysis, it is found that the average yield and average net income are inversely related with the farm size. The availability of family labour, pest and fertilizer management, harvesting management and regular supervision improves the farm yield and higher level of average net income. Cost of cultivation is huge for marginal and small farmers as compared to medium and large farms. The fact is that the large and medium farms own tractors, tillers and sprayers, which minimize the cost of cultivation of the large and medium farms. The unirrigated agriculture parts play a major role in food and non-food cultivation and Government role in providing irrigational facilities may help the farmer's livelihood to a large extent.

Key Words: Unirrigated Agriculture, Farm Size, Productivity, Rainfall

1. Introduction

This paper makes an attempt to explore the economics of unirrigated agricultural production in Perambalur district, Tamil Nadu. Agriculture continues to be the main economic activity in rural areas of the developing world in spite of a steady diversification of their economic base during the preceding decades. Likewise, agriculture is the backbone of the rural India and the largest industry in the country. The role of agriculture is important in terms of food security, international trade and economic

development. India ranks first among the countries that practice unirrigated agriculture both in terms of extent and value of production. India has 143 million hectares of agricultural land and about 108 million hectares are unirrigated area, which constitutes nearly 75 per cent of the total land (Kumar et al., 2009). Unirrigated agriculture is largely practiced in arid, semi-arid and subhumid regions in the country. With about 68 per cent of rural population, these regions are also home to 81 per cent of rural poor (Rao et al., 2005). In such areas, crop production has become difficult as the intensity and frequency of rainfall is low.

The unirrigated agriculture refers to crop production in a farming system which entirely depends on rainfall but may include supplementary irrigation from small dams or tanks fed from rainfall and associated run-off on a particular land holding. However, all unirrigated areas are not of the same character. Unirrigated areas are highly diverse, ranging from assured rainfall and resource-rich areas with good agricultural potential to erratic rainfall and resource-poor areas with much more restricted potential. Some resource-rich unirrigated areas potentially are highly productive and already have experienced widespread adoption of improved seeds. In drier, less favorable areas, on the other hand, productivity growth has lagged behind, and there is widespread poverty and degradation of natural resources (Bhatia, 2005).

However, nearly 50 per cent of the total food grains are grown under unirrigated agriculture and millions of rural poor depend on unirrigated agriculture. In addition, 85 per cent of the cereals, 83 per cent of the pulses, 70 per cent of the oilseeds and 65 per cent of the cotton are predominant unirrigated crops grown in India. Nearly 50 per cent of the total rural workforce and 60 per cent of livestock in the country depend on unirrigated agriculture (CRIDA 2011). It emphasizes the crucial role played by unirrigated agriculture in food security and livelihood of the rural households. By considering this, the policy makers give much importance to the unirrigated agriculture in order to meet

the rising demand for food, basic staples, non-food grains, and exports. At the same time, the productivity of irrigated land is being utilized at the maximum level. The growth in total factor productivity in irrigated agriculture has declined slightly in major crops (Singh and Rathore, 2010). As a result, the opportunity for continued expansion of irrigated agriculture is limited and the need for unirrigated agriculture has always been an important part of the agricultural sector.

Thus the expansion of unirrigated agriculture is initiated through the introduction of high yielding varieties, subsidized farm inputs, extension activities, institutionalized financial facilities, minimum supporting price and marketing infrastructure facilities. These factors motivate the farmers to shift from traditionally grown less remunerative crops to more remunerative crops. As result of expansion in unirrigated agriculture, the widespread crop diversification takes place in unirrigated agricultural production.

In this context, the question raises that whether the introduction of modern seeds and farm inputs, pricing practices and mechanization has reduced the cost of cultivation and increases the productivity of the unirrigated agriculture? In addition to this, whether unirrigated agriculture has changed the relationship between farm size and productivity in unirrigated agricultural? With this background, this paper examines the economics of unirrgated agricultural production in Perambalur district, Tamil Nadu.

2. Methodology

In order to analyse the crop diversification, cropping pattern, cost of cultivation and productivity in unirrigated agriculture, the study incorporates scientific approach in identifying the study district and study villages the details are discussed under four stages.

From the past studies, the gross cropped area under irrigation is used as an indicator to identify unirrigated agricultural areas. They consider that the predominant rainfed agriculture as "unirrigated areas" and predominant irrigated agriculture as "irrigated area." However, several previous studies have faced this conceptual issue in categorizing unirrigated agriculture. Therefore, the studies on unirrigated agriculture have followed both average rainfall and gross cropped area under irrigation (Rangaswamy, 1981; Bapna et al., 1984; Jodha, 1985; Subbarao, 1985; Shah and Shah, 1993; Thorat, 1993).

As a result, actual annual rainfall and gross cropped area under irrigation are considered for the selection of unirrigated districts. In Tamil Nadu, Namakkal, Erode, Tiruchirappalli, Karur, Perambalur, Madurai and Virudhunagar districts are identified as low rainfall district and their actual rainfall is below 800 mm. Among the low rainfall districts, percentage of gross cropped area under irrigation is relatively lower in Thoothukudi (24.94), Perambalur (30.99) and Virudhunagar (46.64) districts. In Thoothukudi district, extent of small scale industries and industrial areas has reduced the dependence over Unirrigated agriculture. Therefore, Perambalur district is selected as a study district at the **first stage**.

Table 1 Low Rain Fall Districts and Percentage of Area under Irrigation

Sl. No.	Low Rain fall Districts	Percentage of Gross Cropped Area under Irrigation
1.	Namakkal	48.59
2.	Erode	69.52
3.	Tiruchirapalli	59.19
4.	Karur	60.31

5.	**Perambalur**	**30.99**
6.	Madurai	63.68
7.	Virudhunagar	46.64
8.	Thoothukudi	24.94

Source: Tamilnadu Statistical Hand Book 2011, Department of Economics and Statistics, Chennai

The common dry crops of Tamil Nadu are *combu, cholam, ragi* and maize, pulses like red-gram, Bengal-gram and oil-seeds like groundnut, gingelly, castor and cotton. Among the common dry crops, cumbu, cholam, ragi and maize, red gram and Bengal-gram come under category of food crops. On the other hand, groundnut, gingelly, castor and cotton are the non-food crops. In Perambalur district, 94.28 per cent of gross sown area is used for cultivating food crops and remaining 5.72 per cent for non-food crops. The gross sown area of major food crops is as follows: Paddy (14.7), Cholam (4.7), Cumbu (0.2), Ragi (0.01), Maize (48.96), other cereals (0.41), Pulses (0.50) and Sugarcane (24.11) respectively. At the same time, Cotton (2.63), Ground nut (2.62), Gingelly (0.35) and Castor (0.11) are the important non-food crops in Perambalur district.

In this context, important dry crops such as maize (food crop) and cotton (non-food crops) are selected for the present study. Thus, the gross cropped area for maize and cotton are used as a tool for selecting the food crop cultivation and non-food crop cultivation blocks in the Perambalur district. The Perambalur district consists of four blocks, namely, Perambalur, Veebanthattai, Veppur and Alathur. Among the four blocks, in Veebanthattai block, 45.12 per cent of the gross cropped area is used for maize cultivation and it is highest among the blocks in the Perambalur district. On the other hand, in Veeppur block 27.81 per cent of the gross cropped area is used for cotton cultivation and it is huge among the blocks in Perambalur district (see Table 2).

Therefore, Veebanthattai and Veeppur blocks are selected as a food and non-food crop cultivating blocks at the **second stage**.

Table 2 Details of Selection of Food and Non-crop Cultivation Blocks in the Perambalur District

Sl. No.	Crops	Blocks of the Perambalur District							
		Perambalur		Veebanthattai		Veppur		Arlathu	
		Area (in Hec.)	%	Area (in Hec.)	%	Area (in Hec.)	%	Area (in Hec.)	%
1.	Paddy	2647.380	17.28	5396.420	17.22	3204.945	11.95	840.165	3.69
2.	Cholam	0.650	0.00	7.950	0.03	1164.685	4.34	2707.915	11.88
3.	Cumbu	49.925	0.33	32.710	0.10	16.400	0.06	106.820	0.47
4.	Ragi	0.000	0.00	4.330	0.01	4.550	0.02	0.775	0.00
5.	Maize	4861.940	31.74	**14141.760**	**45.12**	11228.575	41.85	8113.310	35.60
6.	Varagu	11.660	0.08	28.995	0.09	268.030	1.00	13.805	0.06
7.	Pulses	43.485	0.28	44.260	0.14	152.225	0.57	159.175	0.70
8.	Spices	277.990	1.81	615.755	1.96	336.455	1.25	408.025	1.79
9.	Sugar	283.055	1.85	2202.405	7.03	1572.290	5.86	543.950	2.39
10.	Fruits	143.320	0.94	292.780	0.93	74.685	0.28	200.036	0.88
11.	Vegetables	3877.120	25.31	639.470	2.04	331.590	1.24	3971.030	17.43
12.	Cotton	1244.25	8.12	6866.71	21.9	**7462.46**	**27.8**	4357.36	19.1

		5		0	1	**5**	**1**	5	2
13.	Oil Seeds	817.740	5.34	654.090	2.09	856.350	3.19	993.825	4.36
14.	Other Crops	1058.725	6.91	411.830	1.31	155.960	0.58	372.604	1.64
Total		**15317.245**	**100**	**31339.465**	**100**	**26829.205**	**100**	**22788.800**	**100**

Source: Joint Director of Agriculture, Perambalur District, 2011.

In the **third stage**, Anukkur, Tondamandurai, Venbavur and Vengalam are sleleted as representative food crop villages in Veebanthattai block. Further, Andhur, Assor, Odiyam and Perali are selected as representative non-food crop villages in Veppur block. The village selection has been done with the help of the Join director of Agriculture and Agricultural Extension Officers of the Perambalur district.

In the **fourth stage,** in each of the representative food and non-food cultivation villages, 10 farm households are surveyed from each farm categories, i.e., Marginal, Small, Medium and Large through the disproportionate stratified random sampling method. In each block, 160 sample respondents were surveyed (Marginal = 40+40; Small =40+40; Medium = 40+40 and Large = 40+40). Finally, 320 farm households have been surveyed with the help of pre-tested structured interview schedule. Pre-tested interview schedule includes the details about the social, demographic and economic profile of the respondents and households, cropping pattern and crop diversification, cost and return of food and non-food crops in unirrigated agriculture. The reference period of the study is 2010 - 2011.

In order to analyze the economics of unirrigated agricultural production, the cost of cultivation, average yield per acre and net income per acre are taken into account for

the analysis. Further, the above mentioned factors are compared among the farm groups of the food and non-food cultivation blocks in Perambular district. Therefore, the One-Way ANOVA model is adopted to identify the variation among the farm groups in terms of cost of cultivation, average yield and net income of food and non-food crop cultivation in unirrigated agriculture.

3. Results and Discussion

The cost of cultivation, average yield per acre and average net income per acre may vary among the farm groups according to the food and non-food crop cultivation. Therefore, separate One-Way ANOVA Model was applied to analyse the variations in different farm groups of the unirrigated agriculture. The application procedure of the One-Way ANOVA model confirms the suitability of the model to analyze the variation in cost of cultivation, average yield per acre and average net income per acre among the different farm groups of food and non-food crop cultivating unirrigated agricultural regions.

3.1 Unirrigated Agriculture and Food Crop Production

From the analysis, the cost of cultivation per acre, average yield per acre and net income per acre are treated as dependent variables where farm groups are considered as independent variable. The computed 'F' values of the One-Way ANOVA model are found to be significant except the average yield per acre. This result confirms that the cost of cultivation per acre (6.46) and average net income per acre (62.48) vary among the farm groups in food crop cultivation (Maize). Further, the sum of squares and mean sum of squares are found to significant and substantiate the suitability of the model and validity of the result. The computed values are higher than the table value of 'F' at 5 per

cent level. The significant parameters are compared pair wise. Pair wise comparison of parameters results is drawn below (see Table 3 and 4).

The cost of cultivation is huge for marginal (Rs. 11,732), small (Rs. 11,826) and medium farmers (Rs. 11,506) as compared to large farmers (Rs. 10,662). The variation in cost of cultivations is due to the ownership of farm equipments. The large farmers have the own tractors, tillers and sprayers. It helps them to minimize the cost of agricultural operations in unirrigated agriculture, while the marginal, small and medium farmers have used the tractors, tillers and sprayers by rental. These practices increase the cost of cultivation of the marginal, small and medium farmers. On the other hand, there is no such wide variation in cost of cultivation between marginal, small and medium. The variation in cost of cultivation is existing between marginal and large (1070), large and small (1164) and large and medium (845).

Table 3 Compared 'F' Ratios on Cost of Cultivation, Average Yield and Net Income of Different Farm Groups of the Food Crop Cultivation in Unirrigated Agriculture: One-Way ANOVA Model

Sl. No	Details of Variation		Sum of Squares	d.f	Mean Sum of Square	'F'
1.	Cost of Cultivation Per Acre (in Rs.)	Between Groups	33761624.08	3	11253874.69	6.46 *
		Within Groups	271760935.90	156	1742057.28	
		Total	305522559.98	159	-	
2.	Average Yield Per Acre (in	Between Groups	10819134.70	3	3606378.23	1.50 NS
		Within	375864012.40	156	2409384.69	

	Kg.)	Groups				
		Total	386683147.10	159	-	
3.	Net Income Per Acre (in Rs.)	Between Groups	309818800.40	3	103272933.47	62.48 *
		Within Groups	257864763.20	156	1652979.25	
		Total	567683563.60	159	-	

Source: Computed

Note: * Significant at 5 per cent level

Among the farm groups in food crop cultivation, the average yield per acre is high in marginal farm (2,978 kg.) followed by small (2,486 kg.), medium (2,394 kg.) and large (2,307 kg.). There is extensive variation between marginal and small (492), marginal and medium (584) and marginal and large (671). However the variation is hefty between marginal and large. In the case of marginal farm, the farmers are extensively involved in terms of supervision, manure at the time and suitable pest management. These factors improve the average yield of the marginal farmers as compared to small, medium and large farmers. On the contrary, there is no outsized variation between large and small (-180), large and medium (-87) and medium and small (-93).

The average net income per acre explains the average profit per acre in food crop cultivation. The average profit per acre is huge for marginal farm (Rs. 13,956) followed by small (Rs. 13,039), large (Rs. 12,355) and medium (Rs. 10,182). There is bulky variation existing between marginal and small (916), marginal and medium (3,773), marginal and large (1,601), large and medium (2,172) and medium and small (-2,857). Marginal and small farmers have opportunity for effective agricultural operations due to the availability of family labour, size of the operational land holding, adoption of

comprehensive fertilizer and pest management practices and regular supervision. These factors improve the farm yield, minimize the crop loss and enhance the large amount of profit.

The large farmers also earned good profit as compared to medium farm. The fact in favour of them is the ownership of farm equipments. The ownership of tractors, power tiller and sprayers minimizes the cost of cultivation and yields good amount of profit to the large farmers. But in the medium farm the profit amount is too low among the farm groups in food crop cultivation. The non-availability of family labour, rent for tractor, tiller and sprayer leads to huge cost of cultivation. In addition to that the medium farm size is more or less equal to the large farm size. It requires rigorous farm management practices but these are not followed by the medium farmers. Lack of these practices leads to huge crop loss and reduces the yield per acre. More specifically, lack of farm management practices and huge cost of cultivation give minimum profit to the medium farms.

Table 4 Farm-wise Comparison of Cost of Cultivation, Yield and Net Income From Food Crop Cultivation in Unirrigated Agriculture

Sl. No	Details	Farm Group (i)	Farm Group (j)	Mean Difference (i-j)	't' Value
1.	Cost of Cultivation (in Rs.)	Marginal **(11,732)**	Small **(11,826)**	-94	2.57 NS
		Marginal **(11,732)**	Medium **(11,506)**	226	1.78 NS
		Marginal **(11,732)**	Large **(10,662)**	1070	8.05 *

		Large **(10,662)**	Small **(11,826)**	-1164	9.74 *
		Large **(10,662)**	Medium **(11,506)**	-845	7.41 *
		Medium **(11,506)**	Small **(11,826)**	-320	1.42 NS
2.	Yield (in Kg.)	Marginal **(2,978)**	Small **(2,486)**	492	3.30 *
		Marginal **(2,978)**	Medium **(2,394)**	584	5.42 *
		Marginal **(2,978)**	Large **(2,307)**	671	7.94 *
		Large **(2,307)**	Small **(2,486)**	-180	2.14 NS
		Large **(2,307)**	Medium **(2,394)**	-87	1.12 NS
		Medium **(2,394)**	Small **(2,486)**	-93	1.60 NS
3.	Net Income (in Rs.)	Marginal **(13,956)**	Small **(13,039)**	916	3.37 *
		Marginal **(13,956)**	Medium **(10,182)**	3773	9.32 *
		Marginal **(13,956)**	Large **(12,355)**	1601	3.70 *
		Large **(12,355)**	Small **(13,039)**	-684	1.64 NS

		Large **(12,355)**	Medium (10,182)	2172	4.38 *
		Medium **(10,182)**	Small **(13,039)**	-2857	6.08 *

Source: Computed

Note: * Significant at 5 per cent level

3.2 Unirrigated Agriculture and Non-food Crop Production

This presents section discusses the non-food crop (Cotton) production in unirrigated agriculture. Similarly, the cost of cultivation per acre, average yield per acre and average net income per acre are treated as dependent parameters and the various farm groups are considered as fixed parameter. The analysis for non-food crop cultivation shows that the computed 'F' values of the One-Way ANOVA model found to be significant. The cost of cultivation per acre (57.84), average yield per acre (66.66) and average net income per acre (45.83) differ among the farm groups in non-food crop cultivation. The computed values are higher than the table value of 'F' at 5 per cent level. Further, the sum of squares and mean sum of squares are found to be significant and substantiate the suitability of the model and validity of the result. The significant parameters are compared pair wise. Pair wise comparison of parameters results is drawn below (see Table 5 and 6).

Table 5 Compared 'F' Ratios on Cost of Cultivation, Average Yield and Net Income of Different Farm Groups of the Non-food Crop Cultivation in Unirrigated Agriculture: One-Way ANOVA Model

Sl.	**Details of Variation**	**Sum of**	**d.f**	**Mean Sum of**	**'F'**

No			Squares		Square	
1.	Cost of Cultivation Per Acre (in Rs.)	Between Groups	348825595.60	3	116275198.53	57.84 *
		Within Groups	313608362.40	156	2010310.02	
		Total	662433958.00	159	-	
2.	Average Yield Per Acre (in Kg.)	Between Groups	1672369.20	3	557456.40	66.66 *
		Within Groups	1304531.20	156	8362.38	
		Total	2976900.40	159	-	
3.	Net Income Per Acre (in Rs.)	Between Groups	1800281961.10	3	600093987.03	45.83 *
		Within Groups	2042465586.00	156	13092728.12	
		Total	3842747547.10	159	-	

Source: Computed

Note: * Significant at 5 per cent level

The cost of non-food crop cultivation is varying among farm groups. It is noticeably high for marginal farm (Rs. 22, 006) as compared to small (Rs. 19, 389), medium (Rs. 19, 342) and large (Rs. 17,916). The cotton cultivation is one of the expensive cultivation in unirrigated agriculture. The major segment of the cost is covered by fertilizer, pesticide and harvesting practices. Every season the cotton cultivation farmers face the problem of pest control and therefore they need adopt the multistage pest control technique which involves huge cost. In this context, the marginal and small

farmers are able to manage the labour demand by using their family labour while for the use of sprayer, tractor and power tiller they depend by rental which involves huge cost. As a result, the costs of cultivation for marginal and small farmers are greater as compared to medium and large farm size. Though, the ownership of plough, tilling technology and pest control equipment reduces the cost of cultivation of the large and medium farmers. Therefore, wide variation exists between marginal and small (2,617), marginal and medium (2,666), marginal and large (4,090), large and small (-1,473), large and medium (-1,427).

In the case of average yield per acre the result is favorable to the marginal and small farms. The average yield per acre is huge for marginal (1,267 kg.) followed by small (1,075 kg.), medium (Rs. 1,051 kg.) and large (996 kg.). The main factor to determine the yield is management of harvesting season. The harvesting period of cotton consists three to four month and it requires huge amount of labor for the collection of cotton. Due to the availability of family labour it is affordable for the marginal farmers. But the small, medium and large farmers not have the labour force and are dependent on the wage labour during agricultural busy season. During this period, unexpected rain fall severely affects the cotton yield. Hence, there is variation in yield between marginal and small (192), marginal and medium (216) and marginal and large (271).

Table 6 Farm-wise Comparison of Cost of Cultivation, Yield and Net Income from Non-food Crop Cultivation in Unirrigated Agriculture

Sl. No	Details	Farm Group (i)	Farm Group (j)	Mean Difference (i-j)	't' Value
1.	Cost of Cultivation (in Rs.)	Marginal **(22,006)**	Small **(19,389)**	2617	2.72 *

		Marginal **(22,006)**	Medium **(19,342)**	2664	3.72 *
		Marginal **(22,006)**	Large **(17,916)**	4090	5.08 *
		Large **(17,916)**	Small **(19,389)**	-1473	2.13 *
		Large **(17,916)**	Medium **(19,342)**	-1427	1.73 *
		Medium **(19,342)**	Small **(19,389)**	-47	1.42 NS
2.	Yield (in Kg.)	Marginal **(1,267)**	Small **(1,075)**	192	4.33 *
		Marginal **(1,267)**	Medium **(1,051)**	216	4.72 *
		Marginal **(1,267)**	Large **(9,96)**	271	5.62 *
		Large **(9,96)**	Small **(1,075)**	-79	3.57 NS
		Large **(9,96)**	Medium **(1,051)**	-55	1.36 NS
		Medium **(1,051)**	Small **(1,075)**	-24	1.1 NS
3.	Net Income (in Rs.)	Marginal **(37,570)**	Small **(31,157)**	6414	1.85 *
		Marginal **(37,570)**	Medium **(30,078)**	7492	3.17 *
		Marginal	Large	8668	8.54 *

		(37,570)	**(28,902)**		
		Large **(28,902)**	Small **(31,157)**	-2254	1.78 *
		Large **(28,902)**	Medium **(30,078)**	-1176	1.12 *
		Medium **(30,078)**	Small **(31,157)**	-1079	1.10 *

Source: Computed

Note: * Significant at 5 per cent level

The average net income from non-food crop cultivation is huge for marginal farmers (Rs. 37,570) followed by small (Rs. 31,157), medium (Rs. 30,078) and large farmers (Rs. 28,902). The effective management, family labour, and ample number of harvesting increase the average net income of marginal and small farmers. On the contrary, non -vailability of family labour, wage labour and unexpected crop loss due to unexpected rain fall and heavy wind, reduce the average net income of the medium and large famers. Hence, there is variation between marginal and small (6,441), marginal and medium (7,492), marginal and large (8,668), large and small (-2,254), large and medium (-1,176) and medium and small (-1,079). However, the variation between marginal and large is huge as compared to other farm groups of the non-food crop cultivation.

4. Conclusion

In both food and non-food crop cultivation, the average yield and average net income are inversely related with the farm size. The availability of family labour, pest and fertilizer management, harvesting management and regular supervision improves the farm yield and higher level of average net income. On the other hand, due to non-

availability of family labour and wage labour during the busy agricultural season, ineffective supervision due to large farm size, the medium and large farm have attained minimum farm output and lower level of average net income as compared to marginal and small farms. But the cost of cultivation is huge for marginal and small farmers as compared to medium and large farms. The fact is that the large and medium farms own tractors, tillers and sprayers, which minimize the cost of cultivation of the large and medium farms. While the marginal and small farmers use the tillers, tractors and sprayers by rental and cost of cultivation for marginal and small farmers are high. However, abundance of family labour considerably reduces the labour cost of the marginal and small farmers. The unirrigated agriculture plays a major role in food and non-food cultivation and Government role in providing irrigational facilities may help the farmer's livelihood to a large extent.

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References

Bapna, S.L., H. Binswanger, and J. Quizon. 1984. "Systems of Output Supply and Factor Demand Equations for Semi-arid Tropical India." *Indian Journal of Agricultural Economics*, 39 (2): 179-202.

Bhatia, M.S. 2005. "Viability of Rainfed Agriculture in Semi-Arid Regions." NABARD Occasional Paper No. 40, Mumbai.

CRIDA. 2011. Vision 2030. Central Research Institute for Dry land Agriculture, Hyderabad, Andhra Pradesh.

Government of Tamil Nadu. 2011. Tamil Nadu Statistical Hand Book 2011. Department of Economics and Statistics, Chennai, Tamil Nadu.

Jodha. N.S. 1985. *Development Strategy for rainfed agriculture: Possibilities and constraints*. Economics Program, ICRISAT.

Joint Director of Agriculture. 2011. District G Return 2011, Department of Agriculture and Extension, Perambalur District.

Kumar P., Joshi P.K. and Birthal P.S. 2009. "Demand Projections for Food Grains in India." *Agricultural Economics Research Review*, 22(2): 237-243.

Rangaswamy, P. 1981. "Economics of dry farming in drought prone areas: A case study of Hissar in Haryana." Research Study No. 81/1. Agricultural Economics Research Centre, University of Delhi.

Rao K.P.C., Bantilan M.C.S., Singh K., Subrahmanyam S., Deshingkar P., Rao P. Parthasarathy and Shiferaw B. 2005. "Overcoming Poverty in Rural India: Focus on Rainfed Semi-Arid Tropics." Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics, 96 pp.

Shah, Amita, and D.C. Sah. 1993. "Dry Land Farming under the Changing Source Environment: A Case Study of Gujarat." *Artha Vijnana* 35 (3) (September).

Singh, S. and Rathore, M. S. 2010. Rain-fed Agriculture in India – Perspectives and Challenges, Rawat Publications, Jaipur.

Subbarao, K. 1985**.** "Institutions, Infrastructure and Regional Variations in India's Input Delivery System." In Agricultural Markets in the Semi-Arid Tropics: Proceedings of the International Workshop, October 24-28, 198. Patancheru, India: ICRISAT.

Thorat, S.K. 1993. "*Technological Change and Regional Differentiation*." Khama Publishers. New Delhi.

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