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ANALYSIS ON INPUT-OUTPUT STRUCTURE WITH SPECIAL REFERENCE TO PADDY CULTIVATION, THOOTHUKUDI DISTRICT - TAMIL NADU

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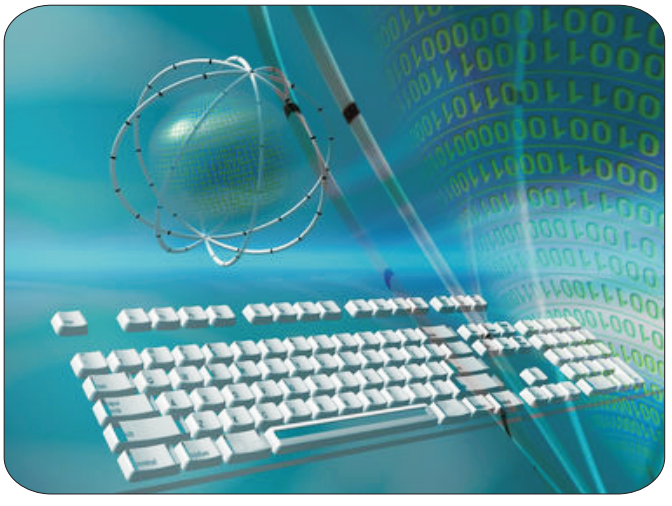

ABSTRACT

Paddy is more water intensive crop and India is facing formidable challenge on paddy cultivation to feed its growing population. The present study is an attempt to analyse the input-output structure of paddy cultivation for farmers of owner cultivated and leased-in land in Thoothukudi district. The study develops both primary and secondary data. Multistage stratified random sampling technique has been adopted for the study. Percentage analysis, averages, standard deviation, Garret's ranking technique and t- value were used. It is observed that the yield per acre was 3501.32 kgs for owner cultivated and 3312.14 kgs for the farmers of leased-in land. This shows that there is a significant difference in the yield between the farmers of owner cultivated and leased-in land. The difference in yield works out to 189.18 kgs. Apart from yield, the difference in the utilisation of other input variables like human labour, fertilizer, pesticides, mechanical power and irrigation is also found to be significant between the owner cultivated and the leased-in land in the study area. It is observed that there is a significant difference in hours used for irrigation purpose between the farmers of owner cultivated and leased-in lands. In the case of pesticides, the farmers of owner cultivated farms used the 159.03 kgs. while the farmers of leased-in lands used 152.42 kgs. In the case of mechanical power, the farmers of owner cultivated farms used 6.53 hours while the farmers of leased-in lands used 6.12 hours. With regard to the use of other variables like the bullock labour and seeds, the differences between the farmers of owner cultivated and leased-in land was not found to be significant. Thus, it is concluded from the analysis that owner cultivated farm are economically more feasible and benefited more than leased-in land irrespective of the size of farms in the study area.

KEYWORDS :paddy cultivation, input variables, fertilizer, pesticides, mechanical power, leased-in land

INTRODUCTION:

Paddy is a significant food harvest and it has greater economic prominence among the food crops, since it is one of the foremost commodities in agricultural exports. Hence, the production recital of the crop is of critical position in cultivating the competent use of resources. Paddy is more water intensive crop and India is facing formidable challenge on paddy cultivation to feed its growing population. It is estimated that about 260mt of food grains are to be produced annually to meet its rising food requirement (Reddy and Sen, 2004). Paddy area in India fluctuates around 43 million hectares and was at maximum of 45.5 million hectares in 2008-09.

The growth rates of paddy area, production and productivity during 1994-95 to 2009-10 were (-) 0.04, 1.15 and 1.04 respectively (Anon., 2010). The empirical findings on input use pattern and production pattern in both owner cultivated land and leased-in land will throw some light on the type of adjustment required in the existing form of leasing characteristics for optimal utilization of available resources which provide a basis for the planners in formulating tenancy reforms for tailoring recommendations and research workers for further in depth studies (Tilekar, 2000). Hence, the present study is an attempt to analyse the input-output structure of paddy cultivation for farmers of owner cultivated and leased-in land in Thoothukudi district.

OBJECTIVES

The study was conducted with the following specific objectives

1.To analyse the socio-economic condition of the paddy cultivation for farmers of owner cultivated and leased-in land.

2.To analyse the input-output structure of paddy cultivation for farmers of owner cultivated and leased-in land.

3.To highlight the yield constraints of paddy cultivation.

METHODOLOGY

The study utilises both primary and secondary data. Multistage stratified random sampling technique has been adopted for the study, taking Tuticorin district as the universe, the taluk as the stratum, the village as the primary unit and paddy cultivators as the ultimate unit. Tuticorin district comprises 12 blocks. Paddy are mainly cultivated in Sattankulam and Tiruchendur taluks which show more than 60 per cent of area under paddy in this district and hence the selection of sample villages restricted to these two taluks. Five villages in each taluk, which account for the highest area under paddy cultivation in the descending order of magnitude, were selected as the study unit for primary data collection. A list of paddy cultivators in the selected villages was obtained from the records of the Joint Director of Agriculture, Tuticorin. The proportionate random sampling technique has been adapted to select 90 each of owner cultivated and leased-in land farmers from these 10 villages. The data relate to the month of May 2016. Percentage analysis, averages, standard deviation, Garret's ranking technique and t- value were used.

REVIEW OF LITERATURE

A number of researchers explored different economic aspects of various crops in general and particularly of rice crop. Khan and Maki (1979) studied the relationship between farm size and economic efficiency in Punjab and Sindh. They found that large farm size did not matter for economic efficiency in agriculture sector as compared to small size. Santha (1993) studied the economics of rice cultivation in India and compared the production cost, input use and profitability of rice production in

three seasons. He found that the Viruppu crop performed better in terms of benefit cost ratio and cost of production.

Rebuffel (1994) observed that small farmers had comparatively less access to credit as compared to large farmers. Further, 80 percent of small farmers used primitive methods of farming. Sreeja and Chandrabhanu (1995) evaluated and identified the economic benefits of fertilization practices for upland rice production. They found that slope of demand curve was greater than the slope of supply curve of paddy; price structure of paddy in Kerala, India. Projected values based on the model showed that instability of supply behaviour to adjust changes in price should be changed to reduce the time lag in achieving equilibrium price and output.

Parikh et al. (1995) measured the economic efficiency in Pakistan agriculture sector using econometric techniques. Their views differed from those of Khan and Maki (1979) and found that small farms were more efficient than large farms. Dash et al. (1995) studied per hectare cost and return and level of input used in production for summer rice and observed that on average, per hectare cost of cultivation was Rs.17113 and average yield per hectare was about 56 quintals, which varied from 52.71 to 58 quintals on sample farms. The average gross and net returns per hectare were Rs. 18923 and Rs. 1920, respectively.

Ishida and Asmuni (1998) in Malaysia presented an economic analysis of rice production so as to trace the impact of agricultural modernization on paddy income. They concluded that farm mechanization had positive impact on paddy income. Haq et al. (2002) using Cobb-Douglas type of production function technique investigated the relationship of farm size and input use and its effect on production and gross/net incomes in potato. They concluded that labour, seed, farmyard manure, nitrophos and labours were the factors significantly contributed towards output.

Lohano and Mari (2005) assessed the input-output relationship of onion crop in Hyderabad district, Sindh, using Cobb-Douglas production function and found that input-output relationship of onion crop was characterized by constant returns to scale. Ahmad, et al. (2005) determined the cost and revenue for potato crop and compared it for two districts of Punjab namely Okara and Kasur. They found significant difference in cost and revenue in these districts. They also considered funds availability, seed quality and stability in price as responsible factors to increase production of potato crop and its profitability.

Arifullah (2007) noted that yield potential was low (13-23%) as compared to world average yield for various crops in general and particularly for IRRI rice, onion, wheat, sugarcane and chickpea. He suggested decreasing the cost of production alongwith increasing per hectare yield. Khan et al. (2009) examined the relationship between energy inputs and rice production in Dera Ismail Khan, district of Pakistan, using cross-sectional data collected on the basis of stratified random sampling technique. The results showed that increase in energy consumption at farm level increased rice yield and therefore, farmers with high cost of production could get better return of their crop.

Studies by Saha and Swaminathan (1994), Rawal and Swaminathan (1998) reveal that the rapid growth in rice production in West Bengal was brought about primarily by an expansion in the boro (summer) crop (which is an irrigated crop based on HYV's of seeds). Rawal and Swaminathan (1998) highlight the role of Operation Barga in reversing the slow output growth in West Bengal. According to them, the acceleration in growth occurred during and after major changes in agrarian institutions and land relations.

AGRICULTURE IN THOOTHUKUDI DISTRICT

Paddy is cultivated in the Palayakayal Srivaikundam, Sattankulam and Tiruchendur taluks.

Cumbu, Cholam, Kuthiraivali and other pulses are raised in the dry tracts of Kovilpatti, Vilathikulam,Nagalapuram Ottapidaram, and Thoothukudi taluks. Cotton is cultivated in Kovilpatti, Ottapidaram and Thoothukudi Taluks. Groundnut cultivation is undertaken in Kovilpatti, Tiruchendur, and Sattankulam taluks. Groundnut cake is being used as manure and cattle feed. Nagalapuram makes its economy to be solely dependent agriculture.

Main business of this area is dry chilly, cholam, cumbu wood charcoal, etc. With 35% share, the district is the top producer of Cumbu in Tamil Nadu. Palmyrah trees are grown mostly in Tiruchendur, Srivaikundam, Sattankulam and Vilathikulam taluks. Jaggery is produced from palmyrah juice; the production of jaggery is the main occupation of the people of Tiruchendur and Sattankulam taluks. Banana and other vegetables are raised in Srivaikundam and Tiruchendur taluks. The road going towards Kulayankarisal from Thiruchendur has banana farms on one side and a salt farm on the other; each farm needs a different type of water. Thoothukudi district is the largest exporter of bananas in Tamil Nadu.

CROP SEASON

In Thoothukudi district, Paddy is cultivated as a double crop and cultivation is done during May - June and October - November. Sometimes sowing takes place well in advance during April - May. The sowing pulses (in the paddy fallow) take place between these two seasons. Cultivation of banana (sowing) takes place during January - February.

Area and Production of important crops in Tuticorin District during 2010-2011

Sl. No.	Crops	Area '000' hectare	Production in'tonnes	Productivity Kg./hectare. (Average yield per Hectare)	% to the Total Area Sown
(1)	(2)	(3)	(4)	(5)	(6)
1.	A. FOOD GRAINS:				
	a) Cereals & Millets				
	Paddy	20007	96614	4829	10.49
	Cholam	8959	18097	2020	4.70
	Cumbu	9390	18442	1964	4.92
2.	b) PULSES				
	Blackgram	37924	16231	428	19.88
	Greengram	35410	10871	307	18.56
3.	C. OIL SEEDS				
	Groundnut	517	673	1301	0.27
	Gingelly	1120	420	375	0.59
	Sunflower	1254	528	421	0.66
4.	D. OTHER CROPS				
	Chillies	11664	4537	389	6.11

Source: Assistant Director of Statistics, Statistical Department, Statistical Hand Book of Tuticorin

District 2012, p.7.

The table shows the area of cultivation and important crops cultivated in Tuticorin district during the year 2010-11. It is observed that Paddy is the main food crop cultivated in Tuticorin district. In pulses production, Blackgram production is more than Greengram production. In oilseeds production, Groundnut occupies the first place.

Total Workers and non-workers in Thoothukudi District – 2011

Sector		Population	Total workers (Main + Marginal)	Main Workers	Marginal Workers	Non-workers
Rural	Male	427030	248691	221286	27405	188908
	Female	439540	180192	136056	44136	286020
	Total	866570	428883	357342	71541	474928
Urban	Male	431889	181695	174224	7471	144793
	Female	439917	63104	53172	9932	272340
	Total	871806	244799	227396	17403	417133
Total	Male	858919	430386	395510	34876	333701
	Female	879457	243296	189228	54068	558360
	Total	1738376	673682	584738	88944	892061

Source: National Information Centre, Thoothukudi.

It is observed from the table that the female marginal workers are more in number in both rural and urban sectors than males. But the female main workers are more in rural sector than in urban sector.

ANALYSIS AND INTERPRETATION

The socio-economic characteristics of sample paddy cultivating farmers from owner cultivated land and leased-in land in Sattankulam and Tiruchendur taluks of Tuticorin district were analysed and presented in the study. It is evident from the results that in owner cultivated land the percentage of male is more i.e., 69% and in leased-in land it was also more i.e., 62%.

In case of owner cultivated land the percentage of middle age respondents is more i.e., 51% and

in leased-in land it was also more i.e., 49%. As per the survey middle age group's involvements is higher than that of old and young aged groups and mean size of the family worked out to be 43.02 years in owner cultivated land and 41.31 years in leased-in land of the study area.

Further, results revealed that in owner cultivated land 26% of the respondents had primary education, about 18% had high school education, about 36% possessed higher secondary level education and only about 9% had pursued degrees. Further, 11% remained illiterate. In leased-in land 38% of the respondents had primary education, about 19% had high school education, about 7% possessed higher secondary level education and only about 8% had pursued degrees. Further, 28% remained illiterate.

Results on family size categories indicate that in owner cultivated land majority of the respondents i.e., 63 percentage of families are having less than 5 size ranging from members and mean size of the family worked out to be 4.01 years. In case of leased-in land it was 68 percentage and mean size of the family worked out to be 4.64 years.

Results on family type in owner cultivated land revealed that 72 percent of the respondents belonging to the nuclear family and in leased-in land it were 59%. This clearly indicates the declining of the joint family system. The study supplementary shows that a considerable number of the farmers are married. They constitute 96 per cent of the sample and the rest 4 per cent are unmarried in owner cultivated land and in leased-in land 82 per cent of the sample farmers are married and the rest 18 per cent are unmarried.

Results on land holding in owner cultivated land and leased-in land revealed that the number of small farmers forms the majority (63% and 67%). The next bigger group is the medium farmers (27% and 25%). The numbers of large farmers are quite few (10% and 8%) and mean and standard deviation of owner cultivated land farmers worked out to be 18.23 and 16.11 and in leased-in land mean and standard deviation of land holding worked out to be 17.01 and 15.31 respectively in the study area.

Further, results revealed that cattle, goat, sheep and buffaloes are the major livestock in the area. In owner cultivated land about 15% of the sample farmers had goat, about 27% of them maintained buffaloes, about 53% of them sustained sheep and about only 5% of them had cattle. Poultry is widely prevalent in the villages. On the contrary in leased-in land about 28% of the sample farmers had goat, about 36% of them maintained buffaloes, about 13% of them keep up sheep and about 23% of them had cattle.

The study supplementary revealed that in owner cultivated land and leased-in land 57% and 62% of the respondents engaged in agriculture as a prime occupation, 34 % and 32% of the farmers were committed in agriculture and allied sector as their occupation and while the landless are almost insignificant (9% and 6%).

The study reveals that in owner cultivated land and leased-in land a considerable number of farmers that is 40 and 28 per cent of them, have less than 5 years of experience and 14 and 18 per cent have 5-10 years of experience. The rest i.e.19 per cent and 27 per cent in owner cultivated land have 10-15 and above 15 years of experience and in leased-in land 10 per cent and 44 per cent have 10-15 and above 15 years of experience respectively.

Input-Output structure per acre for the farmers of owner cultivated and leased-in land cultivation of paddy

Particulars	Owner cultivated land	Leased-in land	t- value
Human Labour (in man days)	35.41	37.23	3.501*
Bullock labour (in pairs)	6.03	5.13	1.422
Fertilizers (in kg)	258.21	286.11	3.9582*
Pesticides (in kg)	159.03	152.42	4.4001*
Mechanical power (in hours)	6.53	6.12	2.9732*
Irrigation (in hours)	183.22	202.01	2.903*
Seeds (in Rs.)	10.62	10.94	1.2722
Yield (in kg)	3501.32	3312.14	3.9614*
Sample size	90	90	

Source: Survey data.
* Indicates significance at 5 per cent level.

It is observed from the table that the yield per acre was 3501.32 kgs for owner cultivated and 3312.14 kgs for the farmers of leased-in land. This shows that there is a significant difference in the yield between the farmers of owner cultivated and leased-in land. The difference in yield works out to 189.18 kgs.

Apart from yield, the difference in the utilisation of other input variables like human labour, fertilizer, pesticides, mechanical power and irrigation is also found to be significant between the owner cultivated and the leased-in land in the study area. In the case of human labour, the amount of labour required is 35.41 man days for farmers of owner cultivated and 37.23 man days for farmers of leased-in lands. The farmers of owner cultivated farm applied 258.21 kgs. of fertilizers, whereas the leased-in lands used 286.11 kgs. of fertilizers. It is observed that there is a significant difference in hours used for irrigation purpose between the farmers of owner cultivated and leased-in lands. In the case of pesticides, the farmers of owner cultivated farms used the 159.03 kgs. while the farmers of leased-in lands used 152.42 kgs.

In the case of mechanical power, the farmers of owner cultivated farms used 6.53 hours while the farmers of leased-in lands used 6.12 hours.

With regard to the use of other variables like the bullock labour and seeds, the differences between the farmers of owner cultivated and leased-in land was not found to be significant.

Thus, it may be concluded from the above analysis that the farmers of owner cultivated farm are found to be better off in the use of inputs like fertilizer and irrigation and they are producing an output more than the farmers of leased-in land.

Yield constraints of production of paddy

Constraints	Owner cultivated land		Leased-in land	
	Mean Score	Rank	Mean Score	Rank
Harshness of disease and pest attacks	68.04	I	71.33	I
Water scarcity	61.11	II	57.32	II
Insufficient credit facilities	54.14	III	56.43	III
Non- availability of inputs (Seeds)	42.03	IV	49.01	IV
Weeds	34.11	V	38.21	V
Traditional Methods	26.24	VI	31.10	VI

Source: Computed from Survey data.

Garret's ranking technique was adopted to identify the main constraints to potential yield in the study area. It is inferred from the table that in the case of owner cultivated land, the harshness of disease and pest attacks was ranked first followed by water scarcity. Insufficient credit facilities were ranked third and non-availability of inputs (seeds) ranked fourth. Weeds and traditional methods were ranked fifth and sixth respectively.

With regard to leased-in land, harshness of diseases and pest attacks was cited to be the major constraint to attain the potential yield in the study area. The problem of water scarcity was considered to be the second factor affecting the accomplishment of maximum yield. Insufficient credit facilities were the next significant constraint affecting yield. Non-availability of inputs (seeds) and weeds were assigned following positions as yield constraints, followed by traditional methods.

CONCLUSION

Thus, it may be concluded that the farmers of owner cultivated farm are found to be better off in the use of inputs like fertilizer and irrigation and they are producing an output more than the farmers of leased-in land. This could be due to the improved supervision and more efficient farm management preferred by the owner cultivated effective holdings. This designated that apart from mechanization, efficient allocation of inputs; direct supervision and farm management are vital factors of economic feasibility and benefits of paddy cultivation in the study area. Thus, it is concluded from the analysis that owner cultivated farm are economically more feasible and benefited more than leased-in land irrespective of the size of farms in the study area.

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