An Analysis Study of Paddy Cultivation in Sivagangai District - A Case Study

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Abstract

Agricultural development is a precondition for the overall economic development of a country. India occupies sixth rank in the world in terms of agricultural development. India stands in the second rank in the production of rice next to china. The share of Indian agriculture is 2.4 percent in the world. Rapid growth in agriculture is essential not only to achieve self-reliance but also for the food security of the household. The agricultural sector through its product contribution, factor contribution, and market contribution might act as the leading sector for economic development. Economist Arthur Lewis thinks that agricultural surplus is used by the secondary and tertiary sectors for their expansion for maintaining food security and at the same time mobilizing a large agricultural surplus for the urban areas is much needed for agricultural development. This paper is mostly focussed on the Log- Linear Regression model of Cob Douglas type and it is adopted to estimate the vital factor which determines the yield. A Yield is for two farm size that is small and large farmers in the regression model, yield is considered as a dependent variable and input factor of the following analyses.

Keywords: Organic manure, Production, productivity, soil fertility, Small and large farmers, economic development.

Introduction

In developing countries, women are the most important producers of food by under taking most dairying time-consuming work in their process, but their contribution is not recognized. In India, rural women constitute about 80 percent of the women population. There is nearly 50 percent of the total rural population and thus numerically capable of playing a pivotal role in the rural economy. However, its disappointing to note that a demographic prospective women in general and rural women in particular displays a picture of educational backwardness poverty, deprivation of ill health and lack of opportunities for economic political and socio- development. A Share of employment in the unorganized sector as held by women could be traced in to nine major employment systems. They are Agriculture, Dairying, Animal, Husbandry, Fisheries, Socio and Agro-Forestry, Kadhi village industry, Handloom, Handicrafts, and Sericulture.

Ravi Kumar Sabharwal, chief agriculture officer, says that, direct seeding rice and system of rice intensification (SRI) were the methods of rice cultivation by which we can save the natural resource. And also he stated that the studies by different farm scientists showed that the SRI used up to 30-40 percent less water per hectare.

He is of the opinion that the SRI was an agro ecological method for increasing the productivity of rice by altering the way we manage the plants, soil and water. He also added that the purpose of the SRI was to enable small and marginal farmers with limited resources to increase their production and income without relying on external sources.

Paddy Production in The World

The following Table 1 furnishes details regarding area, production, and yield of rice in different countries of the world during the period from 2007-2008 to 2008-2009 and projection for the year 2009-2010.

Table 1 Area, Production and Yield of Rice in Different Countries

Country / Region	Area (Million hectares)			Production (Million metric tonnes)			Yield (Metric tonnes per hectare)		
	2007-2008	2008-2009	2009-2010	2007-2008	2008-2009	2009-2010	2007-2008	2008-2009	2009-2010
World	155.08	156.63	152.53	434.39	447.31	434.7	4.18	4.26	4.24
United States	1.11	1.20	1.26	6.34	6.52	7.0	8.09	7.68	7.84
Total foreign	153.96	155.43	151.27	428.04	440.79	427.7	4.15	4.23	4.22
China (East Asia)	28.92	29.24	29.68	130.22	134.33	137.0	6.43	6.56	6.59
Japan	1.67	1.63	1.61	7.93	8.03	7.6	6.51	6.78	6.50
Korea, South	0.95	0.94	0.93	4.41	4.84	4.9	6.28	6.99	7.17
Korea, North	0.60	0.59	0.59	1.53	1.86	1.7	3.94	4.89	4.47
India (South Asia)	43.77	44.00	38.80	96.69	99.15	84.5	3.31	3.38	3.27
Bangladesh	11.10	11.60	11.60	28.80	31.00	30.0	3.89	4.01	3.88
Pakistan	2.55	2.91	2.80	5.70	6.70	6.2	3.35	3.45	3.32
Indonesia	11.90	12.17	12.00	37.00	38.30	37.0	4.82	4.88	4.78
Vietnam	7.41	7.32	7.33	24.38	24.39	24.3	4.98	5.05	5.02
Thailand	10.83	10.80	10.90	19.80	19.85	20.5	2.77	2.78	2.85
Burma	7.09	6.70	7.00	10.73	10.15	10.7	2.61	2.61	2.64
Philippines	4.35	4.53	4.45	10.48	10.75	10.3	3.83	3.77	3.67
Cambodia	2.57	2.61	2.65	4.24	4.52	4.6	2.62	2.75	2.77
Laos	0.82	0.85	0.88	1.73	1.80	1.9	3.51	3.53	3.62
Malaysia	0.65	0.66	0.67	1.48	1.53	1.5	3.49	3.57	3.62
Brazil (South America)	2.87	2.91	2.85	8.20	8.57	7.8	4.20	4.33	4.04
Peru	0.38	0.37	0.33	1.92	1.79	1.6	7.36	6.92	7.40
Nigeria (Sub-Saharan Africa)	2.20	2.30	2.40	3.00	3.20	3.4	2.27	2.32	2.36
Madagascar	1.35	1.36	1.38	2.30	2.62	2.6	2.67	3.01	3.05
Eu27	0.42	0.41	0.45	1.76	1.68	1.9	6.49	6.42	6.83
Italy	0.23	0.22	0.24	0.91	0.85	0.9	6.41	6.25	6.74
Spain	0.10	0.10	0.12	0.52	0.47	0.6	7.23	6.94	7.48
Egypt	0.67	0.67	0.67	4.39	4.39	4.3	10.07	10.04	10.04
Iron	0.63	0.58	0.63	2.18	1.50	2.0	5.24	3.95	4.85
Others	10.27	10.29	10.69	19.20	19.85	20.8	2.87	2.96	3.00

Source: http://www.fas/usda.com.

The major rice producing countries of the world are China, India, Japan, Bangladesh, Korea South, Korea North, Pakistan, Indonesia, Vietnam, Thailand, Burma, Philippines, Cambodia, Laos, Malaysia, Brazil, Peru, Nigeria, Madagascar, EU27, Italy, Spain, Egypt., Iran and others. Asia alone accounts for 90 to 92 percent of rice production. India's share of the world rice production is 22.1 percent whereas

China's share is 33.3 percent. It is evident from Table 1 that Egypt is the leading country in rice yield (10.04 metric tonnes); United States ranks second in yield (7.84 metric tonnes), and it is followed by Spain, Peru, and South Korea with 7.48, 7.40 and 7.17 metric tonnes respectively. India's rice yield comes about fifty percent of China's rice yield (that is 3.27 metric tonnes).

Paddy Production in India

The level of food grains production, procurement, availability, affordability and consumption are the convenient indicators of food security of a country. The secondary data regarding food grains production and rice production and their growth during 2000-2001 to 2008-2009 are presented in Table 2 given below.

Table 2: Food Grains And Rice Production In India

S. No.	Years	Food grains production	Growth rate in percentage	Rice production	Growth rate in percentage
1.	2000-2001	196.8	-	85.0	-
2.	2001-2002	212.9	8.18	93.3	9.76
3.	2002-2003	174.8	-17.89	71.8	-23.04
4.	2003-2004	213.2	21.96	88.5	23.23
5.	2004-2005	198.4	-6.94	83.1	-6.10
6.	2005-2006	208.6	5.14	91.8	10.46

Source: Yojana, August 2012.

The total food grains production has registered a high level over the years from 2000-2001 to 2009-2010. It has increased from 196.8 million tonnes to 233.8 million tonnes. The average annual growth rate in the food grains production has recorded 2.45 percent during the period. Rice production from the years 2000-2001 to 2009-2010 has recorded a positive trend from 85 million tonnes to 96 million tonnes. The average growth rate of rice has formed 2.09 percent during the period from 2000-2001 to 2009-2010.

Rice contributes nearly 44 percent of the total food grains production. The rice area increased from 36.46 million hectares in 1964-65 to 43.66 million hectares in 2005-2006, production from 39.31 million tonnes in 1964-65 to 91.79 million tonnes in 2005-2006. The world productivity increased from 1078 kg/sec to 2102 kg/sec during the same period. India has the largest area of 43.66 million hectares under which 52.6 percent is irrigated and rice is grown in all States and Union Territories of the country.

The annual compound growth rate of rice production area is 0.68 percent, production is 2.63 per cent and productivity is 1.94 percent during 1950-2005, which shows, that there is a significant change in the growth of various parameters over past decades.

The Green Revolution of the 1960s initiated a gradual transformation of the traditional household agriculture into modern and scientific agriculture in several parts of India. The introduction of new technology in agriculture brought about an unprecedented increase in area, production and yield of major cereal crops like rice and wheat.

Paddy Production In Tamilnadu

Agriculture in Tamilnadu has shown significant changes. Hence, a study of the agricultural sector assumes importance for the design of policies to achieve development goals in the decades to come, viz., growth, equity, employment and environment protection all being essential components of sustainable development.

Table 3 shows that rice is one of the most important cereals of India with a production of 7537100 tonnes in 1999-2000 and 5188741tonnes in 2010-11, the yield on an area of 3481 in hectares in 1999-2000 and 2678 in hectares in 2010-11 respectively.

Table 3: Area, Production, and Yield from 1999-2000 to 2010-11 in Tamilnadu

S.No	Year	Tamil Nadu		
		Area in Hectares	Production in Tonnes	Yield in Kg/ Hectares
1.	1999-2000	2163558	7537100	3481
2.	2000-2001	2080010	7366320	3541
3.	2001-2002	2059678	6583630	3196
4.	2002-2003	1516537	3577108	2359
5.	2003-2004	1396651	3222776	2308
6.	2004-2005	1872822	5061622	2703
7.	2005-2006	2050455	5269433	2541
8.	2006-2007	1931397	6610607	3423
9.	2007-2008	1789170	5039954	2817
10.	2008-2009	1755589	5369415	2715
11.	2009-2010	1712529	5215897	2548
12.	2010-2011	1699871	5188741	2678

Source: Ministry of Agriculture

Paddy Production in Sivagangai District

Table 4 furnishes details regarding the area, production and yield of paddy in Sivgangai District during the period from 1999-2000 to 2010-11.

Table 4: Area, Production and Yield From 1999-2000 To 2010-11 In Sivagangai District

S.No	Year	Sivagangai		
		Area in Hectares	Production in Tonnes	Yield in Kg/her
1.	1999-2000	82325	399054	4434
2.	2000-2001	82846	325000	4225
3.	2001-2002	68131	271590	3986
4.	2002-2003	46032	460916	3351
5.	2003-2004	23934	650242	2717
6.	2004-2005	60368	196583	3256
7.	2005-2006	70996	234492	3303
8.	2006-2007	66430	224686	3388
9.	2007-2008	61864	214880	3473
10.	2008-2009	60589	205897	3359
11.	2009-2010	60012	201589	3056
12.	2010-2011	63125	215897	3156

Source: Various Seasonal Crop Reports Tamilnadu, 2012.

Table 4 present the area, production and yield of paddy for Sivagangai District. A picture of cultivated areas for Sivagangai District shows a declining trend during 1999-2000 and 2010-11. Production and yield of paddy also recorded a declining trend for Sivagangai District between the period 1999-2000 and 2010-11.

An Objective of the Study

To study the Determination of Yield and to analyse the Yield Constraints

Sample Design

Selection of Sample

This analysis is based on the primary data collected

by the researcher. The questionnaire method was adopted for the data collection. The sample was stratified into small and large farmers based on the size of holding. The land holding of the farmers was divided into less than five acres and more than five acres. The first group is known as small farmers and the latter is large farmers. The total number of the paddy cultivation farmer is 1056 met all farmers, its difficult the out of 110 farmers are selected by simple random sampling method.

Collection of Data

The present study is based on both primary and secondary data. The primary data was collected with help of a well- designed interview schedule from farmers. The secondary data was collected from statistical office. The required information was elucidated from the farmers by administering a well - structured questionnaire. The respondents were contacted in person.

Analysis of Paddy Cultivation

Determination of Yield

The Log Linear Regression model of Cob Douglas type is adopted to estimate the important factor determines the yield, yields for two farm size Small and Large farmers. In the regression model, yield is considered as a dependent variable and input factor namely,1) Human labour per acre in Rs.,2) Seeds per acre in Rs.,3) Organic manure in Rs.,4) Fertilizer per acre in Rs.,5) Pesticide per acre in Rs.,6) Interest on working capital per acre in Rs., are included as independent variables. The following form of multiple linear Regression model is fitted for the study of determinations yield

$$\text{Log } Y=\beta 0+\beta 1\log X1+\beta 2\log X2+\beta 3\log X2+\beta 4\log X4+\beta 5\log X5+\beta 6\log X6+U$$

Where,

Y =Yield per acre in Rs.

X1 = Human labour per acre in Rs,

X2 = Seeds per acre in Rs.

X3 = Organic manure in Rs,

X4 = Fertilizer per acre in Rs.

X5 = Pesticide per acre in Rs.

X6 = Interest on working capital per acre in Rs.

U = Disturbance term with N (O, σ2).

The above equation model is estimated by the principle of least squares method.

Farm-Wise Analysis

A perusal of Table 1.5 indicates the estimate linear Regression analysis for small, large and total farmers of paddy cultivation in koothani village. Regression Co-Efficient results for small, large and total farmers in koothani village in the following table.

Table 5: Regression Results For Small, Large and Total Farmers in Koothani Village

Variable	Small Farmers	Large Farmers	Total Farmers
Intercept	1.3266	8.2406	1.3934
LogX1	o.4591* (2.916)	0.2144 (1.796)	0.4295* (4.264)
LogX2	0.0996 (0.988)	-0.2048 (-0.322)	0.0984 (1.745)
LogX3	0.4415* (2.736)	0.1112 (1.208)	0.2232* (2.474)
LogX4	0.1543 (1.076)	0.2341* (2.604)	0.1613* (1.927)
LogX5	0.0421 (0.433)	-0.0559 (-0.673)	0.0920 (1.672)
LogX6	0.1047 (0.496)	0.3607* (1.977)	0.0960 (1.641)
R2	0.2840	0.1994	0.6383
F-Value	4.9012	3.0347	33.0706
Number of observation	60	50	110

Note: Figures in parentheses represents‘t’ values.

*Indicates significant at 5 percent Level.

In the case of total farmers all the given, independent variables have a positive impact on yield and it explains about 63.8 percent of the variation of yield. The Human labours, Organic manure and fertilizer are significantly related to the dependent variables. The overall Regression model emerged statistically significant at five percent level (F-value 33.07).

Yield Constraints

In order to find out the major yield constraints to attain potential yield farm level, Garrett's ranking technique is used for this analysis. The sample farmers are requested to analyse the major constraints confronted by them in realising potential yield at farm as per priority.

$$\text{Percent position} = \frac{100(Rij-0.5)}{NJ}$$

Where,

Rij= Rank given by the j-Farmers, i-Variables.

NJ= Number of variables ranked by the j-Farmers

Agro-Biological Problems or Bi-Physical Constraints

The Researcher has been informed by the farmers who have identified five major Agro-Biological problems in paddy cultivation and ranks were worked out and shown in Table1.6.

Table 6: Agro-Biological Problems

S.No	Key Factors	Total Score	Mean Score	Rank	Number of Respondents	Total Number of Respondents
1.	Low level of soil fertility	6948	72.4	2	96	110
2.	Severity of rains	8092	73.5	1	110	110
3.	Lack of natural farming	4487	60.6	4	74	110
4.	Severity of pesticides	5200	65.0	3	80	110
5.	Severity of Disease	2024	32.1	5	63	110

Source: Survey Data

Inference

The Severity of rain is identified as the most important agro-biological factor affecting the paddy cultivation. A Second major problem is low level of soil fertility. Those affecting soil fertility not only depends on low level of rain fall, soil erosion, and severity of pesticides it will affect the crop yields. Since, severity of pest is ranked as the major problem; the natural farming is not possible, so lack of natural farming is ranked as the fourth important problem. The very last problem encountered is severity of a disease.

Conclusion

The study reveals the small farmers are not economically efficient in paddy cultivation, besides there is a positive relationship between farm size and productivity. The technical operation holding increases in the production also. Thus economically large farmers are more efficient than the small farmers. In our discussion large farmers are economically benefitted.

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