



# AN ECONOMIC ANALYSIS ON THE CULTIVATION OF SORGHUM WRT DINDIGUL DISTRICT OF TAMIL NADU

C. Prabakar\* and Y. Shelton Peter

Department of Agricultural Economics, Faculty of Agriculture, Annamalai University, Annamalainagar.

## Abstract

The study was carried out with an overall objective of analysing the economics of sorghum production W.R.T. Dindigul district of Tamil Nadu. The specific objectives were to analyse the trend in area, production and productivity of sorghum in Tamil Nadu, to analyze the economics of sorghum cultivation in the study area and to analyse the problems faced by the farmers in production of sorghum and suggest suitable policy measures. Dindigul district formed the universe of the study. With regard to selection of block, Thoppampatti was purposively selected, since area wise, it occupied the first position among the various blocks of Dindigul district. The reference year for the study was the agriculture year 2018-19. The estimation of cost of cultivation revealed that cultivating Sorghum is a profitable venture. Since often sorghum is grown as a rainfed crop, monsoon failure has been perceived as the major constraint in production of sorghum. In recent years sorghum commands a better consumer preference and hence the Government extension agencies may take steps to promote and enhance the cultivation of sorghum. The sorghum crop can even be considered to get included under the Minimum guarantee price scheme.

**Key Words:** Economic analysis, Sorghum

## Introduction

Sorghum - a grain, forage or sugar crop, is one among the most efficient crops in conversion of solar energy and use of water. Sorghum is known as a high energy, drought-tolerant crop. Sorghum (*Sorghum bicolor*), is also called as great millet, Indian millet, milo, or durra. Sorghum is one of the most important cereal crops and in the supply of food energy, Sorghum is the fifth most important cereal crop in the world after rice, wheat, corn and barley. It is a main cereal food for over 750 million people living in semi- arid tropical region of Africa, Asia and Latin America (FAO 2015). The major varieties cultivated in Tamilnadu are CO 28, TNAU HYBRID CO 5, CO 5, BSR 1, CO 30, PAIYUR 2 APK 1 and PAIYUR 1. The market arrivals of sorghum start increasing from April and arrivals are at peak during August to October period. According to trade sources, during the months of August to October, supply exceeds demand in market which leads to decline in prices.

Lack of organized markets, post-harvest losses, dependence on traders for marketing their panicles, inadequate transport facilities at reasonable cost,

\***Author for correspondence** : E-mail : prabakaragri@yahoo.co.in

increased dependence on internal demand etc., are some of the problems faced by the growers that necessitated this study. With all these limitations, the growers have to cultivate and earn profit. In this context, the present study has been undertaken to examine the economics of the production of sorghum in Dindigul district.

## Objectives of the Study

The general objective of this research work is to study the economics of sorghum cultivation. The specific objectives are:

- To analyze the trend in area, production and productivity of sorghum in Tamil Nadu.
- To analyze the economics of sorghum cultivation in the study area.

To analyse the problems faced by the farmers in production of sorghum and suggest suitable policy measures.

## Materials and Methods

### Sampling Design

A multi-stage stratified random sampling procedure was adopted for the study. The Dindigul district formed

the universe of the study. The blocks in the district formed the first stage unit of sampling. The villages in the selected block formed the second stage and the sorghum growers in the selected villages formed the third and the ultimate unit of the sampling.

Sorghum crop is grown in all the districts of Tamil Nadu. Dindigul district was purposively selected for the study since it occupied the first position in sorghum production. There are 14 blocks in Dindigul district namely Dindigul, Shanarpatti, Athoor, Reddiarchatram, Natham, Nilakottai, Bathlakundu, Kodaikkannal, Palani, Oddanchatram, Thoppampatti, Vedasandur, Guzilitamparai, Vadamadurai.

After arranging the blocks in the descending order of magnitude based on the area under sorghum, the block namely Thoppampatti, which occupied the first position was selected and it formed the first stage unit of sampling.

Thoppampatti block consists of 38 Panchayat Villages. Following the same procedure as like in the selection of sample block, the first five villages Kanthappagoundanvalasu, Alavalasu, Theethagoudenvalasu, Vaagarai, Thiruvandapuram were selected for the present study.

The lists of sorghum growers from the five selected villages were collected from the records of the Village Administrative Office. From this list, 20 growers from each village were selected at random and totally 100 sorghum growers were selected from the five selected villages. The sampling distribution of farmers in the selected villages is given in table 1. Taking into consideration the purpose and data requirement of the study, the period of study was restricted to agriculture year 2018-2019.

### Primary Data

The primary data collection was carried out through personal interview using well-structured and pre-tested interview schedules. Two separate sets of interview schedules were prepared to collect details separately from the farmers and market intermediaries. The interview schedule for the study was designed considering physical,

cultural and socio-economic environment of farming community in the study area and the schedule was pre-tested and finalized. The interview schedule for farmers covered aspects such as general farm and household characteristics, cost of cultivation of sorghum and the problems faced in sorghum production.

### Tools of Analysis

#### Cost of Cultivation

Raju and Rao (1990) categorized and estimated different costs as involved in cultivation of an annual crop as Cost A<sub>1</sub>, Cost A<sub>2</sub>, Cost B and Cost C.

**Cost A1:** It consists of all actual expenses in cash and kind incurred in production by the owner operator. It includes expenses incurred on human labour, bullock labour, machine labour, manures and fertilizers, plant protection chemicals, irrigation charges, interest on working capital, depreciation on capital assets and land tax.

**Cost A2:** Cost A1 plus rent paid for leased in land.

**Cost B:** Cost A<sub>2</sub> plus imputed rental value of owned land plus interest on fixed capital.

**Cost C:** Cost B plus imputed value of family labour. Cost C is the total cost of cultivation or gross cost

**Net income:** Gross return minus Cost C

#### Method of Measurement of Variables

**Land:** To include the share of land in the total cost of cultivation, the imputed rental value of owned land in the respective villages were considered. For leased-in-land, the actual rent paid was taken into account.

**Human Labour:** The human labour was measured in terms of Manday equivalents. The permanent labour, hired labour and family labour were treated alike and converted into common physical units in terms of Manday equivalents of eight hours.

**Casual Labour Wages:** The wages paid to the casual labourers were calculated on the basis of the actual cash and value of kind paid to him per day.

**Permanent Labour Wages:** The wages of permanent labourers were worked out by dividing the total payment made to them in cash and kind during the year by the actual number of days worked in the farm during the same period.

**Family Labour Wages:** The wages for family labour were computed on the basis of the wage payment made to the permanent labours.

**Bullock Labour:** Owned and hired labour was measured in per hour units and was charged at the

**Table 1:** The Sampling Distribution of Farmers in the Selected Villages.

S.No	Village	Number of Farmers
1.	Kanthappagoundanvalasu	20
2.	Alavalasu	20
3.	Theethagoudenvalasu	20
4.	Vaagarai	20
5.	Thiruvandapuram	20
	Total	100

prevailing wage rates in the respective villages.

### Seeds, Manures, Fertilizers and Pesticides:

Seeds, manures, fertilizers and pesticides were valued at actual prices paid for them in the market including the incidentals. The ongoing market rate was imputed for farm produced manure.

### Cost of Production per Unit

Cost of production per tonne of sorghum was arrived at by dividing the net cost of cultivation per acre by the total per acre yield of sorghum in tonnes.

$$\text{Cost of Production} = \frac{\text{Cost of cultivation} - \text{Value of by product}}{\text{Yield / acre}}$$

### Returns per Rupee

Returns per rupee was obtained by dividing the gross returns by cost of cultivation per acre.

$$\text{Returns per Rupee} = \frac{\text{Gross Returns}}{\text{Cost of Cultivation}}$$

### Garrett Ranking Technique

The respondents were asked to rank their problems in sorghum production. In Garrett's ranking technique, these ranks were converted into percent position by using the formula.

$$\text{Percent position} = [100 \times (\text{Rij} - 0.5) / \text{Nj}]$$

Where,

Rij = Ranking given to the i<sup>th</sup> attribute by the f<sup>i</sup> individual

Nj = Number of attributes ranked by the j<sup>th</sup> individual.

By referring to the Garrett's table, the percent positions estimated were converted into scores. Thus, for each factor the scores of various respondents were added and the mean values were estimated. The mean values thus obtained for each of the attributes were arranged in descending order. The attributes with the highest mean value was considered as the most important one and the others followed in that order.

## Results and Discussion

### Area, Production and Productivity of Sorghum in Tamil Nadu

The total area, production and productivity of sorghum in Tamil Nadu during the period of 2006 to 2017 is presented in table 2. It could be seen from the table 2 that area and production of sorghum in Tamilnadu varies widely between years. However the estimated values of compound growth rates of area, production and productivity of sorghum for the years between 2006 - 07

**Table 2:** Area, Production and Productivity of Sorghum in Tamil Nadu(2006 to 2017).

S. No.	Year	Area (in ha)	Production (in tonnes)	Productivity (tonnes/ ha)
1.	2006-07	294376	293940	0.99
2.	2007-08	283526	247836	0.87
3.	2008-09	258876	213436	0.82
4.	2009-10	238476	221960	0.93
5.	2010-11	243465	246981	1.01
6.	2011-12	197696	252522	1.27
7.	2012-13	210893	174966	0.82
8.	2013-14	347131	513313	1.47
9.	2014-15	415103	868940	2.09
10.	2015-16	339200	468000	1.37
11.	2016-17	268391	153856	0.57
	CGR	2.09	4.50	2.36

Source: Office of the Assistance Director of Statistics, Dindigul .

and 2016 – 17 reveal that there is a reasonable increase with them over years which is appreciable. The Compound growth rate for sorghum area was 2.09 and the same for production and productivity were 4.50 and 2.36 respectively.

### Cost of Cultivation of Sorghum

The cost of cultivation was worked out based on Raju and Rao concept and the details on cost and returns are furnished in the table 3. For the land preparation, 2 men labours and 3 women labours were used at the wage rate of Rs 450 and Rs 150 per labour which was estimated as Rs 1350 per acre. In the preparatory stage, tractor was used for ploughing and the hiring charges for one hour ploughing for one acre was Rs 750.

Farm Yard Manure was the only organic manure used for production of sorghum. 2 tonnes per acre at the cost of Rs 800 per tonne was applied, which was estimated as Rs 1600 per acre. For the application of organic manures 1 men labour was used with the wage rate of Rs 450. Urea, Single Super Phosphate and Potash were the main fertilizers used for production of sorghum in the ratio of 32:16:16 kg per acre, which cost Rs 8 per kg, Rs 12 per kg and Rs 16 per kg respectively and it accounted to Rs 256 Rs 192 and Rs 256 per acre. For the application of fertilizers, 1 men labour was used at the rate of Rs 350.

Atrazine and Mancozeb, were the two plant protection chemicals used for sorghum production. It was sprayed only once during the growing period of sorghum which costs Rs. 160 and Rs 450 per acre respectively. One men labour was used for spraying the plant protection chemical with the wage rate of Rs 350. The crop was

irrigated 3 times and for every irrigation one man labour was used at the wage rate of Rs 350 per labour. Three women labours were used for weeding at the rate of Rs 150 per labour, which was estimated as Rs 450.

Two women labours were used for harvesting at the rate of Rs 150 per labour and threshing machine was used for threshing the sorghum after harvesting at the rate of Rs 900 per acre. The cost that was considered for other miscellaneous expense was Rs 400 per acre.

Interest on working capital was estimated at the rate of 7 percent. It worked out to Rs. 618.10. Depreciation on fixed capital was Rs 510. Since sorghum cultivation was done in own land by all respondents, rent paid for leased-in land was excluded. Rental value of owned land was estimated as one third of the value of output. The average family labour wage was estimated as Rs 600 per acre. Summation of Cost B and family labour wages

**Table 3:** Cost of Cultivation of Sorghum (Rs/acre)

Input	Quantity with Units	Cost (Rs)
Land preparation		
a) Human labour	2 Men lab x Rs 450	900
	3 women Lab x Rs 150	450
b) Tractor ploughing	1 hr x Rs 750	750
Organic manures(FYM)	2 tonnes x Rs 800, 1men lab x 450	2050
Inorganic fertilizers	Rs 720, 1 men lab x 350	1070
Plant protection chemicals	Atrazine, Mancozeb, 1 spray x 1 men lab x 350	960
Irrigation charge	3 times x 1 lab x Rs 350	1050
Weeding charge	1 time x 3 w.lab x Rs 150	450
Threshing & harvesting	1hr x Rs 900, 2 women lab x Rs 150	1200
Other miscellaneous expenses		400
Sub total		8830
Interest on working capital @7%		618.10
Depreciation of fixed capital		510
Cost A1		9958.1
Rent paid for leased in land		Nil
Cost A2		9958.1
Rental value of owned land	1/3 value of output	3319.36
Interest on fixed capital		5000
Cost B		18277.46
Family labour wages		600
Cost C		18877.46
Yield (kg)		650
Output (Rs/kg)		40
Gross return		26000
Net return	Gross income – Cost C	7122.54
Returns per rupee	Gross income/ Cost C	1.37
Cost of Production(Rs/ kg)	Cost C/Yield	29.04

**Table 4:** Problems Encountered by Farmers in Production of Sorghum.

S. No.	Problems	Mean Score	Rank
1	Price fluctuation	66.45	I
2.	Irregular monsoon	62.62	II
3.	Labour Scarcity	55.73	III
4.	High wage rate	50.76	IV
5.	Non availability of bank credit	48.43	V
6.	Lack of availability of quality seeds	42.65	VI
7.	High Fertilizer quality	40.65	VII
8.	Difficulty in transportation	36.08	VIII

was considered as Cost C and it was Rs 18877.46 per acre. The average estimated yield of sorghum was 650 kg per acre, where as average sale price was Rs 40 per kg. The gross return was estimated as Rs. 26000 per acre, where as net return of farmer was Rs 7122.54 per acre. The cost of production of 1kg of sorghum was Rs

29.04 and the Returns per rupee worked out to 1.37.

#### Problems Encountered by Farmers in Production of Sorghum

The Garret's ranking technique was used to rank the factors that affected the production of sorghum in the study area. The major factors that affected the cultivation were identified and the growers were asked to rank the eight factors in the order of their importance. The ranks assigned to the eight factors are presented in table 4.

It could be observed from Table 4 that the price fluctuation was the major problem faced by the growers with a mean score of 66.45. The irregular monsoon is the second important problem with mean score of 62.62. The labour scarcity was the third important problem with a mean score of 55.73. The fourth important problem faced by farmers was the high wage rate. The other problems listed were, non - availability of bank credit, lack of availability of quality seeds, high fertilizer cost and difficulty in transportation.

#### Policy Suggestion

The estimation of cost of cultivation revealed that cultivating Sorghum is a profitable venture. Also, since in recent years sorghum commands a better consumer preference, the Government extension agencies may take steps to promote and enhance the cultivation of sorghum.

Price fluctuation is perceived as the foremost problem in sorghum production. Government should take needed steps for stabilizing the price by a permanent regulatory mechanism. Sorghum crop could even be considered, to get included under the guarantee price scheme, since in recent years sorghum commands a better consumer preference.

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