

**A REVIEW :**

# Economic analysis of ratoon management in sugarcane and its assessment on productivity in Vellore district of Tamil Nadu

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**KEY WORDS :**

Ratoon management,  
Sugarcane,  
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## **BACKGROUND AND OBJECTIVES**

Sugarcane is the second most important industrial crop in the country occupying about 5 million hectares in area. India is the second largest producer of sugar after Brazil. About 4 million growers are involved in the cultivation of sugarcane. Sugar industry contributes significantly to the rural economy as the sugar mills are located in the rural areas and provide large scale employment to rural population. The various by products of sugar industry also contribute to the economic growth by promoting a number of subsidiary industries. Sugarcane is emerging as a multiproduct crop used as a basic raw material for the production of sugar, ethanol, electricity, paper and boards, besides a host of ancillary products. Molasses is the cheapest feedstock for the distilleries and the large part of the ethanol requirements is met by the distilleries in the country. The ethanol requirement of the country is going up steadily and the potential of ethanol as a

bio-fuel is seriously debated. Generation of electricity using bagasse has become a standard option for the sugar industry. The use of bagasse as a substitute raw material for wood pulp in paper industry is vital for economic and environmental sustainability.

## **Demand for Sugar and allied products :**

Sugarcane is the basic raw material for sugar production, while molasses and bagasse which are the by-products of sugar industry form the feed stock for Ethanol production and cogeneration, respectively. The demand for sugar, ethanol and electricity is increasing due to growing population and rising per capita income. The projected requirement of sugar in 2030 is 36 million tonnes, which is about 50% higher than the present production. To achieve this target, the sugarcane production should be about 500 million tonnes from the current 350 million tonnes for which the production has to be increased by 7-8 million tonnes annually. The increased production has

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to be achieved from the existing cane area through improved productivity and sugar recovery since further expansion in cane area is not feasible. The demand for ecofriendly commodities (such as ethanol, renewable green power through co-generation) is expected to grow by more than 100% by 2030. Though 5% ethanol blending with petrol was made mandatory from 2003 in 9 states and 4 union territories, the target could not be achieved due to limited availability of bio ethanol, even necessitating imports. National Policy on Bio-fuel proposes to scale up the blending to 20% by 2017, which may necessitate significant increase in domestic ethanol production. At present there are about 300 distilleries operating in the country which have a total installed capacity of 4000 million litres of alcohol in a year. However, the highest production ever achieved has been only 2700 million liters in the year 2006-07. In India sugarcane molasses is the only feedstock for production of ethanol, except for a small number of distilleries producing potable liquors from grains and other feed stocks and thereby ethanol production is totally dependent on sugar production. The estimated ethanol requirement for fuel, potable and industrial use would be 5700 million liters in 2030 which means that the production should be more than doubled to meet the projected requirements. Very few economic research studies have been attempted, so far to study the economic aspects of Sugar cane in Vellore district. In the light of this fact, an enquiry in to the economic aspects of sugarcane production was taken up in Vellore district of Tamil Nadu. The specific objectives of the study are: i) to estimate the costs and returns for sugarcane cultivation, ii) to study the socio economics features of the selected area and iii) to study the production constraints in sugarcane cultivation.

#### **Description of the study area :**

Knowledge on basic features of the study area is necessary to understand the problems, collating the results and suggesting relevant policy options for the study area. A brief description of factors relevant to the study such as demographic features, agro-climatic conditions, soil types, land use pattern, size of operational holdings, sources of irrigation, livestock inventory and other infrastructure facilities of the Vellore district are described.

Gupta and George (1974) worked out the economic viability of Santra gardens in Nagpur using pay back period, net present value, internal rate of returns of gardens and benefit cost ratio. Excluding land cost, investment in the project had a pay back period of seven to nine years and yielded an internal rate of return of 29.3 to 45.9 per cent depending on the size of grove. The net present value and benefit cost ratio even at high discount rate of 12 per cent varied from Rs.4,260 to Rs. 7,910 per acre and 1.85 to 2.64, respectively according to size of grove.

Vandana *et al.* (1996) estimated the gross returns as Rs. 42,009.25 and the net income as Rs. 3,379.07 per hectare while farm efficiency measures like farm business, income, family labour income and farm investment income were Rs.23,682.06, Rs.4,224.38 and Rs. 17,838.71 per hectare, respectively in Banana.

Cembalo (2002) stated that managing perennial crop farms involves long run objectives like maximizing profits as well as short run objectives like minimizing seasonal labour employed. Perennial crop management, moreover, involves making decisions on technical and long run financial issues because of its stream of returns and costs over more than a decade.

## **RESOURCES AND METHODS**

The Vellore district of Tamil Nadu was purposively selected for the study because of its high Sugar cane production. In Vellore district, all the taluks under Ratoon sugar cane were arranged in the descending order of the area under sugarcane and the top two taluks *viz.*, Walajah and Arcot were selected purposively for the study. The villages in the selected taluks were arranged in the descending order of the area under sugar cane. The first two villages with largest area under sugar cane *viz.*, Kadaperi and Sumaithangi in Walajah taluk and Kaniyanur and Kavanur in Arcot taluk were purposively selected for the study. All the Ratoon sugar cane growers in the selected four villages were listed separately. To have a clear idea about the cost of cultivation and management of the orchard, the forty farmers were randomly selected for the study.

## **OBSERVATIONS AND ANALYSIS**

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

**Cost and returns of sugarcane :**

The cost of cultivation of sugarcane *i.e.* the total cost incurred on various items for field preparation to harvest was worked out and represented in the Table 1.

**Table 1 : Maintenance cost of sugarcane cultivation (Rs./ha)**

Sr. No.	Particulars	Amount spent
1.	Land preparation	8450.90 (13.01)
2.	Planting	4201.52 (6.47)
3.	Manuring	8150.56 (12.55)
4.	Fertilization	13435.3 (20.69)
5.	Intercultivation	4435.6 (6.83)
6.	Plant production	9152.13 (14.09)
7.	Irrigation	5860.45 (9.02)
8.	Harvesting	11003.4 (16.94)
9.	Land revenue and cess	260 (0.40)
	Total	64949.80 (100.00)

**Land preparation :**

Land preparation is an important operation in establishing a sugarcane field. Plough was done with tractor. Total amount incurred in this operation was Rs. 8450.90 per hectare, which accounted for 13.01 of the total establishment cost.

**Planting :**

An amount of Rs. 4201.52 per hectare was incurred on planting material, which accounted for 6.47 per cent of the total cost.

**Manuring :**

Most of the farmers were using farm yard manure for sugar cane crop. The cost incurred on manuring was Rs. 8150.56 per hectare, which accounted to 12.55 per cent to the total cost.

**Fertilization :**

The cost incurred on fertilizers and its application was Rs. 13435.3 hectare which accounted for 20.69 per cent of the total cost.

**Intercultivation :**

Intercultivation was done to improve the soil condition and also to conserve soil moisture. The cost incurred on intercultivation was Rs. 4435.6 per hectare, which accounted for 6.83 per cent of total cost.

**Irrigation :**

The newly planted saplings are to be watered

regularly during the first few months after planting, depending on the condition of the soil. The cost incurred on irrigation was Rs. 5860.45 per hectare which was worked out to be 9.02 per cent to the total cost.

**Plant protection :**

The cost incurred on planted protection was Rs. 9152.13 per hectare which accounted for 14.09 per cent of the total cost. While calculating the production of sugar cane the maintenance cost incurred after first fruiting was included in direct cost. sugar cane can be maintained for three years by ratoon cropping and good economic returns can be expected. Sugar cane cultivators incurred Rs.11263.40 as maintenance costs in the first year which included harvesting cost of Rs. 11003.4 accounting for 97.69 per cent and land revenue and cess of Rs.260 accounting for 2.31 per cent.

**Total cost of cultivation of sugar cane under Ratoon:**

On examination of the Table 2. it is evident that the total variable costs per hectare included human labour of Rs.32533.85 and bullock labour of Rs.2275.40 and machine labour of Rs.1498.97 in addition to other input costs like planting material of Rs.3498.77, FYM of Rs.1500, fertilizers of Rs.14479.85 plant protection chemicals of Rs.8000.56 fuel of Rs.1505.71 and interest on working capital of Rs.8591.00.

It is inferred from the particulars furnished in the table that sum of all the years costs incurred on the sample farmers were Rs. 25835.30 out of which rental value of owned land gets major share of Rs.13377.00 (9.83%) followed by annuity value of Rs.7763.00 (5.71%), interest on fixed capital of Rs.2895 (2.13%) and land revenue and of cess Rs.300 (0.22%).

**Cost of cultivation of sugar cane according to cost concepts :**

The cost of cultivation of a crop is not uniquely defined on account of the fact that various components of costs differs in their in their economic significance and therefore, it becomes necessary to work out aggregate costs differing in composition

Gross returns obtained by selling sugar cane was found to be Rs.277150.00 and net income was Rs.148511.40 per hectare over a period its life time.

Farm efficiency measures like farm business income, family labour income and farm investment income were worked out to be Rs. 14392.88, and Rs. 137648.88 and

**Table 2 : Operation wise cost structure of sugarcane (Rs./ha)**

Particulars	Rs.
<b>Variable cost</b>	
Human Labour	32533.85 (23.92)
Owned	6586.94 (4.84)
Hired	25946.91 (19.08)
a) Land Preparation	5437.80 (4.00)
Owned	960.00 (0.71)
Hired	4477.80 (3.29)
b) Planting	607.26 (0.45)
Owned	104.64 (0.08)
Hired	502.62 (0.37)
c) Manuring	1291.66 (0.95)
Owned	500.10 (0.37)
Hired	791.56 (0.58)
d) Fertilization	2512.26 (1.85)
Owned	860.05 (0.63)
Hired	1652.21 (1.21)
e) Plant protection	3005.87 (2.21)
Owned	1008.60 (0.74)
Hired	1997.27 (1.47)
f) Irrigation	6084.80 (4.47)
Owned	1510.62 (1.11)
Hired	4574.18 (3.36)
g) Intercultivation	2692.83 (1.98)
Owned	500.62 (0.37)
Hired	2192.21 (1.61)
h) Harvesting	10962.57 (8.06)
Owned	1300.00 (0.96)
Hired	9662.57 (7.10)
<b>Bullock labour</b>	2275.40 (1.67)
Owned	600.00 (0.44)
Hired	1675.40 (1.23)
a) Land Preparation	1489.97 (1.10)
Owned	392.50 (0.29)
Hired	1097.47 (0.81)
b) Intercultivation	730.57 (0.54)
Owned	150.23 (0.11)
Hired	580.34 (0.43)
<b>Machine labour</b>	1498.93 (1.10)
Owned	250.63 (0.18)
Hired	1248.30 (0.92)
Owned	852.86 (0.63)
Hired	215.36 (0.16)
Intercultivation	631.16 (0.46)
Owned	20.36 (0.01)
Hired	610.80 (0.45)
<b>Input material</b>	37575.89 (27.63)
1. Seed	3498.77 (2.57)
2. FYM	1500.00 (1.10)
3. Fertiliser	14479.85 (10.65)
4. Plant protection chemicals	8000.56 (5.88)
5. Fuel	1505.71 (1.11)
<b>Interest on working capital</b>	8591.00 (6.32)
- Land revenue and Cess	300.05 (0.22)
- Depreciation	1500.25 (1.10)
- Rental value of owned land	13377.00 (9.83)
- Interest on fixed capital	2895.00 (2.13)
- Annuity value	7763.00 (5.71)
Sub Total (B)	25835.30 (18.99)
<b>Total cost (A+B)</b>	<b>136018.98 (100.00)</b>

**Table 3 : Income measures for sugarcane cultivation (Rs./ha)**

Sr. No.	Particulars	Value
1.	Gross income	277150.00
2.	Net income	148511.40
3.	Farm business income	14392.88
4.	Family labour income	137648.88
5.	Farm investment income	14357.94

Rs.14375.94.

### Summary and conclusions :

Vellore district was purposively chosen for the study. In this district two taluks were selected and from each taluk two villages were selected based on the highest area under sugar cane cultivation. Then a total of 40 farmers were selected from four villages with ten from each village. Thus, one district, two taluks, four villages and 10 farmers from each village, totaling to 40 farmers formed the sample for the study. The constraint data were collected from the sugar cane growers and the required data on costs and returns of sugar cane production were collected with a well structure and pre-tested schedule. Tabular and functional analyses were used and interpreted for arriving at valid conclusions.

### Establishment costs and maintenance costs :

The costs were classified in to establishment costs and maintenance costs. the total variable costs per hectare included human labour of Rs.32533.85 and bullock labour of Rs.2275.40 and machine labour of Rs.1498.97 in addition to other input costs like planting material of Rs.3498.77, FYM of Rs.1500, fertilizers of Rs.14479.85 plant protection chemicals of Rs.8000.56 fuel of Rs.1505.71 and interest on working capital of Rs.8591.00.

The total cost of production of sugar cane per hectare was worked out as Rs.136018.98 of which 18.99 per cent constituted the fixed costs. The annuity value was Rs.7763.00 per hectare which accounted to 5.71 per cent of total cost of production. Cost A1/A2, Cost B1, Cost B2, Cost C1, Cost C2 and C3 were worked out to be Rs.76594.6, Rs.82395.35, Rs.106234.8, Rs.82051.00, Rs.136459.90. and Rs.128638.60 per hectare, respectively.

### Returns :

Gross returns obtained by selling sugar cane was

found to be Rs.277150.00 and net income was Rs.148511.40 per hectare over a period its life time.

Farm efficiency measures like farm business income, family labour income and farm investment income were worked out to be Rs. 14392.88, and Rs. 137648.88 and Rs.14375.94.

### Constraints for cane yield and productivity :

#### *Production constraints :*

Sugarcane cultivation in the country falls under 5 agro climatic region viz, Peninsular, East Coast, North West, North Central and North East Zones. The productivity in each zone is affected a varied number of factors. Yield in sub-tropical india is affected by the prolonged winter, which reduces the effective growing period. Drought, water logging, salinity and alkalinity affect cane production significantly in many states. Approximately 2.97 lakh ha of cane area is prone to drought, affecting the crop at one or other stage of growth. Drought can bring down the yields by 30-50% and in severe drought situations the loss could be as high as 70 per cent. Floods and water logging are serious problem in Eastern UP, Bihar, Orissa, Coastal Andhra and parts of Maharashtra. Approximately 2.13 lakh ha of sugarcane area is flood prone in different states. Water logging affects all stages of crop growth and can reduce germination, root establishment, tillering and growth resulting in reduced yield. Sugarcane is cultivated in about 7-8 lakh hectares under saline conditions. Though the crop is moderately tolerant to salinity, the losses are

significant. The following were the main identified areas for constraint in the study area.

- Land is the major constraints for cultivation sugarcane.
- Non availability of high yielding variety.
- Dearth of good quality seed.
- Improper water management.
- Uses of imbalanced fertilizer doses.
- Negligence in plant protection.
- Unremunerative Prices for sugar.
- Farmer organization is very crucial in promoting sugar cane as well as research in uses of the different plant parts and varieties. Also important is knowledge on the economic importance of the crop.

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