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An Economic Analysis on Production of Grapes in Theni District of Tamilnadu

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This study was mainly concentrated on grape production. The results of analysis would throw light on the extent of cost and returns of grape cultivation, constraints faced by farmers ranked using Garett's ranking technique. The cost and return of the grape farm per acre were analyzed and the average total cost was worked out to Rs.73,815.45 per acre and the average gross return was Rs 1,20,290 per acre.The result of the study indicates that grape cultivation is highly profitable and the benefit cost ratio was more than one (1.6). The major constraints faced by the sample farmers in the cultivation of grapes were pest attack followed by weeds, water shortage, credit availability and lack of input availability. The results would help the policy makers in formulating suitable programs and devising strategy for increasing production of grapes in Tamil Nadu.

Keywords: Economic analysis; Garett's ranking; grapes; production constraints and production cost.

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1. INTRODUCTION

Grapes are a popular fruit crop in India. After citrus and banana, grape is the third most extensively framed fruit. Large increases in vineyard conversion plantings have been spurred by global expansion in grape production and consumption for the fresh market and for quality wines. However, the changes in planted acreage and vineyard conversions are not well documented enough to allow for a forecast of future supply [1]. Among the major grape producing countries in the world, Spain has the largest area under cultivation which contributes 16.9 per cent followed by China and France which constitutes 10.8% and 3.8% respectively. In case of production point of view, China is the leading producer followed by Italy and USA (Indian Horticulture Database, 2018) [2].

1.1 Production Status of Grapes in India

India produced about 2.6 per cent (79,125,982 metric tonnes) of the total world production (FAOSTAT, 2019) [3]. Maharashtra (78.3 per cent) is the leading producer of grapes in India. Maharashtra and Karnataka produce around 95.7% of India's grapes. Among the major grape producing states in India, Maharashtra has the highest area under cultivation which contributes 105.5 ('000 Hectare) followed by Karnataka and Tamil Nadu which constitutes 26.6 ('000 Hectare) and 2.2 ('000 Hectare) respectively. Other notable grape-growing states are Karnataka, Tamil Nadu, Andhra Pradesh, and Punjab (Indian Horticulture Database, 2018). In India, grapes are frequently consumed as a fresh fruit. Raisins, wine, juice, juice concentrate, squash, drinks, jams, and marmalades were made from grapes [4].

1.2 Production Status of Grapes in Tamil Nadu

Grape was first planted in Tamil Nadu in 1832, although it was only recently identified as a high profitable crop. As a result, the crop is available in the market virtually all year [5]. Pachadraksha was the first variety to be grown in Tamil Nadu, and it quickly rose to the top because of its consistent yields year after year, adaptability to the region, and marketability. However, colourful cultivars, particularly Muscat, have gradually taken their place (Muscat Humberg). Coimbatore, Theni, Dharmapuri, Dindigul, and Thirunelveli were the district having highest concentration of fresh fruits in Tamilnadu [6]. Among the major grape producing districts in Tamil Nadu, Theni has the highest area under cultivation which contributes 1,697 hectares followed by Dindigul and Coimbatore which contributes 184 hectares and 60 hectares respectively. In Tamil Nadu, Theni district is the leading producer (17.2 tons) followed by Dindigul (13.6 tons) and Coimbatore (12.2 tons) (Indian Horticulture Database, 2018).

1.3 Production Status of Grapes in District

Muscat and Thomson seedless are commercially cultivated varieties in Theni district. Because of its swift growth and early maturity, the Muscat variety, also known as Paneer Drakshai, is one of the most popular grape variety. The climate and soil types of the Uthamapalayam, Cumbum, and Periakulam blocks are ideal for growing Muscat varieties, while the Chinamanur block is ideal for growing Thomson seedless varieties. The grapes grown in the Theni District are harvested twice a year. It is a feature that's not frequent in other temperate viticulture regions. Cumbum Valley, which includes blocks of Chinnamanur, Cumbum, and Uthamapalayam were Tamil Nadu's main grape-growing region [4]. As a result the crop is available in the market virtually all year [5].

The objective of this research is to estimate the cost and returns of grape cultivation and to identify the constraints faced by grape cultivators in production of grapes.

1.4 Research Gap

The preceding reviews reveal that, with the exception of grapes, the majority of studies on the production of various agricultural commodities are focused on a certain location or other agricultural items. In Theni district, there were few research on grape production and constraints. As a result, the current study was created to fill the void.

2. LITERATURE REVIEWS

Venkatraman [7], in his studies says that apportionment of fixed cost is done on different criteria in case of perennial crops. He assumes the life period of grape vineyard as 25 years and apportioned the land value to the entire life period with 10 per cent interest on the share of land value for the particular year. The cost of

establishing the vineyard is also distributed among the life period of 25 years.

Bernard et al. [8] divided costs into two categories: fixed and variable. Fixed costs were overhead farming expenses that remained constant regardless of output. Fixed costs included taxes, asset depreciation, interest payments, and rent. The variable cost, on the other hand, would vary depending on the amount of output produced.

Johl and Kapur [9]: Fixed cash costs and fixed non-cash expenses. Land tax, insurance premiums, and permanent labour costs were all fixed cash costs. Depreciation on the building, machinery, and equipments, interest on capital investments, family labour costs, and management costs were all fixed non-cash costs.

Balappa and Hugar [10] calculated the cost and returns of tomato production. Farmers spent a total of Rs. 59,880.80 per hectare, according to the report, with variable costs accounting for 96.5 per cent. The largest components of variable cost were human labour (29.5 per cent) and plant protection chemicals (18.8 per cent). The study found coordinated efforts to disseminate new technology for the proper and judicious utilization of low-cost inputs were critical.

Balaji et al. [11] ranked the constraints to groundnut production and marketing using Garrett's [12] ranking method, which included pest and disease incidence, erratic rainfall, water scarcity, forest animals, non-availability of good quality seeds, insufficient labour supply coupled with high wage rate, low level of adoption of recommended technologies, lower marketed surplus.

3. METHODOLOGY

To accomplish the above objectives, the primary data was collected with the help of well structured and pre-tested interview. Theni district of Tamil Nadu was the selected study area where a large number of farmers were engaged in grapes cultivation.The study is confined to Cumbum valley of Theni district by considering its three grape growing blocks –Uthamapalyam, Chinnamannur, & Cumbum. Purposive and Convenience sampling technique were used for the study. Sample size of farmers – 60, comprising of 20 farmers from each block. Cost of Cultivation [13], to study the cost and return structure of grape cultivation and Garrett's ranking technique (Garret *et.al*, 1996) to analyse the problems in grape cultivation, were the tools adopted for interpretation of data.

4. RESULTS AND DISCUSSION

The descriptive statistics (Table 1) gives the demographic characteristics of the respondents. Male respondents were the majority (87 percent), followed by female (13 per cent). Age 41-50 (33.3 per cent) was found to be the maximum, followed by age 31-40 (24.4 per cent), above 50 (22.2 per cent) and below 30 (20 per cent). Married respondents were major (80 per cent) followed by unmarried (20 per cent). Nearly 40 per cent of the family income was between Rs.10,000-15,000 followed by 34.4 per cent of their family income is between Rs.15,000-20,000 and 20 per cent of the family income is above Rs.20,000. Only 5.6 per cent of their family income is less than Rs.10,000. Small farmers (< 1 ha) occupied with 68.9 per cent and marginal farmers (1 to 2 ha) consisted 18.9 per cent to total farmers. Proportion of large farmers (< 2 ha) was lowest with 12.2 per cent to total.

Out of 60 respondents, 46.7 per cent respondents have family size of 4 to 6 members followed by 30 per cent and 23.3 per cent have below 3 members and above 6 members respectively. In family-wise classification, 67.9 per cent come under the category of nuclear family followed by 32.2 per cent come under the category of Joint family. In agricultural experience, 33.3 per cent of sample farmers had 21-30 years of experience, followed by 21.6 per cent of sample farmers with more than 30 years of experience. Nearly 25 per cent of the overall sample farmers had 11 - 20 years of farming experience. Only 12 per cent of the farmers in the whole sample have < 10 years of farming experience. Fifty five per cent sample growers could involve a maximum of three members from their families. The participation of 4 to 6 members from the family constitutes 33.3 per cent and above 6 members working on the field constitutes 7 per cent. The participation of 3 members is higher (55 per cent) among the grape growers. Farmers that owned garden land alone were 39.9 per cent, remaining 81.7 per cent were farmers owned both garden land and dry land.

Table 1. Demographics variables of the sample

Characteristics		Percentage
Gender	Male	87
	Female	13
Age	Below 30	20
	31-40	24.4
	41-50	33.3
	Above 50	22.3
Marital Status	Married	80
	Unmarried	20
Education	Illiterate	11.1
	Primary (1-5)	15.6
	Secondary(6-10)	21.1
	Higher Secondary(12)	24.4
	UG	22.2
	PG	5.6
Income per month(Rs)	<10000	5.6
	10000-15000	40
	15000-20000	34.5
	>20000	20
Land holdings	< 1 ha	18.9
	1 to 2 ha	68.9
	>2 ha	12.2

Out of 60 respondents, 40 per cent of the respondents have less than 5 years of experience in the grape cultivation followed by 35.6 per cent of respondents had experience of more than 5 years and less than 10 years, 13.3 per cent of respondents had experience of above 10 years and less than 15 years and only 11.2 per cent of respondents had experience of above 15 years.

The overall establishment cost for the cultivars came to Rs. 2,63,292.40. Initial establishment charges account for 61.3 per cent in the operation wise distribution establishment cost. The second largest component in the establishment cost is fertilizer and manuring, which accounts for 10.2 per cent. The labour cost is of 7.2 per cent. The interest on land value and land tax is 7 per cent. Other expenses account for less than 20 per cent of the total cost of the establishment. Preparatory cultivation cost 1.6 per cent, irrigation cost 3.8 per cent, weeding cost 4.6 per cent, plants and planting 2.6 per cent and young plant care 1.6 per cent.

4.1 Economics of Grape Cultivation in Theni District

The maintenance and operating costs includes labour, irrigation, manure, fertilizer, plant protection, watch and ward costs, land tax, cost of repair and upkeep of farm implements, harvesting and handling charges. The annual maintenance and operating cost of grape production per acre from the first year onwards was calculated and reported in Table 2. Fertilizer accounted for major share of the total average yearly maintenance and operational cost, followed by labour. Labour costs included manure, fertilizer, pesticide treatment, grape cutting, weeding, ploughing, earthing up around the vine, and other tasks. The average cost fertilizer was Rs. 13,900.40 per acre, contributing 27.7 per cent.

The second most important component of maintenance and operating expenditures is labour. The average labour cost per acre was Rs. 13,100.00 per acre, with a percentage share of 26.0 per cent in total maintenance and operational cost. The average manure expense per acre was Rs. 9,100.8, contributing 18.1 per cent. Plant protection was also a significant part of cost structure Rs. 6,251.7 were spent on this input value, corresponding to 12.4 per cent. Irrigation cost 1.0 per cent , land tax 0.06 per cent, farm implement repair and upkeep 0.7 per cent, and harvesting and handling 1.6 per cent. The crop has a 97.7 per cent operational cost and 2.3 per cent maintenance cost. The yearly maintenance and operational cost per acre of vine yard is Rs. 50,278.9.

Annual maintenance and operational costs, also known as direct costs, and the annual portion of establishment costs, as well as interest on fixed

capital, interest on working capital, and depreciation, are all included in the cost of production per acre of vine yard. Production cost per acre of vine yard is shown in Table 2. Annual maintenance and operational cost accounts for 68.1 per cent of the variable cost, according to the Table 2. The annual portion of establishment cost accounts for the highest per cent of fixed cost, accounting for 14.5 per cent. The second largest fixed cost component is interest on fixed capital, which accounts for 9.9 per cent. The depreciation which is about 5.4 per cent. Interest on working capital pays 2.1 per cent.

It could be seen from the Table 2 that the total cost of production of grape was Rs .73815.45 per acre. The percentage share of total variable cost and total fixed cost of the total cost of cultivation were 68.1 per cent and 31.9 per cent respectively, which means the total variable cost for grape cultivation was Rs. 50,278.9 and total fixed cost was Rs. 23,536.55. Gross return from grape cultivation was Rs. 1,20,290 per acre and net return worked out as Rs .46,474.55 per acre. The result of the study indicates that grape cultivation is highly profitable and the benefit cost ratio was more than one (1.6).

4.2 Problems Faced in Grapes Cultivation by Sample Farmers

Garrett's ranking technique was used to identify the key limits to grape yield potential. Farmers were asked to rank the limits they face in order of importance. The respondent's ranks for each constraint were transformed into percentages. Farmers growing grapes identified five primary yield restrictions among various bio-physical and socio-economic factors. Farmers planting grapes in the study region are unable to achieve the maximum yield due to these limitations. Pest attack, weeds, water shortage, credit availability and lack of input availability were the major constraints faced by famers in grape cultivation.

Table 2. Cost and return analysis from the muscat grape cultivation (per acre)

Sl. No.	Cost components	In Rupees	Percentage
A	**Operational cost**	**49,127.8**	**97.7**
1	Labour	13,100.00	26.1
2	Irrigation	510.65	1.0
3	Manure	9,100.75	18.1
4	Fertilizer	13,900.40	27.7
5	Plant protection	6,251.65	12.4
6	Watch and Ward	6,234.35	12.4
7	Land tax	30.00	0.06
B	**Maintenance cost**	**1,151.1**	**2.3**
1	Repair and upkeep of farm implements	350.60	0.7
2	Harvesting and Handling charges	800.50	1.6
	Annual maintenance and Operational Cost(A+B)	50278.90	100
C	**Total variable cost(A+B)**	**50,278.90**	**68.1**
D	**Total fixed cost**	**23,536.55**	**31.9**
1	Annual share of establishment cost	10,656.19	14.5
2	Interest on fixed capital	7,298.90	9.9
3	Interest on working capital	1,580.89	2.1
4	Depreciation	4,000.57	5.4
E	**Total cost of cultivation(C+D)**	**73815.45**	**100.00**
F	Returns of production in kg /acre	8687	**-**
G	Gross Returns (in Rs /acre)	120290	**-**
H	**Net Return (in Rs /acre)(G-E)**	**46474.55**	**-**
I	**Benefit Cost Ratio (G/E)**	**1.6**	

Source: Primary data

Table 3. Problems faced in grapes cultivation by sample farmers

Sl. No.	Constraints	Score	Rank
1	Credit availability	44	IV
2	Water shortage	52	III
3	Pest attack	70	I
4	Lack of input availability	28	V
5	Weeds	58	II

Table 3 shows that pest attack was ranked first with scores of 70 followed by weeds and water shortage that was ranked second and third with score of 58 and 52 respectively. Credit availability was ranked fourth and lack of input availability was given fifth rank with score of 44 and 28 respectively.

5. CONCLUSION

The total cost of cultivation of grape estimated in study area was Rs. 75,006.41 per acre. Cost of labour was the important factor in grape cultivation. The direct and indirect cost were Rs. 51,198.90 per acre and Rs. 23,807.51 per acre respectively. The average yield of grape was 8,679 kgs per acre.The net return in grape production was Rs.46,474.55 per acre.The result of the study indicates that grape cultivation is highly profitable and the benefit cost ratio was more than one (1.6).The major constraints faced by the sample farmers in the cultivation of grapes were pest attack followed by weeds, water shortage, credit availability and lack of input availability.The current rate of development cannot be maintained unless timely institutional arrangements, both private and governmental, are made. As a result, it is advised that a winery be created in Cumbum valley to absorb extra grape production from the growers. Formation of grape processing units in Theni district could lead for value addition and stable markets for local grape growers.

6. LIMITATION OF THE STUDY

The current study sheds information on the pattern and level of viticulture investment made by farmers, as well as its economic sustainability, allowing other farmers to enter the viticulture business due to increased productivity. The study's findings would be valuable in offering recommendations to farmers and overcoming the limits in grape production alone.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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