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Does Maize Cultivation is Profitable in Tamil Nadu-economics of Maize cultivation in Western Zone of Tamil Nadu, India

N. Kiruthika [a++*], S. Senthilnathan [a#], V. Karthick [a++], R. Parimalarangan [a++] and M. Prahadeeswaran [b#]

[a] *Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, India.*

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

Maize is important cereal crop and widely cultivated across India after Rice and Wheat. Maize in India, contributes nearly 9 per cent in the national food basket. Maize is cultivated throughout the year in all states of the country for various purposes including grain, fodder, green cobs, sweet corn, baby corn, popcorn in peri-urban areas. The present study is taken to identify the economics of maize cultivation in different districts of western zone of Tamil Nadu. The study is based on the primary data. The primary data required for the study were collected through personal interview from 166 farmers with the help of a comprehensive interview schedule. The study identifies that

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[++] *Assistant Professor;*
[#] *Associate Professor;*
**Corresponding author: E-mail: kiruthikaa.natarajan@gmail.com;*

ploughing cost differs from Rs.11450 to Rs.11850, cost for seed and sowing differs from Rs.10500 to Rs.11,500. The study also identifies that on average the maize farmers earn Rs.50,000 per hectare and the benefit cost ratio come around 1.6.

Keywords: Maize; economics; Western Zone; benefit cost ratio.

1. INTRODUCTION

Maize (*Zea mays L*) is a highly adaptable and versatile crop plays a crucial role in global agriculture food systems. Maize is known as queen of cereals because it has the highest genetic yield potential among the cereals [1]. Globally, though China having highest area under Miaze cultivation (43.35 million ha), United States of America having highest production viz., 383.9 million tonnes. Since the productivity of Maize in USA is 11.11t/ha which is double than the global average viz., 4.92t/ha. Whereas, the average productivity in India is 2.43t/ha. (FAOSTAT Database/2023)

Globally Maize is being cultivated for so many purposes including 61% of feed, 22% of industrial and 17% of food and 22% of industrial. After rice and wheat, maize is the third most significant food crop in India. In India, maize makes up around 9% of the country's food basket. Apart from providing essential nourishment for humans and high-quality animal feed, maize is a fundamental raw material used in thousands of industrial products such as food sweeteners, textile, alcoholic beverages, oil, starch, gum, etc.,

Mostly maize is being used as feed for poultry industry. Globally India possess significant position in egg and broiler chicken production. Since maize makes up over 60% of the feed used in the chicken feed industry, it is an essential raw ingredient. Nowadays, the global commerce in maize surpasses that of rice [2].

Globally, a significant amount of maize has been processed to create bioethanol for mixing with vehicle fuels. Actually, maize is the only crop with this wide range of applications.

Maize is one of the versatile emerging crops with wider adaptability under varied agro-climatic conditions. It has been noted that maize consumption directly is declining in rural India. As a result, appropriate awareness and price discovery mechanisms must be implemented [3]. Most small-scale and marginal farmers cultivate maize. Therefore, increasing price discovery and crop realization are crucial for boosting maize output in India. (Grant Thornton India LLP, 2016).

Every state in the union cultivates maize all year long for a variety of uses, such as popcorn in peri-urban areas, green cobs, sweet corn, baby corn, and grain. Andhra Pradesh, Maharashtra, Karnataka, Bihar, Rajasthan, Uttar Pradesh and Madhya Pradesh are the leading states that cultivate maize and account for more than 80% of the nation's total production of the crop. Murugudu Manoj et al., [4].

In this background, the present study is taken to identify the economics of maize cultivation in western agro climatic zones of Tamil Nadu.

2. REVIEW OF LITERATURE

Sang Isaac Kipchirchir et al [5] examined the dry maize grain market integration in Kenya's Kipkelion East and Kipkelion West Sub-Counties. The study examined the price correlation of dry maize grain between the source and terminal markets. Purposive and stratified random sampling techniques were used to gather the data, and regression and Pearson's product-moment correlation models were used to analyze it.

Murthy et al. [6] examined the expenses and yield structure associated with growing maize in the north Karnataka districts of Dharwad and Harveri. According to the study, variable costs made up almost 74% of the entire cost of cultivation. The primary cost components of total variable costs were labor costs for humans, seeds, FYM, fertilizers, and bullock labor costs. The study also found that production of maize in Dharwad and Haveri districts was profitable with returns per rupee of expenditure of 1.42 and 1.50.

Suresh Kumar et al. [7] examined the structure of cost, usage of inputs, profit and efficiency in resource use of Wheat , India's south Gujarat division. In the study, 250 farmers provided the information. According to the report, the average total cost of growing wheat was Rs. 45, 784. Increased expenses on small farms are linked to

the heavy reliance on family labor, bullocks, manures, and irrigation fees. With an increase in farm size, the average net profit per hectare over (Cost-C2) was Rs. 20,314. The ratio of input to production was 1:1.44 overall.

The profitability of maize production in Adamawa State's Yola North local government area was investigated by Lamba et al. [8] While the overall variable cost for the production of maize was Rs. 6, 562/ha, the total gross return was Rs. 12, 450/ha. Labour is the primary variable input, accounting for 69.93%. The lucrative production of maize was shown by the gross margin of Rs. 4, 991 /ha.

Oladejo and Adetunji [9] conducted research on the economics of producing maize (*Zea mays* L.) in Nigeria's Oyo State. The multistage random sampling technique was utilized by the authors. Descriptive statistics and the Cobb-Douglas regression model's estimation were used to examine the data for the study, which was conducted utilizing a scheduled interview schedule. The study found a substantial correlation between the costs of producing maize and the profits that the study area's maize farmers receive. According to the normal enterprise budgetary analysis, during the survey year, respondents' profits per hectare of maize produced came to 85.24 US dollars.

Navadkar et al. [10] looked into the structure of resource use, cultivation costs, and maize marketing. Functional analysis employed a production function of the Cobb-Douglas type. According to the survey, the number of man-days per hectare for male and female laborers was 77.19 and 106.45, respectively. The labor utilization rate for bullocks was 10.68 pair days. In the small, medium, and big size groups, the nitrogen usage per hectare was 110.80, 110.18, and 112.10 kg, respectively. The total cost of growing maize per hectare (also known as Cost "C") was Rs. 40624.50. Additionally, they found that the land's rental value (17.53 percent) was the highest among the several cost categories.

3. DATA AND METHODOLOGY

The study is based on the primary data. With the aid of an extensive interview schedule, in-person interviews were used to gather the primary data needed for the study. The study's questionnaires were created with the physical, cultural, and socioeconomic aspects of the maize production regions. They were also pre-tested and refined. The farmers' interview schedule included general farm and household characteristics, information on the cost and growing techniques used for maize, specifics on the sale of maize, issues with production and marketing, etc. The details of sample size are given in Table 1.

3.1 Measurement of Variables

3.1.1 Maize production

3.1.1.1 Planting material

Seeds are used to cultivate maize. The farmers themselves provided the information on the amount of seed material. The amount of seed material used by the sample farmer and its price were multiplied to get the cost of the seed material.

3.1.1.2 Human labour

Men and women's labor was measured differently in terms of days worked. The quantity of hired and permanent labor was reduced to a single physical unit (man days of eight hours) and treated equally. The labor required for the entire project was determined by adding hired labor to the labor that was deemed family labor separately.

3.1.1.3 Machine power

The tariffs that are currently in place for bespoke hiring in the chosen villages were used to value machine power.

Table 1. Number of Maize sample farmers in Western district of Tamil Nadu

Western Zone	No. of Farmers
Erode	50
Karur	40
Tirupur	51
Coimbatore	25
Total	**166**

3.1.1.4 Manures, fertilizers and plant protection chemicals

For the purpose of producing maize, information on chemical fertilizers, manures, and plant protection chemicals was gathered from each farmer. Farm-produced manure was valued at the going rates in the market, whereas fertilizers and plant protection chemicals were valued at the actual cost paid.

3.1.1.5 Irrigation

Since there is little variation in irrigation depth among farms, the irrigation variable was quantified in terms of the number of irrigations. The cost of irrigation includes labor—mostly from family members—for irrigating the field as well as additional expenses related to running and maintaining the pumpsets and other irrigation equipment that the sample farmers used to irrigate their maize fields.

4. RESULTS AND DISCUSSION

4.1 Cost Analysis

The cost concepts followed are given below:

4.1.1 Cost of cultivation

When growing maize over a season, the cost of cultivation comprised both fixed and operating expenses.

4.1.2 Output and returns

The overall costs incurred by the growers of maize, expressed on a per hectare basis, are referred to as the cost of cultivation. The average market price that prevailed in the relevant district was taken in order to calculate the returns.

4.1.3 Cost of cultivation of maize

The next paragraphs show and examine the specifics of maize farming costs.

4.2 Cultivation Costs

The expenses incurred in growing maize throughout a growing season comprise both material and operational expenditures. Labor, manures, chemicals, depreciation, land revenue, and interest on working capital were among the several expenses that were incurred.

4.3 Cost of Labour

The labor cost for tasks like manuring, applying chemicals, creating ridges and furrows, cutting them, planting bulbs, weeding, tilling the soil, watering, and chemical spraying comprises both hired labor and family labor. It also included the labor-intensive part of harvesting maize. Based on the pay rates that were in effect in the research region in the year that the data was collected, the labor expenses were computed.

4.4 Cost of Seed Materials

The price of the seed that was most popular in that particular district has been paid separately.

4.5 Cost of Fertilizers and Plant Protection Chemicals

Cost of fertilizers and plant protection chemicals covers the price of the various fertilizers and chemicals required to protect plants. To determine the overall cost, the farmers' use of fertilizers and plant protection chemicals was assessed at their respective market values.

4.6 Depreciation

Interest on working capital and the rate of depreciation are examples of fixed costs. For fixed capital goods utilized in maize production, such as irrigation systems and agricultural machinery, depreciation was computed at a rate of 5% for buildings and 10% for implements.

4.7 Interest on Working Capital

A seven percent interest rate was determined for loans related to agriculture.

4.8 Cost and Returns of Maize Cultivation

Economics of maize production were estimated separately for different districts of western climatic zone maize sample farmers. For every farmer, the streams of expenses paid and gains realized were computed. The cost of cultivation was determined by taking into account the market price of inputs at the time of their use. The average market price of the crop at the time of sale was used to calculate the gross return, and the cost of cultivation was subtracted from the gross income to determine the net returns (Rs/ha).

Table 2. Cost of cultivation of Maize sample farmers in the study area (Rs/ha)

Particulars	Erode	Karur	Tirupur	Coimbatore
Ploughing	11750	11450	11500	11850
Seed and sowing	11000	11000	10500	11500
Weeding cost	7500	7250	7500	7780
Cost of fertilizer	9000	8000	8500	9000
Cost of pest control	16250	16000	16250	17000
Irrigation charges	7500	7000	7500	8000
Harvesting cost	9000	8500	8800	9000
Interest rate(7%)	5040	4844	4940	5190
Fixed Cost	1000	1000	1000	1000
Total cost	78040	75044	76490	80320
Yield (kg/ac)	6250	6000	6250	6250
Value (Rs/Kg)	20	20	20	22
Gross income	125000	120000	125000	137500
Net returns	46960	44956	48510	57180
BCR	1.60	1.59	1.63	1.71

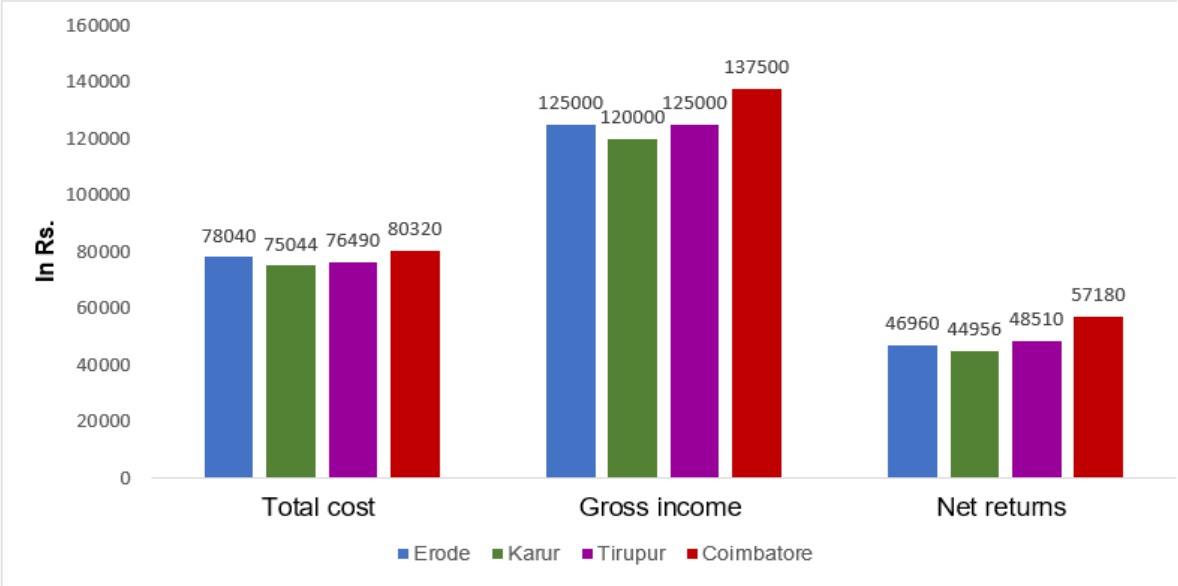

Fig. 1. Cost and returns in different districts of Western Zone of Tamil Nadu

The economics of maize production in Table 2 among different districts of western zone of Tamil Nadu and the cost and returns was depicted in Fig1. It indicates that the total cost of cultivation for maize doesn't very much. Ploughing cost differs from Rs.11450 to Rs.11850, cost for seed and sowing differs from Rs.10500 to Rs.11,500. On average the maize farmers earn Rs.50,000 per hectare and the BCR come around 1.6 [11,12].

5. CONCLUSION

Maize is one of the versatile emerging crops with wider adaptability under varied agro-climatic conditions. Globally, maize is known as queen of cereals because it has the highest genetic yield potential among the cereals. Most small-scale and marginal farmers cultivate maize. Therefore, increasing price discovery and crop realization are crucial for boosting maize output in India. To have the policy on the same, it is necessary to the economics of maize cultivation. Hence the present study is taken to identify the economics of maize cultivation in western agro climatic zones of Tamil Nadu. The study was based on the primary data collected from 166 farmers of western zone of Tamil Nadu. The study reveals that the total cost of cultivation for maize doesn't very much. Ploughing cost

differs from Rs.11450 to Rs.11850, cost for seed and sowing differs from Rs.10500 to Rs.11,500. On average the maize farmers earn Rs.50,000 per hectare and the BCR come around 1.6.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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