International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
www.chemijournal.com
IJCS 2020; SP-8(6): 78-81

Received: 20-09-2020
Accepted: 23-10-2020

**S. Arunkumar**
P.G. Scholar, Department of Agricultural Economics, Agricultural College and Research Institute, Tamil Nadu Agricultural University, Madurai, Tamil Nadu, India

**A. Daniel Viswasam Samuel**
Professor (Agriculture. Economics), Department of Social Sciences, Anbil Dharmalingam Agricultural College and Research Institute, Tamil Nadu Agricultural University, Trichy, Tamil Nadu, India

**P. Masilamani**
Dean, Anbil Dharmalingam Agricultural College and Research Institute, Tamil Nadu Agricultural University, Trichy, Tamil Nadu, India

**B. Sivasankari**
Assistant Professor (Maths), Department of Agricultural Economics, Agricultural College and Research Institute, TNAU, Madurai, Tamil Nadu, India

**Corresponding Author:**
**A. Daniel Viswasam Samuel**
Professor (Agriculture. Economics), Department of Social Sciences, Anbil Dharmalingam Agricultural College and Research Institute, Tamil Nadu Agricultural University, Trichy, Tamil Nadu, India

# An economic analysis of cauliflower production and its constraints in Krishnagiri district of Tamil Nadu

**S. Arunkumar, A. Daniel Viswasam Samuel, P. Masilamani and B. Sivasankari**

**DOI:** https://doi.org/10.22271/chemi.2020.v8.i6b.10921

**Abstract**
The study examined the economics of cauliflower cultivation and the constraints in production in Krishnagiri district of Tamil Nadu. Cole crop plays a major role because of higher returns per acre and the commodities earn a valuable foreign exchange. The cost and returns in cauliflower production, resource use efficiency and its constraints were studied. The cost of cultivating cauliflower per hectare was found to be Rs.1,03,521 and the gross returns per hectare was Rs. 2,52,000. The net income in cultivating cauliflower per hectare was Rs. 1, 48,479. The cost of human labour contributes higher cost in cultivation of cauliflower which is about 18.83 per cent (Rs. 19,500.00). In cob- Douglas production function, farmyard manure, chemical fertilizers like phosphorous were positive and significant at one per cent level with the coefficient values of 0.59 and 0.95 correspondingly. The major constraints in cauliflower production were non-availability of labours at appropriate time, high incidence of insect pests and high cost of inputs. Some of the marketing constraints faced by the farmers were lack of storage facilities and lack of market information.

**Keywords:** Cost and returns, cauliflower, resource-use efficiency, constraints

## Introduction
In India, agriculture is one of the biggest strongholds of the economy, as it is the source of livelihood of almost two thirds of the workforce of the country. It accounted for 15.4 per cent of the country's gross domestic product (GDP) in 2018-2019. Agriculture also provided employment to 49.9 per cent of the workforce. Horticulture is the fast growing sector between land based agriculture systems. Horticulture sector helps *per se* in changing the old subsistence farming mainly in dry lands, rain fed, hills, coastal and arid agro ecosystems. The returns produced through horticultural crops are higher than the field crops. Horticultural crops cover large varieties of fruits and vegetables, flowers, spice and plantation crops, medicinal and aromatic plants. In India vegetables are grown in 9.21 million ha which accounts for production of 162.18 million tonnes with an average productivity of about 17.6 tonnes per hectare. India is the second leading vegetable producer in world next to china and the contribution of vegetable production in world is about 13.99 percent (FAO2016-17). Among different vegetables grown in India,

Cauliflower (*Brassica oleracea L. Var. botrytis*) is generally characterized *nitty-gritty* as one of the most delicious and delicate vegetable of the Cole crops. Cauliflower consists of a good source of vitamin A and vitamin B, Carbohydrate (5.2%), protein (2.7%), and fat (0.2%). Cooked cauliflower contains large amount of vitamin B and a fair amount of protein in comparison to other Cole crops. It is one of the most popular vegetables in the world. It is grown throughout the world especially in China, India, USA, Spain, Italy, Mexico and France, due to *sine qua non* its higher nutritional value and widespread cultivation. In India during 2017-18 cauliflower was grown in an area of about 452.59(000'Ha) with the production of 8668.22(000'tonnes) and the productivity was about 19.15 MT/Ha (Horticulture statistics at a glance 2018). The study was conceived with a state of knowing the economics of production and the constraints in the cultivation of cauliflower.

The objectives of the study were,

1. To appraise the cost and returns from cauliflower cultivation
2. To evaluate the resource use efficiency in cauliflower production.
3. To find the constraints in production and Marketing of cauliflower and evoke measures.

**Materials and Methods**

This research study was carried out in Krishnagiri district of Tamil Nadu in India. Krishnagiri district was purposively selected for this study because of higher production of Cole crops in this district. The study area and the villages were selected based on simple random sampling technique. From the study area, approximately 90 farmers were selected at random and the primary data collection was carried out through personal interview using well-structured and pre-tested interview schedules. Individual sets of interview schedules were prepared to collect details from the farmers. 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.

**Tools of analysis**

**Cost of cultivation**

For estimating the cost of cultivation of cauliflower per hectare, the standard cost concepts used in cost of production in farm management studies were used to estimate various types of costs in the present study.

**Cost A:** Includes the wages of hired and owned human labour, machine labour, value of grafts, value of manure, fertilizers and plant protection chemicals, depreciation of machinery and buildings, land revenue and interest on working capital.

**Cost B:** Includes Cost A plus rental value of land plus interest on fixed capital and amortized establishment cost.

**Cost C:** Includes Cost B plus value of imputed family labour.

**Net income:** The profit at Cost C, that is, the difference between gross income and Cost C represents the net income of the farm enterprise.

**Cobb-douglas production function**

Production function analysis is done to assess the resource use efficiency in cauliflower production. After examining the association between the dependent and independent variables with a scatter diagram, Cobb- Douglas production function was selected for the study.

The form of regression model used was

$$Y = a\ X_1^{b1}\ X_2^{b2}\ X_3^{b3}\ X_4^{b4}\ X_5^{b5}\ X_6^{b6}\ X_7^{b7}\ \mu_t$$

Where,

| | | |
|---|---|---|
| Y | = | Yield of cauliflower (kgs /ha) |
| $X_1$ | = | Quantity of farmyard manure (T./ha) |
| $X_2$ | = | Quantity of nitrogen (Kg. /ha.) |
| $X_3$ | = | Quantity of phosphorous (Kg. /ha.) |
| $X_4$ | = | Quantity of potash (Kg. /ha.) |
| $X_5$ | = | Plant protection (litres/ha) |
| $X_6$ | = | Human labour (man days/ha.) |
| $X_7$ | = | Machine hours (hrs. /ha.) |
| $\mu_t$ | = | Error term |
| $a,b_{1,\ldots}b_7$ | = | Parameters to be estimated |

**Garrett's ranking technique**

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

$$\text{Percent position} = \frac{100\ X\ (R_{ij} - 0.5)}{N_j}$$

Where,

$R_{ij}$ = Ranking given to the $i^{th}$ attribute by the $j^{th}$ individual

$N_j$ = Number of attributes ranked by the $j^{th}$ individual.

By referring to the Garrett's table, the per cent positions estimated were converted into scores. Thus, for each factor the scores of the 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 Discussions**

**Cost and returns in cultivation of cauliflower**

A clear understanding about the economics of Cauliflower production in Krishnagiri district is needed and the cost and return in production of Cauliflower was estimated and conferred in this unit. Cost of cultivation was calculated on per hectare and offered in Table 1.1.

**Table 1.1:** Cost and returns in cultivation of cauliflower

| S. No. | Particulars | Value (Rs.) | Percentage |
|---|---|---|---|
| 1 | Cost $A_1$ | | |
| | Human Labour (Hired) | 19500.00 | 18.83 |
| | Machine Labour (Owned and hired) | 8000.00 | 7.72 |
| | Seedlings | 18525.00 | 17.89 |
| | Organic manures (FYM) | 5540.00 | 5.35 |
| | Inorganic fertilizers | 12650.00 | 12.21 |

| | | | |
|---|---|---|---|
| | Plant protection chemicals | 10300.00 | 9.94 |
| | Depreciation on fixed capital | 2370.00 | 2.28 |
| | Interest on working capital | 5216.00 | 5.03 |
| | Land Revenue | 134.00 | 0.13 |
| | Total | 82,235.00 | 79.38 |
| 2 | Cost $A_2$ = Cost $A_1$ + Rent paid for leased in land | 82,235.00 | 79.38 |
| | Interest on owned capital | 3650.00 | 3.52 |
| 3 | Cost $B_1$ = Cost $A_1$ + Interest on owned capital (excluding land) | 85,885.00 | 82.96 |
| | Rental value of owned land | 3,625.00 | 3.50 |
| 4 | Cost $B_2$ = Cost $B_1$ + Rental value of owned land | 89,510.00 | 86.46 |
| | Imputed value of family Labour | 4600.00 | 4.44 |
| 5 | Cost $C_1$ = Cost $B_1$ + Imputed value of family Labour | 90,485.00 | 87.40 |
| 6 | Cost $C_2$ = Cost $B_2$ + Imputed value of family Labour | 94,110.00 | 90.90 |
| 7 | Cost $C_3$ = Cost $C_2$ + 10% of Cost $C_2$ | 1,03,521.00 | 100.00 |
| 8 | Gross income | 2,52,000.00 | |
| 9 | Net income | 1,48,479.00 | |
| 10 | Cost of production (Rs/flower) | 2.87 | |
| 11 | Net income (Rs/flower) | 4.12 | |

The average total costs (Cost C2) for a hectare were worked out to be Rs. 94,110.00. The operational cost (Cost $A_1$) for a hectare was about 79.38 per cent (Rs.82, 235.00). The cost components were fragmented into different input factors and the main part was taken by the cost of human labour in cultivation of cauliflower crop of about 18.83 per cent (Rs.19,500.00) and the application of inorganic fertilizers were accounting for 12.21 per cent (Rs.12,650).

The minimum shares in cost of cultivation of cauliflower were embraced by the factor of organic manure application. (i.e. 5.35 percent) which costs for about Rs.5,540.00. The share of plant protection chemicals was about Rs. 10300 (i.e. 9.94 percent), this is because there is more damage due to pest incidence in cauliflower cultivation and the farmers applied the plant protection chemicals without considering economic threshold level as problem active measures. In the cultivation of cauliflower, the gross income for a hectare was Rs. 2,52,000.00. On an average from the study, the cost of production of cauliflower for each flower was Rs.2.87 while the net returns from the cultivation were Rs.4.12 per flower.

**Resource use Efficiency in Cauliflower cultivation**

Cobb-Douglas production was used to evaluate the output elasticity with respect to key inputs in the production of cauliflower. The assessed Cobb-Douglas production function for Cauliflower is fitted out in Table 1.2.

**Table 1.2:** Estimation of Resource use Efficiency in Cauliflower

| S. No. | Variables | Regression coefficient | Standard error | Significance |
|---|---|---|---|---|
| 1. | Regression constant | 1.14 | 0.55 | ** |
| 2. | FYM (t/ha) | 0.59 | 0.33 | ** |
| 3. | Nitrogen (Kgs/ha.) | -0.02 | 0.12 | NS |
| 4. | Phosphorous (Kgs/ha.) | 0.95 | 1.05 | ** |
| 5. | Potash (Kgs./ha) | 0.46 | 0.36 | * |
| 6. | Human labour (man days/ ha) | 0.18 | 1.58 | * |
| 7. | Machine hours (hrs./ha) | 2.72 | 8.85 | NS |
| 8. | Plant protection chemicals (lit/ha) | 0.11 | 0.09 | NS |

$R^2$ = 0.79 F-Ratio =26.95 N = 90

**Note:** ** Significant at 1 percent level * Significant at 5 percent level NS Non-significant

The coefficient of multiple determinations ($R^2$) was 0.79 indicating that 79 per cent of the systematic variation in cauliflower yield can be attributed to the independent variables comprised in the model. In log linear production function, the coefficient characterizes the production elasticity of the resources used. The yield responded significantly to the inputs such as farmyard manure, chemical fertilizers (phosphorous and potash) and human labour. The coefficient of farmyard manure, chemical fertilizers like phosphorous were positive and significant at one per cent level with the coefficient values of 0.59 and 0.95 correspondingly. By these means, human labour and potash also observed to be positive and significant with coefficient values 0.18 and 0.46 respectively, which indicated that an increase in the usage of farmyard manure and phosphorous fertilizers by one per cent ceteris paribus would increase the yield of cauliflower by 0.59 and 0.95 per cent respectively at the existing geometric mean level.

The coefficient of human labour was observed to be positive and significant at five per cent level with the coefficient value of 0.18 indicating that one per cent increase in human labour usage, ceteris paribus would increase the yield of cauliflower by 0.18 per cent at the existing geometric mean level. The coefficient of potash was observed to be positive and significant at five per cent level with the coefficient value of 0.46 indicating that one per cent increase in potash usage, ceteris paribus would increase the yield of cauliflower by 0.46 per cent at the existing geometric mean level. However the variables like machine labour, nitrogen and plant protection chemicals were found to be non-significant.

**Constraints in production and marketing of cauliflower**

**Production constraints faced by sample farmers**

The farmers in the study area encountered quite a few difficulties in the production of Cauliflower. Hence the study incorporated to identify the major constraints in the cauliflower production and the results are presented in Table 1.3.

**Table 1.3:** Constraints faced in Cauliflower production by sample farmers

| S. No. | Nature of Constraints | Mean Score | Rank |
|---|---|---|---|
| 1 | Non-availability of labour during season | 64.80 | I |
| 2 | High incidence of pest/insects | 55.69 | II |
| 3 | High cost of inputs | 44.73 | III |
| 4 | High wage rate | 40.55 | IV |
| 5 | Supply of inputs on time | 38.70 | V |

The farmers expressed that Non-availability of sufficient labour in time is the most important problem in Cauliflower production (64.80). The Second major constraint in the Cauliflower production was High incidence of pest /insects (55.69). High cost of inputs (44.73) was the third problem. The fourth important problem was high wage rate (40.55) which is predominant in the study area. The fifth important problem faced by the Cauliflower producers was lack of inputs on time (38.70).

**Marketing constraints faced by sample farmers**

The Cauliflower growers in the study area have faced several marketing constraints in the study area. The foremost major five marketing constraints were identified and they were ranked using Garrett's' ranking technique and are given in Table 1.4

**Table 1.4:** Constraints faced by Cauliflower marketing by sample farmers

| S. No. | Constraints | Score | Rank |
|---|---|---|---|
| 1 | Lack of cold storage facility | 68.55 | I |
| 2 | Lack of market information | 60.12 | II |
| 3 | High cost of labour | 51.26 | III |
| 4 | High transport cost | 34.60 | IV |
| 5 | Labour shortage | 31.20 | V |

The most important constraint identified by the Cauliflower growers in marketing of the produce was lack of cold storage facility (68.55). The second major constraint ranked by the sample farmers were lack of market information (60.12). The next important constraint was High cost of labour (51.26). High transport cost (34.60) and Labour shortage (31.20) were the other constraints faced by the Cauliflower producers in marketing.

**Implications of the study**

1. Since the cultivation practices of Cauliflower are carried without variation in the study area, there is shortage of labor during peak hours and if available the wages are hiked. Hence the farmers should be ensured provision of machine labor which warrant liberal credit support to stakeholders.
2. High incidence of insects and pests is another important constraint and there is poor supply of inputs. There is a need of input supply network system particularly for plant protection chemicals has to be devised along with cropping line.
3. Proper cold storage facilities must be made in a district because it will be more beneficial for the farmers to get a better price for his produce.
4. Farmers of the study area need to be taught of market intelligence, so that farmers can regulate their sale at a higher price.
5. High transport cost is also an important constraint, hence it is suggested to form Cauliflower growers association through which mass transportation can be under taken and reduces unit cost of transportation
6. Besides the applications of chemical fertilizer the farmers can explore the possibilities of using FYM, as the crop has a significant yield response to manures ensuring sustainability.

**References**


1. Ajay Kumar *et al*., constraints faced by the farmers in production and marketing of vegetables in Haryana. Indian Journal of Agricultural Sciences 2019;89(1):153-60.
2. De S, Rahaman SM. Economics of production and marketing of cabbage in Bankura district of West Bengal. Journal of Crop and Weed 2014;10(1):101-106.
3. Sultan Singh, Chauhan SK. Production and marketing of off-season vegetables in Himachal Pradesh. Himachal Journal of Agricultural Research 2018;44(1&2):68-74.
4. Ravekar SF, *et al*., Economics and marketing of cauliflower and cabbage in Hingoli district of Marathwada region of Maharashtra state. International Research Journal of Agricultural Economics and Statistics 2015;6(2).
5. Akter S, *et al*., An economic analysis of winter vegetables production in some selected areas of Narsingdi district. J Bangladesh Agril. Univ 2011;9(2):241-246.
6. Hena Imtiyaz, Peeyush Soni. Economics of production and marketing of vegetables and fruit - A case study of district Allahabad, India. New Agriculturist 2013;24(2):241-246.