



Research Article

ECONOMIC ANALYSIS AND MARKET POTENTIAL OF COMMERCIAL VEGETABLE SEEDLING NURSERIES IN TAMIL NADU

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Received: January 05, 2021; Revised: January 26, 2021; Accepted: January 27, 2021; Published: January 30, 2021

Abstract: The present study was attempted to examine the market potential of vegetable seedlings and the economic viability of commercial vegetable seedling nurseries. The study was conducted in Tamil Nadu. Krishnagiri, Dharmapuri, Coimbatore and Tiruppur districts were purposively selected for the study based on the number of commercial vegetable seedling nurseries. The study concluded that the total cost incurred for vegetable seedling production was Rs.10,62,965 and the net income was Rs.446,537. The investment analysis revealed that sample nurseries were economically viable in terms of Net Present Value (394718), Benefit Cost Ratio (1.42). Delay of payment by the farmers for the purchase and massive competition among the nurseries were the major constraints in production and marketing of vegetable seedlings in the state.

Keywords: Economic analysis, Market potential, Vegetable seedling, Tamil Nadu

Citation: Mohana K., et al., (2021) Economic Analysis and Market Potential of Commercial Vegetable Seedling Nurseries in Tamil Nadu. International Journal of Agriculture Sciences, ISSN: 0975-3710 & E-ISSN: 0975-9107, Volume 13, Issue 1, pp.- 10612-10615.

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Academic Editor / Reviewer: Dr Vipul N Kapadia

Introduction

India is the second largest producer of vegetables and it accounts for 11.7 percent of the total world production of vegetables. During the year 2018-19, vegetables constitute a share around 59.2 percent of horticultural production in India [1]. Major vegetables grown in the country are tomato, onion, potato, brinjal, cabbage, cauliflower, okra, peas, chillies, beans etc. Vegetables play an important role in the balanced diet by providing energy and supplying unique sources of vitamins, minerals, antioxidants, dietary fiber and phytochemicals. Vegetables with a shorter duration and higher productivity have resulted a greater economic returns to the farmers [2]. In Tamil Nadu, the area under vegetables was 2.25 lakh hectares with the production of 56.6 lakh tonnes. The major vegetables grown in this state are onion, tomato, lady's finger, brinjal and tapioca. These crops accounts for more than 70 percent of the total area as well as the production of vegetables. It plays vital role in up-liftment of farming community through its prolific yield potential.

The first and foremost requirement for the efficient production of vegetables is to raise healthy vigorous seedlings [3]. Earlier, the farmers were used to produce the seedlings by preparing their own raised beds under open field condition. However, during recent years, this method was discontinued due to expensive seed material, high incidence of pests and diseases, high rate of mortality and non-uniform growth of seedlings. Therefore, the practice of large scale seedling production emerged as a profession and commercial activity [4].

The Pro-tray vegetable seedling production is an important technique for quality seedling production where seedlings are grown under a shade net. Such seedlings have better germination with uniform growth and are free from pest and diseases [5]. Farmers are using commercial seedling to cultivate vegetable crops during recent years. To cater the requirement, many nursery units were started in major vegetable production centres in Tamil Nadu. However, mushrooming of nursery units might lead to over supply and price crash. Further, there is no quality regulation for seedlings as that of seeds.

Hence it is necessary to study the economic viability and market potential of vegetable seedling in Tamil Nadu.

Material and Methods

In Tamil Nadu, the vegetables are cultivated in an area of 2.25 lakh hectares. Based on the number of commercial vegetable seedling nurseries, Krishnagiri, Dharmapuri, Coimbatore and Tiruppur districts of Tamil Nadu were purposively selected for the study. The list of licensed nurseries were collected from the office of Seed certification. From each selected districts, ten nursery units were selected as random with the sample size of 40 nursery units. The primary data on investment pattern, cost-returns structure and constraints faced by nursery units were collected with the help of pre-tested interview schedule through personal interview. Secondary data on area and production of vegetables were collected from the publications of Department of Horticulture for the study. The compound annual growth rate was estimated by using the data on area under selected vegetable crops for the past ten years. The growth rate was worked out by using the formula of the following form

$$Y_t = AB^t$$

Where,

Y_t = Area under vegetable crops in ha during the year 't'

A = Constant term

B = Parameter to be estimated

t = Time measured in years

By taking natural logarithms on both sides of the equation, the following form was obtained.

$$\log Y = \log A + t \log B$$

Taking $\log A = a$

$\log B = b$

$$\log Y = a + b^t$$

Table-2 Estimated Market potential of selected vegetable crop seedlings in Tamil Nadu

Selected vegetable crops	Growth rate (CAGR) of selected vegetable crops (2009-10 to 2018-19)	Estimated area in 2019-2020	Estimated market potential for vegetable seedlings (crores)	Estimated area in 2020-2021	Estimated market potential for vegetable seedlings (crores)
Tomato	1.5	24120.26	59.57	24482.06	60.47
Chilli	-1.9	44772.84	111.93	43922.15	109.80
Brinjal	6.6	13423.9	32.44	14311.22	34.59
Cabbage	1.2	1877.85	11.59	1900.57	11.73
Cauliflower	9.6	1584.58	8.80	1737.65	9.65

The growth rate is calculated as,

$$\text{CAGR} = ((\text{Antilog of } b) - 1) \times 100$$

To find out the projected area under vegetable crops, the compound growth rate was substituted in the following formula.

$$A_t = A_0 (1 + r/100)^n$$

Where,

A_t = Projected area under vegetable crops in period 't'

A_0 = Area in the base year

r = Compound Growth Rate

n = No. of years

The market potential for the vegetable seedlings in this state was estimated using projected area under selected vegetable crop and the requirement of seedlings on the basis of recommended spacing per hectare based on package of practice (<http://agritech.tnau.ac.in>).

Net Present Value (NPV)

It is the difference between the sum of present worth of benefits and sum of present worth of cost calculated at discount rate.

$$\text{NPV} = \sum_{t=1}^n \frac{B_t - C_t}{(1+r)^t}$$

Where,

B_t = Benefits in t^{th} year, C_t = Costs in t^{th} year

n = Number of years, r = Discount rate

Benefit cost ratio (B-C Ratio)

The benefit cost ratio is the ratio of the sum present value of benefit to sum of present value of cost for a discount rate.

$$\text{B:C Ratio} = \frac{\sum_{t=1}^n B_t / (1+r)^t}{\sum_{t=1}^n C_t / (1+r)^t}$$

Where,

B_t = Benefits in t^{th} year, C_t = Costs in t^{th} year

n = Number of years, r = Discount rate

Results and Discussion

The compound annual growth rate (CAGR) for the area under selected vegetable crops in Tamil Nadu was worked out using time series data from 2009-10 to 2018-19. The growth rate in area of vegetables like tomato, chilli, brinjal, cabbage and cauliflower were calculated and presented in [Table-1].

Table-1 Estimated compound annual growth rate of selected vegetable crops in Tamil Nadu

Year	Tomato	Chilli	Brinjal	Cabbage	Cauliflower
2009-10	23792	58746	6912	2154	901
2010-11	22087	53626	7871	2222	875
2011-12	21971	56442	9551	1889	885
2012-13	21090	47110	9174	1547	994
2013-14	24633	41401	10804	1089	991
2014-15	23954	44606	11016	1433	1111
2015-16	23676	46522	13475	1941	1452
2016-17	21650	44838	12198	1673	1192
2017-18	22481	44120	12331	2347	1303
2018-19	27058	48114	13938	1883	2167
CAGR	1.5	-1.9	6.61	1.21	9.66
Avg. area	23763.8	45640	12591.6	1855.4	1445

From the [Table-1], it was concluded that there was a positive significant growth (1.5 percent) in area under tomato in Tamil Nadu. The price volatility of tomatoes led the farmers to reduce the area under tomato cultivation. Area under tomato crop was projected, based on the estimates of growth rate of the study period during 2019-20. Based on the projected area for the year 2019-20 and 2020-21, the market potential for tomato seedlings was calculated in [Table-2]. The projected area for the year 2019-20 was 24120.26 hectares and the projected seedling for the year was 59.57 crores.

Chilli registered a negative growth rate at -1.9 percent, hence decrease in area for the subsequent years. The projected chilli seedlings was 111.93 crores for the year 2019-2020 and it was 109.80 crores for 2020-2021. Based on the estimated area growth rate of brinjal, change in area was estimated during subsequent years (2019-20 to 2020-2021). The magnitude of increase in area was 13423 hectares (2019-2020) and 14311 hectares (2020-2021). The market potential of brinjal seedlings was 32.44 crores and 34.59 crores during 2019-20 and 2020-21 respectively.

Cabbage registered a positive significant growth rate of 1.2 percent per year. Hence, the projected area under cabbage was higher with the projected quantity of cabbage seedlings was 11.59 crores and 11.73 crores during 2019-20 and 2020-21 respectively. Cauliflower showed a positive growth rate of 9.6 percent and hence the projected area was also increased. The projected quantity of cauliflower seedlings for the cultivation in Tamil Nadu was 8.80 crores and 9.65 crores during the above period. The area under vegetable cultivation and market potential for vegetable seedlings are highly dependent on market price prevailing in the previous year. To meet the immense demand for vegetable seedlings, the establishment of commercial nurseries would inevitable as these nurseries provide the healthy seedlings which are basic input for production of vegetables. However, the quality standards might be developed in line with seeds to maintain quality in the market.

Economic of commercial vegetable seedlings under protected cultivation

The economics of commercial vegetable seedling production under protected cultivation is presented in [Table-3]. The market potential for commercial seedling of the selected crops, was estimated based on the average production of commercial vegetable seedling nurseries in Tamil Nadu.

The seedlings of tomato, chilli and brinjal are cultivated throughout the year, while the cabbage and cauliflower seedlings are cultivated only four months (September to December). The total cost of cultivating 2000 m² nursery was Rs. 10,62,965. The variable cost accounted to Rs.9,85,845 which includes expenditure on seeds, protraits, fertilizer, plant protection chemical, cocopeat and human labour and interest on working capital. The labour cost was maximum with 36.28 percent followed by seeds of selected vegetables accounted for 34.81 percent of the total variable cost. Filling of trays with pot mixture, sowing, irrigation and application of plant protection chemicals were labour intensive operations.

Fixed costs were accounted Rs.35,255 which includes depreciation on tank, pipe, sprayer, rose can, spade including shade net. Interest on fixed capital was Rs.21895. The gross returns obtained from vegetable seedlings was Rs.15,09,501. The income from tomato seedlings was high at Rs.5,98,878, followed by cabbage seedlings Rs.4,96,742. The income from brinjal, chilli and cauliflower seedling were Rs.1,64,206, Rs.1,30,340 and Rs.1,19,335 respectively. The average sale price of tomato seedling was higher accounts about ₹0.70 per seedling followed by cauliflower seedling at the rate of ₹0.60 per seedling whereas the average sale price of chilli, brinjal and cabbage seedling were uniform and about ₹0.50 per seedling.

Table-3 Cost and returns of commercial vegetable seedling production under protected condition (2000 m²)

SN	Particulars	Quantity	Rate per unit (Rs)	Value (Rs)
I.	Variable cost (A)			
1	Seeds			
a.	Tomato (Kg)	4	41500/kg	1,66,000 (16.85)
b.	Chilli (kg)	1.4	32000/kg	44800 (4.54)
c.	Brinjal (kg)	0.98	13000/kg	12250 (1.25)
d.	Cabbage (kg)	4	20000/kg	80000 (8.11)
e.	Cauliflower (kg)	1	40000/kg	40000 (4.06)
2	Protrays with 98 cells (no)	28175	6/tray	169050 (17.15)
3	Cocopeat (kg)	10000	3.5	35000 (3.55)
4	Fertilizer			2000 (0.20)
5	Plant Protection Chemical			14500 (1.47)
6	Human labour			
a.	Men labour	270 days	500	135000 (13.69)
b.	Women labour	810 days	275	222750 (22.59)
7	Working Capital			9,21,350
8	Interest on working capital (7%)			64494.5 (6.54)
9	Total Variable cost (A)			9,85,845 (100)
II.	Fixed cost(B)			
10	Rental value of land (Rs)			20000 (25.93)
11	Depreciation (Tank, Pipe, sprayers, rose can, spade, including shade net house) (Rs)			35225 (45.68)
12	Interest on Fixed capital (10%) (Rs)			21895 (28.39)
13	Total Fixed cost (B)			77120 (100)
C	Total cost (A+B)			10,62,965
D	Returns			
a.	Income from sale of tomato seedlings	855540	0.7	598878 (39.67)
b.	Income from sale of chilli seedlings	260680	0.5	130340 (8.63)
c.	Income from sale of brinjal seedlings	328413	0.5	164206 (10.88)
d.	Income from sale of cabbage seedlings	993485	0.5	496742 (32.91)
e.	Income from sale of cauliflower seedlings	198891	0.6	119335 (7.91)
D	Gross income			1509501 (100)
E	Net income			4,46,537

Note: Figures in the parentheses indicate percentage to total

Economic viability of Commercial vegetable seedling nurseries

Financial feasibility of commercial vegetable seedling nurseries was examined by employing net present value and benefit cost ratio measures. The net present value was Rs.3,94,718 for 2000 m² area at the rate of 12 percent discount rate. The BCR was 1.42 which was more than unity indicated that investment in nurseries was financially viable.

Marketing of vegetable seedlings

There was only one marketing channel present in commercial vegetable seedlings market. It was nursery units → vegetable grower. The farmers had to travel longer distances to procure required seedlings from nurseries if there were no commercial nurseries in their locality.

Constraints in production & marketing of commercial vegetable seedling nurseries

Table-4 Constraints in commercial vegetable seedling nurseries

SN	Particulars	Score	Rank
1	Delay of Payment by farmers	60.20	I
2	Competition among nurseries	56.53	II
3	Labour availability	51.92	III
4	Water scarcity	51.28	IV
5	Price fluctuation	42.77	V
6	Mortality of seedling	40.48	VI
7	Pest and Disease incidence	32.92	VII
8	Lack of technical guidance	27.72	VIII

It was concluded from the [Table-4], that delayed payment for seedlings was the major constraints faced by the commercial nurseries. Competition among nurseries was found to be the second major constraint followed by price fluctuation. Labour availability and water scarcity were ranked third and fourth constraints respectively. Hence, nursery units might adopt differential pricing for credit and cash sales. Further, competition might be avoided by branding of nursery seedlings. High level of mechanization and automation could also reduce the labour requirement.

Conclusion

The vegetable seedling production has emerged as a highly commercialized venture, wherein most of the farmers buy their seedlings from nurseries. The economic analysis showed that net income of the seedlings was Rs.4,46,537. Seedling raised under protected structure was economically viable which was inferred with net present value of Rs. 394718 and B-C ratio of 1.42. Thus, the vegetable seedling production under shade net condition was found to be profitable venture. Hence, rural youth might opt for commercial seedling production as business venture. The results of the analysis of market potential indicated that 60.47crores of tomato, 109.80 crores of chilli, 34.59 crores of brinjal, 11.73 crores of cabbage and 9.65 crores of cauliflower seedlings would be required to the farmers in Tamil Nadu. It was revealed from the results that the demand would grow in the near future.

Application of research: This study was attempted to examine the market potential and economic viability of commercial vegetable seedling nurseries in Tamil Nadu. Hence, it will gain interest among youngsters to take up a vegetable seedling production as a business venture.

Research category: Agribusiness Management

Acknowledgement / Funding: Authors are thankful to Agricultural College and Research institute, Tamil Nadu Agricultural University, Coimbatore, 641 003, India.

****Principal investigator or Chairperson of research: Dr C Velavan**

University: Tamil Nadu Agricultural University, Coimbatore, 641 003, India.

Research project name: MBA Thesis

Author contributions: All authors equally contributed

Author statement: All authors read, reviewed, agreed and approved the final manuscript. Note-All authors agreed that – Written informed consent was obtained from all participants prior to publish/ enrolment

Study area / Sample collection: Coimbatore, Krishnagiri, Dharmapuri and Tiruppur districts of Tamil Nadu

Cultivar / Variety / Breed name: Nil

Conflict of Interest: None declared

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors

Ethical Committee Approval Number: Nil

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