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Production Function and Returns Organic and Conventional Betel Leaf Cultivation: A Case study of Thanjavur District in Tamil Nadu

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Abstract

The production function in organic and conventional farming have been examined and the under organic farming has been assessed with respect to important sustainability indicators such as conservation of soil, water, power and farmers economic well-being and livelihood security. The study is based on primary data for 2012-13 collected from 30 organic farming and 30 conventional sample households from the Thanjavur district of Tamil Nadu. The organic farming sample households have been found younger and more educated having larger landholdings and better resources. The organic farming is labour intensive, but its cost of cultivation is lower due to saving on chemical fertilizers, irrigation, seeds and agrochemicals. The yield on organic farmer has been reported lower but it is more than compensated by the price premium received and yield and profit stability observed on the organic farming. In addition, the organic farming has been found superior in terms of economic well being and livelihood security of the farmer.

Keywords: Conventional, Income, Livelihood, Organic, Sustainability.

Introduction

Botanical name of betel vine is *Piper betel*. In India, it is known as 'pan'. Betel vine is a perennial, dio ecious, evergreen climber that is grown in tropics and subtropics for its leaves that are used as a chewing stimulant. In India, betel vine is grown as an important cash crop in southern parts, mainly in the states of Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu. Betel is also cultivated in Assam, Bihar, Madhya Pradesh, Maharashtra, Orissa, Tripura, Uttar Pradesh and West Bengal. Betel leaves has good export potential and India exports betel leaves to the countrieslike Pakistan, Bangladesh, Indonesia, Malaysia, Burmaand, Thailand. Soil with good organic matter and drainage system is best suited for betel vine growth. However, it can be grown on different types of soils such as heavy clayey loam; laterite and sandy loam soils.Varieties Based on shape, size, brittleness, and taste of leaf blade, betel vine is classified into pungent and non-pungent varieties. Important betelvine varieties cultivated in Andhra Pradesh are Karapaku, Chennor, Tellaku, Bangla and Kalli Patti and important betelvine varieties cultivated in Assam are Assam Patti, Awani pan, Bangla and Khasi Pan. Important betelvine varieties cultivated in Bihar are Desi Pan, Calcutta, Paton, Maghai and Bangla while important betelvine varieties cultivated in Karnataka are Kariyale, Mysoreale and Ambadiale. Important betelvine varieties cultivated in Kerala are Nadan, Kalkodi and Puthukodi and important betelvine varieties cultivated in Madhya Pradesh are Desi Bangla, Calcutta and Deswari. Important betelvine varieties cultivated in Maharashtra are Kallipatti, Kapoori and Bangla (Ramtek) while important betelvine varieties cultivated in Orissa are Godi Bangla, Nova Cuttak, Sanchi and Birkoli. Important betelvine varieties cultivated in Tamil Nadu are Pachai Kodi and Vellaikodi and important betelvine varieties cultivated in Uttar Pradesh are Deswari, Kapoori, Maghai and Bangla. Important betelvine varieties cultivated in West Bengal are Bangla, Sanchi, Mitha, Kali Bangla and Simurali Bangla. Stem cuttings having 3–5 nodes are used for propagation and these are planted in such a manner that 2–3 nodes are buried in the soil. A single node cutting with a mother leaf is also planted. Cuttings of the apical and middle portions of the vine are used for planting.

Two types of cultivation is practiced in India: open system of cultivation using support plants and closed system of cultivation using artificial rectangular structures called barejas. Constructionof Bareja (rectangularstructures) for artificial support and shade Barejas are normally made on slightly slopy land, near to a source of irrigation at a higher level than the adjoining area. There must be a slope in all directions for a quick drainage of excess water. Barejas are nothing but rectangular structures made up of bamboo or jute sticks which are normally having a height of 2–2.5 meters. These rectangular structures are covered with thatching using coconut leaves or straw or such other materials.

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Raising of support plants for natural support and shade Plants of Sesbania grandiflora, S. sesban, Erythrina variegata and Moringa oleifera are raised to provide support and shade. They are sown in 45–60cm rows at least 45 days before planting the cuttings of betelvine. Soil should be prepared well by 4–5 ploughings and land should be raised by 5–10cm from the adjacent areas, providing proper gradient on both sides for quick drainage. Afterwards, field beds of suitable size (15cm high and 30cm broad) are prepared. Before planting the cuttings, soil should be sterilized thoroughly.The betel leaf still retains its loyal customers, thanks to its traditional value, digestive properties and high calcium content. The sudden price rise can be attributed to reduced supply from Andhra Pradesh, which is a major supplier. However, this change in the wholesale market has not yet reflected on the `paan` business, largely because the paan kiosk owners do not want to lose their customers.

A senior official at the city-based agriculture produce market committee (APMC) said, "Andhra Pradesh, Tamil Nadu, West Bengal and Orissa are major producers of betel leaves. The erratic rain in December followed by cold wave damaged the plant and affected production. Whatever could be salvaged was transported to metros first, where sellers get higher returns. This created a shortage is smaller cities. A box carrying about 3,000 leaves is now sold for Rs 1,000, when the normal price for the same box is around Rs 400." Asif Tamboli, a commission agent at the APMC, said, "Betel leaves were never so costly. But fortunately the retail prices are unlikely to shoot up, as paan-vendors do not want to lose their customer base." Satara and Sangli districts are major producers of betel leaves in Maharashtra. But its small plantation size restricts marketing within the state. In this connection this article broad six heading, introduction, review of literature, objectives, tools use, result and discussion and conclusion.

Review of Literature

The deep green heart shaped leaves of betel vine are popularly known as *paan* in india. it is also known as nagaballi, nagurvel, saptaseera, sompatra, tamalapaku, tambul, tambuli, vaksha patra, vettilai, voojangalata etc in different parts of the country (csir, 1969; guha and jain, 1997). the scientific name of betel vine is *piper betle* l. it belongs to the family piperaceae, i.e. the black pepper family (gunther, 1952). the vine is a dioecious (male and female plants are different), shade loving perennial root climber. there are about 100 varieties of betel vine in the world, of which about 40 are found in india and 30 in west bengal (guha, 1997; maity, 1989; samanta, 1994). the most probable place of origin of betel vine is malaysia (chattopadhyay and maity, 1967). in spite of its alienness, the plant is much more popular in india than in any other country of the world since the antiquity. this would be evident from the numerous citations laid down in the ancient literature, particularly the indian scriptures. in these citations, significance of the leaves has been explained in relation to every sphere of human life including social, cultural, religious and even day-to-day life, which is very much relevant even these days. for example, a well-prepared betel quid is still regarded as an excellent mouth freshener and mild vitalizer, routinely served on the social, cultural and religious occasions like marriage, *puja* (religious festivals), *sraddha* ceremonythere are several studies relating to sustainable agriculture and transition from modern agriculture to organic agriculture. however, not many studies are available on the economic aspects of organic agriculture.

Howard and Albert (1940) draw attention to the destruction of soil and deals with the consequences of it. It suggests methods to restore and maintain the soil fertility. The study contains a detailed deposition of the famous Indore method of maintaining soil health. The reasons and sources of the erosion of soil fertility and its effect on living things are discussed. The criticism of the agriculture research and examples of how it had to be carried out to protect soil and its productivity are discussed in detail.

Rajendran and Basavaraj (2005) in their study note that in the era of modernization, it is difficult to refuse to adopt different modern farming methods and techniques and at the same time, it is not possible to completely give up the IKS merely for the reason that they are easily adoptable at local level. In fact the economic, environment and social consequences of modern farming have been widely addressed in the recent past and the literature favoring sustainable agricultural development. As a consequence, low external input sustainable agriculture, ecological farming and organic farming are being advocated across the globe. In this context the Indigenous Knowledge System (IKS) proves to be some solace, but strategy. Not much attention has been given to this important issue.

Rajendran and Tholkappian (2010) in their study on “Is Organic in Farming a Panacea for Food and Nutritional Security in India?” in their article observe that the modern farming system enabled to increase the food grain production substantially. Compounded with this, environmental degradation, loss in biodiversity and so on has been noticed. This has made individual thinkers to find alternative model and organic agriculture is found as sustainable and viable. In India many individuals and NGOs have been actively engaged in this domain. Nevertheless, there are some obstacles especially in marketing the organic products. Marketing for both inputs and output is found as either weak or underdeveloped. Appropriate and timely intervention will help solve the marketing problems. In this connection the filed experiences in Erode, Thanjavur district and elsewhere reveal that though the spread of organic farming is found as slow, it has much advantage like environment sustainability, crop diversity, economic viability and technical feasibility. Though it is an exploratory exercise, the sample farms are highly skewed.

Gandhimathy B, C Tholkappian and S Rajendran (2010) in their study on **"**Pesticide Application and its Adverse Impact on Health and Environment: Evidences from Kerala" observe that the increase the yield levels and production in agriculture. At the same time it should not be compromised with environmental loss and human cost. In the present case it is very clear that the banned pesticide has been used without any precautionary measures. Consequently, the entire biotic and abiotic system has been severely expressed. Local communities are helpless. Proper assessment, rigorous monitoring and environmental implications of synthetic chemicals should be ascertained will before allowing for large scale use. More significantly, the long term implications on the human health and environment need to be studied scientifically for sustainable development.

Mendoza (2002) notes that organic farming in general and organic rice farming in particular is more laborious than agrochemical depended modern rice farming in the Philippines. This study explains the amount of labor utilization on the modern rice farming and organic rice farming. As result organic rice farming can be more labor intensive depending on what operations (nutrient management) is involved. As a sown in audit, modern farming is more labor intensive especially after the adjustments on labor cost were made. Though it is a household study, it does not cover other crops including wheat and other major cereals.

Shirsagar (2008) study reveals the impact of organic farming on economics of sugarcane cultivation in Maharashtra. The study was based on primary data collected from two districts covering 142 farmers, 72 growing organic sugarcane and 70 growing conventional sugarcane. The results concluded that cultivation enhances human labor employment by 16.9 per cent and its cost of cultivation is also lower by 14.2 per cent than the conventional crop, it is more than compensated by the price premium received and yield stability observed on organic sugarcane farms. Overall, the organic sugarcane farming gave 15.63 per cent higher profits than conventional sugarcane farms.

Tholkappian C and S. Rajendran (2011) notes that organic sugarcane farming is important in achieving the goal of sustainable agriculture. It has been suggested that organic farming should receive prime attention from all the stakeholders to realize its full potential in increasing profitability and providing the much sought after of agriculture

Objectives

- The social background of organic and conventional betel cultivation in study area.
- To compare and contract the economic viability of organic and conventional betel leaves cultivation in study area.

Sample Propose

The present research was conducted in Tamil Nadu. The state has been purposefully selected due to the availability of data base relating to organic farmers and close proximity to the researcher Gandhigram Trust. The located Dindugal documents the details on organic farms. The New Delhi based, Centre for Service and Environment has also documented the particulars of. These two sources were used for elucidating the farmers list. Thanjavur district selected for primary data collection. These district purposefully selected because of the highly concentration of organic farmers in these district.

Model Dimension

As per the records of the Government there are 60 organic farmers, Thanjavur (30) district. The study covered all the 30 farmers practicing organic farming system. In order to make a comparative study a control group of 30 farmers practicing conventional agriculture were selected from the neighbour hood of organic farms. The criteria for selection of these farmers are that they represent the same characters of organic farmers in terms of socio – economic background, geographical location and crops grown. Thus there are 60 farmers in both the sample districts for the study.

Tools Use

Cost A1 relates to owner farm situation in which the farmers cultivate own land and also contributes other resources. Since all the sample growers are owner cultivators, this cost concept is appropriate to calculate cost of cultivation. It includes the following items of costs.

- Value of hired human labor.
- Value of owned and hired draught animal power.
- Value of owned and hired machinery charges including rent.
- Value of fertilizer.
- Value of manures (owned and purchased).
- Value of seed (both farm produced and purchased).
- Value of insecticides and pesticides.
- Irrigation charges (both owned and purchased).
- Canal water charges.
- Land revenue, cusses and other taxes.
- Depreciation on farm implements (both bullock-drawn and used by human labor)
- Depreciation on farm buildings, farm machinery and irrigation structure.
- Interest on working capital. Miscellaneous expenses (repairs to farm implements and artisans).

Cobb-Douglas Production Function

Cobb-Douglas production function has been the most widely used model in many empirical studies. Therefore, this functional form is used in the present analysis. The following Stochastic Production Frontier is

estimated.

$$\ln Y_{it} = \beta_{0t} + \beta_{1t} \ln X_{1it} + \beta_{2t} \ln X_{2it} + \beta_{3t} \ln X_{3it} + \beta_{4t} \ln X_{4it} + V_{it} + U_i$$

- X_{1it} = Value of farm power in rupees of i^{th} farm in the t^{th} period.
- X_{2it} = Value of organic nutrients in rupees of i^{th} farm in the t^{th} period.
- X_{3it} = Value of seed in rupees of i^{th} farm in the t^{th} period.
- X_{4it} = Irrigation charges in rupees of ith farm in the t^{th} period.
- V = Random variable and Assumed to be independent and identically distributed (iid) as N (0, σ_v 2) and independent of U_i random variables.

U_i= is firm-specific technical efficiency related variable and non-negative, Defined by the truncation (at zero of N $(0, \sigma_u^2)$.

Result and Discussion in Betel Leaf Cultivation

The characteristics of organic and conventional grooving farmer been recorded in Table 1.1. The average size of holding observed on sample farms, both organic and conventional, was quite big. The ownership of livestock is vital for practicing organic farming. The major livestock owned by sample farmers included bullocks, cows, buffaloes, sheep and goats.

Table I. Characteristics Organic and Conventional Sample Household In Thanjavur Farmer

Characteristics	Organic	Conventional
Social Background		
Average Family Size (Numbers)	4.3	**3.5**
Average Age of Family Head (Year)	38.9	**43.8**
Average Education of Family Head	11.08	**9.86**
Farmers with Agriculture as a Main Occupation (%)	92.32	**94.56**
Landholding		
Size of Owned Landholding (Ha)	6.12	**5.86**
Major Livestock Owned (Number per Household)	30	**30**
Value of Major Livestock Owned (Per Household)	75,120	**58,708**
Major Mechniery Owned (Number per Household	7.57	**5.08**
Value of Major Mechniery Owned (Per Household)	186,861	**12,185**
Betel Leaves	**10.30**	**14.10**

Source: Primary Data

The livestock position, depicted in table 1.1 revealed that the number as well as the value of livestock owned by organic farmers was higher than of conventional farmers. The better livestock position of organic farmers may be attributed to their higher demand for manures and other livestock products. The major machinery consisted of bullock carts, electricity pumps, drip irrigation, sprayer. The major machinery position was also better both in terms of number and value, on organic and conventional sample farmers.

Organic and Conventional Betel Leaf Cultivation

The Betel leaf is a very perishable commodity, commercial and annual crop grown mainly in Thanjavur district. Farming system, yield per acre, return from main product and return from by product, net returns per acre.

Table II. Cost and Return In Betel Cultivation (In ₹ Per Acre)

Si.no	Particulars	Thanjavur	
		Organic	Conventional
1	Biological Power	15680	**16500**
2	Organic Nutrition	1280	**750**
3	Chemical Fertilizer	-	**1500**
4	Seeds	8950	**8500**

5	Irrigation	1250	**1400**
6	Land Tax	450	**250**
7	Charges on Implements Machinery	3818	**4678**
8	Repair of Machineries	1460	**1870**
9	Total Cost of cultivation (1+2+3+4+5+6+7+8)	32888	**35448**
10	Yield (100 leaf / acre)	4200	**4950**
11	Prices Received (l00 leaf/ ₹)	18	**14**
12	Income from by product	2500	**2950**
13	Gross Returns (₹)	78100	**72250**
14	**Net Return (₹) (12-9)**	**45212**	**36802**

Source: Survey Data

Net return from Betel was found to higher from organic farms (₹ 45212 per acre) compared to conventional farms (₹ 36802 per acre). Similarly the gross returns were (₹ 78100 per acre) from organic agriculture and (₹ 72250 per acre) conventional farms.Relatively higher cost of cultivation in conventional agriculture is due to higher cost of chemical fertilizer like urea, potash, complex and salt were expensive. Changs of farm implemented machinery charge is higher in organic agriculture due to more use of farm equipments. Marginal differences could be seen in other costs expect for biological power. Because the cost of the transportation of FYM weeding, harvesting and its administration requires more labor, which is reflected in the biological power. Betel leaf is traditionally known to be useful for the treatment of various diseases like bad breath, boils and abscesses, conjunctivitis, constipation, headache, hysteria, itches, mastitis, mastoiditis, leucorrhoea, otorrhoea, ringworm, swelling of gum, rheumatism, abrasion, cuts and injuries etc as folk medicine while the root is known for it's female contraceptive effects. The essential oil contained in the leaves possesses antibacterial, anti protozoan and anti fungal properties. Therefore, the oil kills or inhibits growth of dreadful bacteria causing typhoid, cholera, tuberculosis etc. A cursory look at the cropwise costs and returns indicates that except for a limited situation (crops), the returns are quite high for organic growers. It is also to be remembered that the expenditure under organic farming is also little high. But overall the viability of cultivation is found favour for organic system. Some crops like maize, banana and paddy are exclusively grown for domestic consumption. Sometimes the sample farmers distribute the products as free/gift to their kith and kin.

A View of Organic Betel Vine Yard in Thanjavur District

Conclusion

Organic agriculture is economically profitable compared to modern agriculture. The study revealed that farm business income from organic agriculture is greater than that from conventional agriculture in the betel leaves cultivation. The study showed that ecological farming is an integrated system of farming and livestock. Organic farmers shall keep livestock for the supply of farm yield manure, though many are depending on outside sources of farm yield manure to supplement. Very few modern farmers own livestock. Majority of the ecological farmers have invested on agriculture in the farm of pump sets, tractors and other agricultural implements while very few of the modern farmers own these implements. Initiatives from the state, civil societies and scientists for promoting organic farming will improve this sector. Due to health, economic and environment reasons, people demand more of chemical for food items. This is more evident from the data for global level. Middle income households in domestic market also look out for such products. Hence comprehensive and continuous efforts must be intimated on this right direction.

References

1. Chattopadhyay, S. B. and Maity, S.: *Diseases of Betelvine and Spices*. ICAR, New Delhi (1967)
2. Howard and Albert (1940) "An Agriculture Testament", Research Foundation for Science, Technology and Ecology, New Delhi.
3. Rajendran S and S M Basavaraj (2005), "Relevance of Indigenous Knowledge Systems for Sustainable Agriculture", Ed. *A Southern Economist Publication:* 358-361.
4. Rajendran S and C Tholkappian (2010) "Is Organic In Farming A Panacea for Food and Nutritional Security in India? "Paradox *of Poverty and Economics Prosperity"* Ed: Mani and S. Annamalai, Serial Publication Fourth coming.
5. Samikkha (1994). "A Report on the Problems and Solutions of Betel Vine Cultivation". A booklet published by Mr. H. R. Adhikari, C-2/16, Karunamoyee, Salt Lake City, Kolkata-64 (WB), India
6. Mendoza Teodoro C (2002), "Impact Analysis of Organic Farming in Rice Agro-ecosystemsin the Philippines", *Paper presented during the 1st RDA/ARNOA International Conference on Asian Research Network of Organic Agriculture*, held at Suwon and Cheonan, Korea, during Nov:12-15.
7. Shirsagar KG (2008) "Impact of organic farming on economic of sugarcane Cultivation in Maharashtra", Working paper:15 Gokhale institute of Politics and Economics, Pune.
8. Tholkappian C and S. Rajendran (2011) " Organic Sugarcane Farming Development of Sustainable Agriculture in Tamil Nadu"*Agriculture and Rural Development"*ED: Dr.Sundara Raj, ISBN:978-81-904529-8-4:109.114.
9. Tholkappian C and S. Rajendran (2011) Pesticides Application and its adverse Impact on Health : Evidences from Kerala *International Journal of Sciences and Technology*, 1(2):51-59.