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ARTICLE

Estimation on Financial Viability on Coconut Gardens Using Integrated Nutrient Management

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Abstract

Coconut is a small holder's crop in Kerala. About 90 percent of the coconut growers are small and marginal farmers with less than two hectares of land. It is mostly grown as a homestead crop. The farmers consider coconut as cash in hand as they can collect their daily requirements of food from the sale proceeds of the coconut on any day they like. As per the economic analysis treating palms by integrated nutrient management is economically attractive. The cost of fertilizer is increasing on a yearly basis which if not used continuously the soil health and vigour of palms and also the yield will be affected. On the contrary, if organic farming technology (to reduce labour involvement and to encourage on farm resource utilization) has to be standardized and transferred to farmers for adoption it will not adversely affect soil health, water quality, biodiversity, atmosphere and renewable energy sources. An attempt was made to measure the productivity and ret of capital by estimating 1. Net present value, 2. Benefit- Cost ratio and 3. Annuity value of cultivation .The input cost of cultivation and returns obtained were used for the computations. Average price received by farmers was taken into account to arrive at the returns of farmers from the sale of nuts till 2011. It is assumed that the price of nuts increases @ 5% per annum from 2012 onwards, and the returns from the palms were calculated up to 2021. Net present value is the present worth of the net cash flow stream. The formal selection criteria for the net present value measure of project is to accept all project with a positive net present value when discounted at the opportunity cost of capital. Benefit-Cost ratio is the ratio between present worth of benefits and that of costs. This indicates the return per rupee of investment. If the estimated figure is greater than unity the project is considered viable. In this work B-C ratio was found to be more than unity in 1/4th fertilizer+ organic debris and 25. Kg. cow dung+ bio fertilizer + organic debris i.e., 1.426 and 2.028 respectively. In the control plot the B-C ratio was also more than unity ie, 1.203. Annuity value indicates the average annual discount net return from plantations which can be compared with the per year net return of annual crops. The annuity value or discounted annual net income realized by the coconut orchards was the highest in 25. Kg. cow dung + bio fertilizer + organic debris and 1/4th fertilizer+ organic debris treatments. This reveals that the discounted net income was high compared to the costs incurred.

Keywords: Benefit-Cost ratio, Net present value, Annuity value

Introduction

Agricultural research in India has focused mainly on increasing the productivity of crops, while the farmer's objective is to realize better profitability. Hence, this study focuses to find out the economic aspects of the different treatments. The cost concept developed for field crops are not fully relevant to perennial crops as they limit the annual maintenance cost. As perennial crops have long gestation period, any cost calculation with respect to the crops should include 1. Estimating the cost on raising a garden to the bearing stage i.e., establishment cost, 2. Estimating the annual cost for maintaining a garden including the harvest changes. To test the economic worthiness of the investment in palms, three common indicators of the financial analysis suggested by Gittinger (1984) viz, Benefit- Cost Ratio (BCR), the Net Present Value(NPV) and Internal Rate of Return (IRR) were applied by Karunanayakae (1990), Korikanthimath et. al. (1998), Bhalerao et. al. (1985). Organic farming may not lead to higher production and income in the short run as its returns are of long term nature. It is initially a soil building process, organic farming systems ensure inherent capacity to maintain and increase soil health and fertility leading to sustained increase in yield and production and sustainability of crops, this results in stability and a high jump in income and sustainability in agriculture.

Materials and Methods

A field experiment was undertaken at the Regional Station, Central Plantation Crops Research Institute, Kayamkulam. (Latitude 900 48'N, longitude 760 19'L and altitude (MSL) 3.05 above sea level. The present experiment was done with sandy loam soil with pH 5.0-6.0 and the West Coast tall variety of coconut palms. The field was divided with earthen bunds of 8 equal parts of 20X20 m. measurements to avoid erosion and to conserve the fertility. The field was left for priming skipping chemical fertilizers for about a year. Taking cue from the Vedic preparations of "Panchagavya to Karve's super manure and Palekkar's jeevamritham" cow-dung based preparation was made with the following com-

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ponents. The preparations were kept for natural fermentation for a period of 72 hrs. Components are Cow dung-50 gm, Cow's urine-25 ml, Jaggery-10 gm, Grounded soaked -pea-10 gm, Wellwater-1000ml. As this batch of preparation harboured higher population of beneficial microbes, the culture was enriched by repeated fermentation in a cascade type of operation. The sediment of the decanted preparation was shade dried and kept for an extended period of 120 days evaluating the population at an interval of 15 days. The enriched preparation of shade dried inoculum was used for further bulk and applied on field. The soil samples were collected from selected palms of experimental plot Control Plot of CPCRI, Kayamkulam, during the month of June. The study was conducted from 2008-2011 in CPCRI, RS, Kayamkulam.With respect to perennial crops like coconut, having a long gestation period and continuous yield for a number of years, calculation of cost should include both the cost of establishing the crop as well as its maintenance . Maintenance cost was computed from the age group of 15-35 years and more than 35 years. The palms in the selected holdings were post stratified, on the basis of their age, into four groups. 1. up to 1 year old, 2. 2-3 years old, 3. 4-7 years old, and 4. 8-14 years. The establishment costs were computed as follows: The basic assumption was that the costs up to the 7 th year constitutes the establishment cost since most palms belonging to West Coast variety start bearing by the 8th year and stabilized production from 14th year onwards. The cost up to the age of 7 years was considered as establishment cost.

Average of the input-output prices for the years 2009-2011 were used for the study because on 2008 no inputs were applied. Per ha. cost of cultivation was worked out as per the actual expenditure incurred in establishing the treatment orchards as per the records maintained by CPCRI, RS, Kayamkulam. To estimate cost of production, annuity value method was used.. Annuity value at the market rate of interest (10%) has been calculated using the formula (Nelson et. al., 1973) given below.

$$A= i/i-(1+i)^{-n}$$

Where A is the annuity value, i = rate of interest and n=bearing period in years.

Capital productivity analysis is the most important tool for evaluating the financial feasibility of perennial crops. It brings out the efficiency of capital use in production. There are various methods to measure the capital productivity. The measures used in this study were 1. Benefit- Cost Ratio (BCR) and 2. Net Present Value (NPV). This was calculated on assumption that 1. Discounting factor @ 10%, 2. Main tenance cost is same in all the years after 2012 which will be economical. 3. Number of nuts per ha. worked out based on five year average number of nuts, 4. Price of nuts increases @ 5% per annum from 2012 onwards.5 All calculations are based on the information provided per ha. 6. Seedlings average age is 6 years and will become bearing in another two years and the average age of bearing palms is 20 years in all the treatments

Results and Discussion

The cost of input was maximum in 1/4th fertilizer+ 25. Kg. cow dung + organic debris and 25. Kg. cow dung+ bio fertilizer + organic debris followed by full dose of chemical fertilizers (Table 1). The items required for working out the cost of production are the annual cost of cultivation of bearing palms, annuity value of the total establishment cost based on the economic life span of the crop and annual yield.

Data on the number of bearing palms in the holdings, number of harvest, number of palms, number of nuts were compiled for working out the average yield of the palm in a holding from the year 2007- 2011. The maximum nuts were obtained from 25. Kg. cow dung + bio fertilizer + organic debris.

Since the study starts from 2007 onwards returns from coconut from 2007-2011 were studied. The average farm gate price during the study period 2007-2011 was 3.84, 5.28, 4.49, 5.67 and 9.04 respectively. Income from byproducts was not considered for computing the gross returns. The net returns are shown in Table 2. An attempt was made to measure the productivity and ret of capital by estimating 1. Net present value, 2. Benefit- Cost ratio and 3. Annuity value of cultivation.

The input cost of cultivation and returns obtained were used for the computations. Average price received by farmers was taken into account to arrive at the returns of farmers from the sale of nuts till 2011. It is assumed that the price of nuts increases @ 5% per annum from 2012 onwards and the returns from the palms were calculated up to 2021. The results of financial viability of coconut gardens (ha.) are furnished in Table 3.

Net present value is the present worth of the net cash flow stream. The formal selection criteria for the net present value measure of project is to accept all project with a positive net present value when discounted at the opportunity cost of capital.

Benefit-Cost ratio is the ratio between present worth of benefits and that of costs. This indicates the return per rupee of investment. If the estimated figure is greater than unity the project is considered viable. In this work B-C ratio was

Table 1. Input cost of bearing palms

TREATMENTS	2009	2010	2011
Control(full dose of chemical fertilizer)	16600	17250	17500
T1 (reduced fertilizer + organic debris.)	13050	13550	13750
T2 (reduced fertilizer + 25kg.cowdung+organic debris)	19250	20050	20550
T3 (25kg. cow dung + Bio fertilizer + organic debris.)	19200	20000	20500
T4 (Biofertilizer + organic debris.)	12900	13500	13700

Table 2. Net returns from coconut

TREATMENTS	2007	2008	2009	2010	2011
Control(full dose of chemical fertilizer)	6989	8131	9115	11113	15820
T1 (reduced fertilizer + organic debris.)	2765	5322	5496	7348	12367
T2 (reduced fertilizer + cow dung)	7434	8828	17385	9480	14319
T3 (cow dung + Bio fertilizer)	9953	16727	11638	21637	33846
T4 (Biofertilizer)	3625	5919	5298	7025	10667

Table 3. Financial viability of coconut gardens

TREATMENTS	NPV	BCR	2009
Control(full dose of chemical fertilizer)	46586	1.203	2101
T1 (reduced fertilizer + organic debris.)	90577	1.426	4086
T2 (reduced fertilizer cow dung)	-64837	0.732	-2925
T3 (cow dung + Bio fertilizer)	247340	2.028	11157
T4 (Biofertilizer.)	-13682	0.936	-617

found to be more than unity in 1/4th fertilizer+ organic debris and 25. Kg. cow dung+ bio fertilizer + organic debris i.e., 1.426 and 2.028 respectively. In the control plot the B-C ratio was also more than unity i.e., 1.203.

Annuity value indicates the average annual discount net return from plantations which can be compared with the per year net return of annual crops. The annuity value or discounted annual net income realized by the coconut orchards was the highest in 25. Kg. cow dung + bio fertilizer + organic debris and 1/4th fertilizer+ organic debris treatments. This reveals that the discounted net income was high compared to the costs incurred.

The acceptance of any technology developed by farmers ultimately depends on the economics of the crop production. Among the different indicators of monitory efficiency, the economics in terms of net returns and B:C ratio have a greater impact on the practical utility and acceptance of technology.

The input cost incurred the materials used to provide manures, transportation, irrigation, fertilizers, mulching and crown cleaning and harvesting. Crown cleaning was often clubbed with harvesting operations. In all the treatments better management practices like organic addition brought through leaf litter recycling, stem flow through fall and biological activity and beneficial interactions of the different components were applied. Though damage of nuts due to eriophyid mite incidence was reported, remedial measures were also taken using marotti cake and sand in all the treatments. Cost of hired labour was worked out for various operations such as basin management, irrigation and intercultural operations performed during the study. Labour utilization was low for seedlings than in bearing palms. In bearing palms, harvesting charge was the major component of hired labour cost, followed by basin management. Sud et. al. (2009) reported similar observations and they also reported that charges for climbing young palms were comparatively low which also resulted in reduced harvesting charges. But sometimes harvesting operations were combined with crown cleaning for which the wage rate was high. Input cost was high in reduced fertilizer + cow dung + organic debris, and cow dung + Bio fertilizer + organic debris. In these treatments cow dung was the major component. The yield was highest in cow dung+ Bio fertilize+ organic debris followed by control plot and in reduced fertilizer+ organic debris treated palms.

The productivity of coconut gardens was worked out from 2007 onwards and the maximum production in 2011 was reported in cow dung+ Bio fertilizer + organic debris and so the net return was also high in this treatment. Financial viability was also worked out by finding the Net present value, Benefit- Cost ratio, and Annuity value. In this work Benefit-Cost ratio was found to be more than unity in cow dung+ bio fertilizer + organic debris with organic pest management over rest of the organic treatments and the next best was reduced fertilizer+ organic debris with chemical plant protection which could be attributed to the higher yield. The number of bearing palms in reduced fertilizer+ organic debris, reduced fertilizer + cow dung+ organic debris, cow dung+ bio fertilizer + organic debris ,bio fertilizer + organic debris and in the control plot were 72, 88, 72, 59 and 70 respectively. In the control plot the Benefit-Cost ratio was also more than unity i.e. 1.203. If the Benefit-Cost ratio is greater than unity the project is considered viable. Here in this work the above three treatments show B-C ratio above unity and in cow dung+ bio fertilizer + organic debris it is above 2 and in bio fertilizer + organic debris with organic pest management B-C ratio was 0.936 and in reduced fertilizer + cow dung+ organic debris, the B-C ratio was 0.732. This is because number of bearing palms in bio fertilizer + organic debris is less than in other plots and also due to the higher cost of ingredients used for the preparation.. Definitely B: C ratio. Will be higher in this treatment provided the farmer's produce this manure on their own farm. These results are in accordance with those of Yadav

and Christopher (2006); Shwetha and Babalad (2008) and Sai Ram et al. (2004) studied about the cost of production and capital productivity of coconut in Kerala using only chemical fertilizers. In their work the Benefit-Cost ratio was marginal, i. e., 1.02. They found that a small price can adversely affect the project worth. Price fluctuations may affect the management operations and ultimately effect the production.

Marketing of coconuts differs from that of fresh fruits due to the durability of coconut, and it can be sold as tender nut as well as mature nuts. From 2007 to 2011 the gate price of coconut showed variations. Seasonality in supply and perishable nature of agricultural produce are the major causes of price fluctuations of agricultural commodities. Other than seasonality, trend and cyclical fluctuations are also the important components of price variations. (Babu et al., 1996; Gadhavi et al., 2001).

Coconut is a small holder's crop in Kerala. About 90 percent of the coconut growers are small and marginal farmers with less than two hectares of land. It is mostly grown as a homestead crop. The farmers consider coconut as cash in hand as they can collect their daily requirements of food from the sale proceeds of the coconut on any day they like. The economic analysis shows that treating palms by integrated nutrient management is economically attractive. If chemical fertilizers is applied in recommended dose, the cost of fertilizer is increasing year by year , and if not used continuously the soil health and vigour of palms and yield will be affected and the application become unattractive and if organic farming technology (to reduce labour involvement and to encourage on farm resource utilization) has to be standardized and transferred to farmers for adoption it will not adversely affect soil health, water quality, biodiversity, atmosphere and renewable energy sources. In addition if the Government intervenes in highly fluctuating price situations, the coconut farmers should get adequate income by adopting integrated nutrient management.

Summary and Conclusion

Gross returns, net returns and B:C ratio were significantly higher with the application of reduced fertilizer and cow dung and cow dung + biofertilizer. The control plot also showed B: C ratio more than unity.

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