

# **An Integrated Model for Small Farm Profitability – a case study**

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## **Introduction**

Predominance of small holdings and the homestead farming system of agriculture distinguishes Kerala agriculture from the rest of the country. Homestead farming is a complex and innovative land use system prevalent in several tropical countries where limitation of size of holdings necessitates accommodation of a large number and variety of crops and enterprises in the same piece of land as a means of subsistence and as a source of cash income. They are mostly coconut based, low external input systems with a corresponding low output and consequent low income. The crop mix and cultivation practices are often guided by the farmer's own perceptions and convenience rather than by any scientific recommendations.

Systematic scientific attempts at restructuring and modification of the homesteads for enhancing productivity have been very limited, mainly due to the complexity and variability of the system. An attempt was made by the Farming Systems Research Station, Kerala Agricultural University to develop integrated farm models for resource use efficiency as well as profit maximization of homesteads of Kerala. This paper discusses some of the models thus developed for small farms.

## **Study Area**

The study mainly focuses on homesteads of Kollam district which comes under the South Zone of Kerala. The district adequately represents the four agro-ecological regions of the State, namely lowland, midland, upland and the hill zone. The topography is undulating with elevations ranging from below Mean Sea Level to 2694 m above MSL. The district receives an annual average rainfall of around 2500mm distributed over the two monsoons with maximum in the South West monsoon during May-June to

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July- August. The temperature ranges from 23°C to 34°C. Irrigation facilities are limited and most of the homesteads are rainfed. The case study discussed in this paper pertains to a farm in Thrikkaruva panchayath in Anchalumoodu block panchayath of Kollam district. It is located on the banks of the Ashtamudi lake in the coastal lowland region. The soil type is sandy loam.

## **Objectives**

The study was undertaken with the following objectives.

1. To prepare an inventory on the homesteads of the Zone
2. To develop integrated farming models for resource use efficiency and profit maximization.

## **Methodology**

A comprehensive data base on the homestead farming system of the district was collected during the year 2001-02 by personal interview method with the help of a pre tested questionnaire. The collected data pertained to demographic profile and socio economic characters of the respondents, land holding and land use pattern, cropping pattern and cultivation practices, marketing and returns as well as constraints to farming. The data of each farm were critically analyzed by a multidisciplinary team of scientists to identify possibilities of improvement and probable interventions were identified. These were then discussed with the farmers concerned and based upon their willingness and preferences the interventions were implemented under scientific supervision and monitored. Data were recorded and modifications and improvements were made periodically. One such integrated model which was especially successful is discussed in the following pages.

## **Results and Discussion**

Benchmark information on the homestead selected is given in Table 1 below.

**Table 1: Benchmark information on selected farm (Year: 2001-02)**

| Sl. No. | Particulars             | Details                                                                                                                            |
|---------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| 1       | Age of the farmer       | 56                                                                                                                                 |
| 2       | Main occupation         | Agriculture                                                                                                                        |
| 3       | Area owned              | 0.04 ha                                                                                                                            |
| 4       | Crops cultivated        | 1. Coconut – 28 Nos.<br>2. Banana – 900 Nos<br>3. Other perennials<br>mango (4), jack (2), sapota (1), papaya (4)<br>4. Vegetables |
| 5       | Other activities        | Nil                                                                                                                                |
| 6       | Source of irrigation    | Two open wells with electric motors                                                                                                |
| 7       | Source of labour        | Self, supported by hired labour during peak seasons of labour requirement                                                          |
| 8       | Manures and fertilisers | Excess use incurring loss on cost of inputs and poor keeping quality of produce.                                                   |
| 9       | Plant protection        | Indiscriminate use of pesticides and fungicides often guided by the local dealer.                                                  |

### Interventions suggested

The interventions suggested by the multidisciplinary team of scientists included the following:

- Increase in cropping intensity by introducing new annual and perennial crops
- Diversification of farm by integrating new subsidiary enterprises.
- Emphasis on organic agriculture through farm waste recycling.
- Correcting/improving farmer's practices with respect to a) manurial practices, b) plant protection and c) irrigation.

The following interventions were implemented after detailed deliberations with the farmer.

Table 2. Interventions Implemented and their Impact (2005-06)

| Sl. No.                          | Intervention suggested           | Interventions implemented                                                                  | Additional cost (Rs.) | Additional benefit (Rs) | Other implications                                                                  |
|----------------------------------|----------------------------------|--------------------------------------------------------------------------------------------|-----------------------|-------------------------|-------------------------------------------------------------------------------------|
| 1                                | Correcting cultivation practices | Correct package of practices manures and fertilizers                                       | Nil                   | 3630                    | Savings in cost. Reduction in environmental pollution and health hazards.           |
|                                  |                                  | Integrated pest management                                                                 | Nil                   | Not assessed            |                                                                                     |
| 2                                | Increasing cropping intensity    | 1. Black pepper -100                                                                       | 950                   |                         | More efficient use of land. Generation of cash income.                              |
|                                  |                                  | 2. Vanilla -50                                                                             | 2500                  |                         | Familiarization with new crops and improved varieties of crops. Nutrition security. |
|                                  |                                  | 3. Arecanut -50                                                                            | 1250                  |                         |                                                                                     |
|                                  |                                  | 4. Cardamom – 100                                                                          | 5550                  | 11450                   |                                                                                     |
|                                  |                                  | 5. Nutmeg -2                                                                               | 50                    |                         |                                                                                     |
|                                  |                                  | 6. Garcinia – 2                                                                            | 50                    |                         |                                                                                     |
|                                  |                                  | 7. Glyricidia – 100                                                                        | 0                     |                         |                                                                                     |
|                                  |                                  | 8. Bush jasmine – 50                                                                       | 600                   |                         |                                                                                     |
|                                  |                                  | 9. Vegetables – Bitter gourd, brinjal, cowpea, chillies, drum stick, ivy gourd and tubers. | 500                   | 700                     |                                                                                     |
|                                  |                                  | 10. Banana - 500                                                                           | 22500                 | 40000                   |                                                                                     |
| Introduction of new enterprises* |                                  |                                                                                            |                       |                         |                                                                                     |
| 3                                | Backyard poultry                 | 100                                                                                        | 39228                 | 16812                   | Nutrition security                                                                  |
| 4                                | Japanese quail                   | 300                                                                                        | 37072                 | 10028                   | Employment & income to women & children                                             |
| 5                                | Goat                             | 10                                                                                         | 15400                 | 15600                   |                                                                                     |
| 6                                | Ornamental fish                  | 300 pairs                                                                                  | 3310                  | 5090                    |                                                                                     |
| 7                                | Ornamental poultry               | 25 pairs                                                                                   | 10100                 | 9500                    | Income and employment generation                                                    |
| 8                                | Nursery                          | 1. Cardamom - 500                                                                          | 2000                  | 23000                   | Source of organic manure                                                            |
| 9                                | Vermi composting                 | Low cost unit                                                                              | 16510                 | 20400                   | Income from sale of worms & compost.                                                |

\*The costs are high because of the initial investment costs.

The model developed was periodically assessed and appropriate modifications were made in the components as well as in management. The data on costs, returns and labour use were collected and analysed to assess the superiority or otherwise of the model developed.

The economic indicators related to the integrated model developed are given in Table 3.

**Table 3. Economic indicators related to the Integrated Model**

| Sl. No. | Indicators              | Pre- intervention | Post intervention |
|---------|-------------------------|-------------------|-------------------|
| 1       | No. of crops            | 6                 | 15                |
| 2       | No. of activities       | 1                 | 8                 |
| 3       | Cropping intensity (%)  | 158               | 168               |
| 4       | Gross farm income (Rs.) | 110200            | 309920            |
| 5       | Net farm income (Rs.)   | 44650             | 147710            |
| 6       | Efficiency*             | 1102              | 3099              |
| 7       | BC Ratio                | 1.68              | 1.91              |
| 8       | MER**                   | 1                 | 2.81              |

\* Efficiency is defined as an output per unit of some input (Spedding, 1973.)

$E = O / I$  where

O refers to total monetary return from the system

I is input in terms of land area.

\*\* Monetary Equivalent Ratio (MER) is defined as the sum of the ratios of intercrop monetary returns to the highest sole crop monetary return from the entire land area occupied by all intercrops per unit time (Adetiloye and Adekunle, 1989). MER measures the economic superiority or otherwise of intercropping over the most economic sole crop.

$$MER = (ra + rb + rc + \dots + rn) / Ra$$

Where  $Ra = Pa \times Ya$ , highest sole crop monetary return obtained from crop a, here banana was the crop displaced for introduction of other crops/activities.

$$ra = Pa \times ya; rb = Pb \times yb; \dots + rn = Pn \times yn$$

Where  $ra, rb, \dots, rn$  are the monetary returns from crops and activities (a, b, c, ..., n) in the farm

$y_a, y_b, \dots, y_n$  are the yields obtained from the various crops and activities (a, b, c, ..., n) and  $P_a, P_b, \dots, P_n$  are the current market prices of outputs a, b, ..., n.

The data presented in Table 3 clearly reveals the superiority of the integrated system developed and the indicators will be still better once the system fully establishes and all components come to bearing.

### **Other impacts**

The indirect and intangible benefits to the beneficiary have been evaluated on the basis of the apparent improvement in the physical quality of life as evidenced by the possession of certain expensive consumer goods, exposure to mass media and perceptible changes in his status among the farming community as well as among the general public. The increase in farm income has enabled him to purchase a TV, land phone as well as mobile phone, which were kept as low key priorities earlier, for want of money.

In contrast to an insignificant personal profile in the pre project period, he has attracted considerable media attention with more than five articles appearing in the most widely circulated newspapers and farm journals. A radio programme and a TV programme have also been produced on his entrepreneurial skills and achievements. Coverage in popular media like TV, magazines and newspapers has enhanced his position among the farming community and a number of farmers and others interested in farming visiting his farm is increasing day by day. His well acclaimed expertise in the cultivation of banana, cardamom, cardamom seedlings, vermicomposting etc. has elevated him to the status of a master trainer in these areas.

### **Conclusion**

The primary focus of traditional homestead farms worldwide had been on subsistence. But in a state like Kerala where majority of the farmers depend on small farms for their livelihood, the emphasis has to some extent shifted from subsistence to income generation. The productivity, profitability, income and employment generation of the small farms can be increased tremendously through integrated farming. The crop mix, species composition and diversity of activities the farmer willingly experimented on his farm, validate the above point. The fact that he continues all of them even two years after withdrawal of financial support is further proof of the success of the model developed.

It is concluded that the homestead farms of Kerala could be successfully remodeled giving emphasis on cash generation, at the same time retaining their subsistence orientation through diversification of crops and enterprises. Policy initiatives and institutional support by way of research, credit, input supply and marketing facilities could greatly facilitate this change.

## References

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- Acknowledgement: The financial assistance rendered by the NATP is gratefully acknowledged.

# Annexure I: Spacing\* and Climatic Requirement of Crops in the Model

| Crop                                | Nature            | Variety                                                             | Spacing     | Soil & Climate                                                                                                                          |
|-------------------------------------|-------------------|---------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Banana<br>(Musa spp.)               | Fruit             | Nendran                                                             | 2 x 2 m     | Well drained fertile soil<br>Performs well in open conditions                                                                           |
|                                     | Fruit             | Njalipoovan,<br>Palayankodan                                        | 2 x 2 m     | Performs well under open & shade                                                                                                        |
| Black pepper<br>(Piper nigrum)      | Spice             | Karimunda                                                           | 3 x 3 m     | Light well drained porous soil rich in organic matter. Annual rainfall of 150-300cm. Performs well under shade.                         |
| Bush jasmine<br>(Jasminum sambac)   | Ornamental        |                                                                     | 1.2 x 1.2 m | Wide range of soils. Well drained sandy loam & red loam best. sunshine, low rainfall                                                    |
| Cardamom*<br>(Elettaria cardamomum) | Spice             | Local variety<br>"Kanni elam"<br>ideal for growing in low altitude. | 2 x 2 m     | Well drained, deep, good textured soil rich in humus.<br><br>Shade loving crop, performs best under an altitude of 600-1200m above MSL. |
| Camboge<br>(Garcinia gummi-gutta)   | Spice             | gummi-gutta                                                         | 4 x 4 m     | Performs best in river banks and valleys, but grows well in dry regions in plains as well as hill tops.                                 |
| Gliricidia<br>(Gliricidia maculata) | Green leaf manure |                                                                     | 3 x 3 m     | can be planted along the boundary as a live fence. The tree can be used for trailing black pepper.                                      |
| Nutmeg<br>(Myristica fragrans)      | Spice             |                                                                     | 8 x 8 m     | Well drained soil rich in humus<br>Hot humid climate                                                                                    |
| Vegetables                          | Culinary          | Bitter gourd, chilli, egg fruit, cowpea, little gourd               |             | Rich well drained soil, good sunshine and irrigation.                                                                                   |

\* None of the above crops are planted in the recommended spacing as all of them are intercrops. Cardamom is accommodated in the space created by sacrificing banana. Trees like nutmeg and camboge are planted towards the border. Gliricidia is planted along the boundary and black pepper is trailed on them.