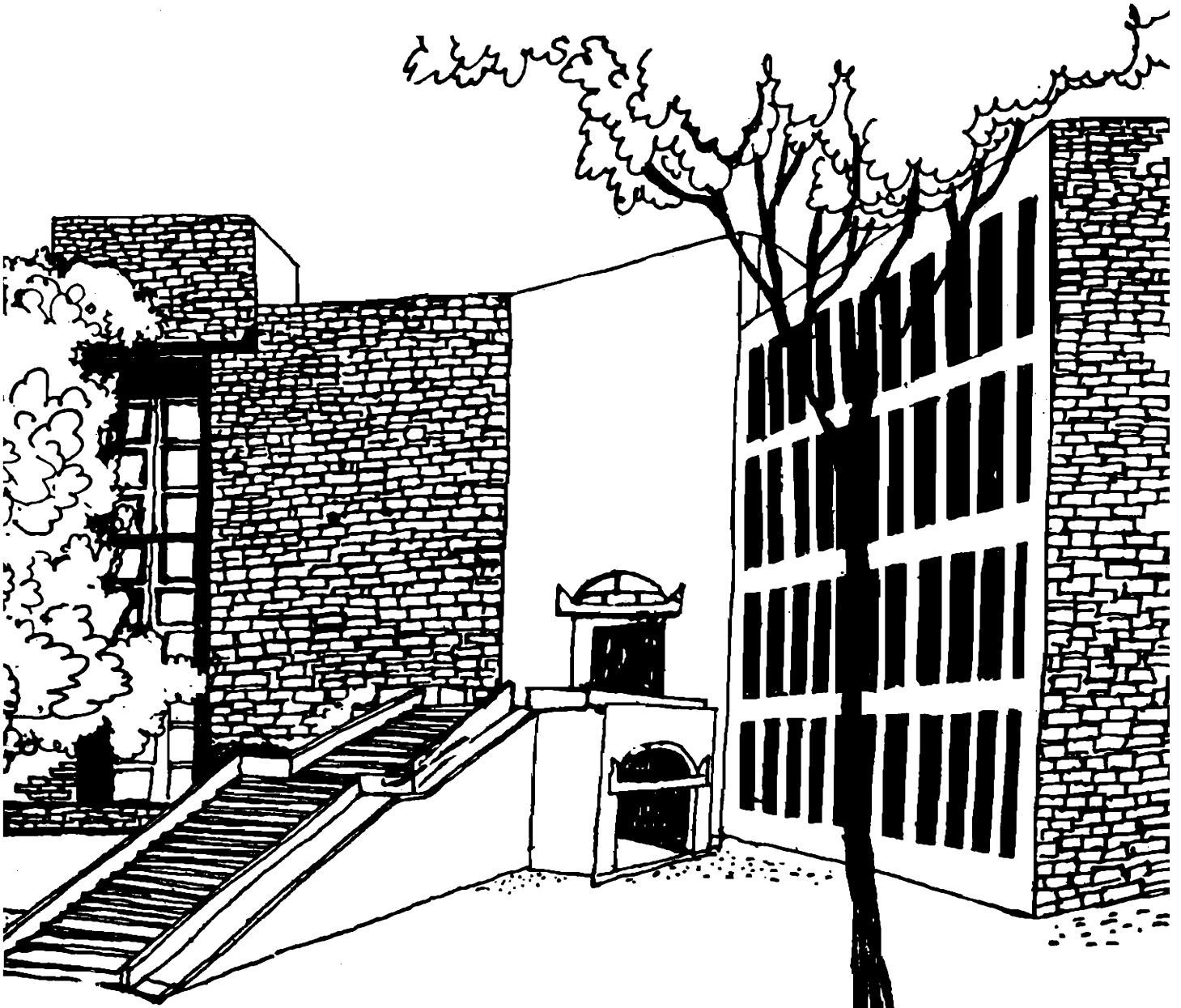




Working Paper



DEVELOPING SMALL HOLDERS AGRICULTURE
THROUGH CHANGING CROP COMPOSITION

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ABSTRACT

Small size of holdings of a large proportion of farmers is considered a major bottleneck in increasing the income of the people in rural areas. In India the proportion of small holders is increasing over time. Previous studies have suggested policies oriented towards non-price factors such as increasing yield and changing crop composition for improving their incomes. This study examines how sericulture could be an ideal enterprise for small and marginal farmers in India. Analysis of primary data collected from 3 taluks of Karnataka state suggested that sericulture is far more attractive compared to competing crops in the respective areas in terms of net returns, cash flows and employment generation. Increasing silk production can also help in increasing foreign exchange earnings. Moreover, sericulture has other desirable features such as increased employment opportunities for women. Therefore, efforts towards popularising sericulture among small and marginal farmers could help in improving the living standards of these farmers.

Developing Small Holders Agriculture Through Changing Crop Composition

Gopal Naik and K.R.Babu¹

Introduction

In developing countries, especially in China and India, the small size of holdings of a large proportion of farmers are considered as one of the main factors causing rural poverty and hindering agricultural growth. Small holders are able to realize only a part of the production potential due to physical, technological and institutional constraints. These constraints together with their low risk bearing ability discourage them to adopt new technologies. Several studies (Barry and Cline, 1979; Bhatta, 1979) have reported inverse relationship between land productivity and farm size in semi-arid tropics of India. However, recent studies have indicated that this relationship has weakened (Parthasarathy, 1987; Chosh, 1986) because of their inability to adopt new technology.

In developing countries the technological development in the agriculture sector has benefited predominantly the large farmers. With the increased surplus of agricultural commodities, coming mainly from large holders, the prices of many agricultural commodities have not increased at the same rate as the prices in rest of the economy. The large farmers are able to manage this situation as their cost has decreased through adoption of new technology, where as the small farmers due to their inability to adopt of new technology, are caught between increasing input cost and lower output prices. Several studies have documented drastic decline in the real income of the majority, especially of resource-poor farmers in the recent years (Roling, 1989). Decreasing crop returns coupled with lack of remunerative employment in rural areas have kept small holders continuously in poverty.

In countries like India where prospects of large scale increase in employment in urban areas is bleak, the pressure on land continues to increase especially

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due to higher population growth rate in rural areas. This has resulted in an increasing number of small holders.

Any attempt to improve small holders agriculture should, therefore, be aimed at identifying the means of providing higher returns and gainful employment. Price policy as an instrument to improve small holders agriculture is not considered advisable (Lele and Mellor, 1988). This is because the small holders have negligible marketable surplus and often, as in case of foodgrain, they are also the purchasers of the produce. Therefore, increase in prices could have adverse income effect. Minhas and Vaidyanathan (1965), and Narain (1977) have examined the contribution of non-price factors such as expansion in area, increasing yields and changing crop composition as sources of growth. Elasticity of production with respect to non-price factors are considered to be greater than for price factors (Lele and Mellor, 1988). Therefore, allocating resources to non-price factor may be more efficient than increasing prices.

Area expansion does not have much potential in densely populated countries like India. Yield growth is largely dependent on public investment in generation and application of technology. Therefore, a more plausible option is to examine the possibility of finding better crop composition. Such possibility could arise either due to technological innovations or due to changes in domestic and international demand situation.

In recent years developing countries are also confronted with heavy foreign debt burden. This has increased their debt-service ratio which is exerting pressure on the economy to increase exports. Agriculture being one of the few areas where developing countries seem to have comparative advantage, increasing pressure is felt on agriculture to produce export oriented commodities. Therefore, while finding a suitable crop composition, considerations towards exports would be a more acceptable choice to policy makers in countries like India, where debt burden has increased substantially in the recent years. In this context, we examine how considering sericulture in crop composition in India could help in achieving multiple objectives of

raising net returns of small holders, increasing employment opportunities and realizing higher export earnings.

Small Holders in Indian Agriculture

Agriculture supports more than 70 per cent of the 840 million people, contributes nearly 34 per cent to the gross domestic product and accounts for nearly 30 per cent of the export earnings. Major proportion of the agriculture population consists of small and marginal farmers having an average land holding of less than 1.50 hectares (Table 1). Their income is low so as their living standards. Low income results in low savings as most of it is spent on food and other basic requirements. Landless and marginal farmers spend nearly 60 per cent of their total expenditure on food (Lele and Mellor, 1988). Due to this, their investments in irrigation, fertilizers and seeds, etc. are low and in turn also their production and incomes. This situation coupled with the increasing population has led to increase in rural unemployment, malnutrition and poverty.

The labour force in general, is growing at a rate of 2.5 per cent per annum, while the growth rate in employment in agriculture has declined from 2.32 per cent during the period 1972-73 to 1977-78 to 1.20 per cent during the period 1983-84 to 1987-88. The growth in employment in the economy as a whole declined from 2.82 per cent during the period 1972-73 to 1977-78 to 2.22 per cent during the period 1977-78 to 1983-84, and has further decreased to 1.55 per cent during the period 1983-84 to 1987-88. The employment opportunities in agriculture has to some extent become limited due to mounting pressure on the land. The land to labour ratio has declined from 0.25 in 1970-71 to 0.20 in 1986-87. The average size of holding has decreased for all categories of farmers (marginal, small, small-medium, medium and large) during the period 1960-61 to 1985-86 (Table 2). The overall decline has been 37.55 per cent and the decline for marginal farmers is -13.64 per cent. This explains the increasing unemployment in the rural areas in the recent years especially during off season (Vaidyanathan, 1988).

The number of marginal farmers have increased approximately by three fold from 19.90 million in 1960-61 to 56.75 million in 1985-86 (Table 1). Their share in total number of holdings has gone up from 40.70 per cent in 1960-61 to 58.07 per cent in 1985-86. Though the percentage shares of small farmers and small-medium farmers have decreased their numbers have increased considerably. In the case of medium farmers their share in total number of holding has decreased by one third where as the number of holding has increased marginally. In the case of large farmers both the number of holdings and percentage share of number of holdings have decreased. Total area cultivated by marginal, small, small-medium and medium farmers has also increased. The area cultivated by large farmers has decreased from 40.38 million hectares in 1960-61 to 33.19 million hectares in 1985-86. The rates of growth of both land holding and area operated are inversely related to size of holdings. For the bigger sizes of holdings the rate of growth are lower for both number of holding and area operated. These trends indicate that the larger sizes of holdings are broken into smaller sizes over time (Figure 1).

Limited employment opportunities in agriculture has lead to migration of rural people to the urban areas and this has created the present situation of overcrowding of the cities. The rest of the economy is unable to absorb this migration.

Government of India has been emphasizing on rural development to raise income and create employment opportunities in the rural areas. However, the programmes aimed at these objectives such as Integrated Rural Development Programme, National Rural Employment Programme etc., have not achieved the intended results.

Indian total external debt burden has increased from Rs.39,691 crores in 1985-86 to nearly Rs.1,80,000 crores in 1991. The foreign debt-service ratio has increased from 8.0 per cent in 1980-81 to 21 per cent in 1989-90. This has put pressure on the government to find ways of increasing exports. Agriculture has been considered as one of the potential sources of exports.

Since price policy is not an attractive proposition the burden on the government is to find non-price policies to address these problems. In the remaining part of the paper we show how emphasizing on sericulture could satisfy these immediate concerns of Indian economy.

Sericulture Industry

Sericulture industry involves mulberry (the food plant for silkworms) cultivation, silkworm rearing, reeling of cocoons to get raw silk and weaving raw silk into fabrics¹. Farmers cultivate mulberry plants and rear silkworms by feeding mulberry leaves. Mulberry plants are fully grown in 10 to 12 months and lasts for 15 years. Mulberry leaves are fed to silkworm larvae for 28 to 30 days before they spin cocoons around them to undergo morphological changes from larvae to moths. After spinning is completed the cocoons are collected and are marketed before the pupae cut open the cocoons to emerge out as moths.

World Silk Situation

Unlike in the case of many agricultural commodities the demand for silk is highly income elastic². With the dramatic increase in production of agricultural commodities, mostly in developed countries due mainly to modern technology and farm support policies, there is a surplus of these commodities world wide resulting in low prices in the recent years. However, in the case of sericulture its labour intensive nature has made it unattractive in traditionally major producing country like Japan. And, with the increase in income the global demand is outstripping the supply. The prices of raw silk in India has gone up from Rs.316 per kilogram in 1979-80 to around Rs.1200 per kilogram in 1991. This changed world market situation has given an unique opportunity to labour surplus countries such as India and China, where the agro-climatic condition is also favorable to take up sericulture. China has

¹ Mulberry is one of the four types of silk produced in India, and mulberry silk production accounted for 89 per cent of the total silk produced in the country during 1987-88.

² Income and price elasticities for Indian exports of silk products was estimated at 2.14 and 4.21, respectively (Thimmaiah and Nagabhusan, 1985).

already increased the silk production substantially, i.e., from 11,124 tonnes in 1970 to 35,800 tonnes in 1987. It accounts for 57.39 percent of the world production and 90 per cent of the global exports.

Situation in India

India has been producing silk for the last three centuries. Its silk production has increased from 2,258 tonnes in 1970 to 11,861 tonnes in 1990. It is the second largest silk producing country contributing nearly 14 per cent to the world silk production.

Though the silk production has been growing at the rate of 10 per cent per annum, India imports nearly 20 per cent of its raw silk requirements. Nearly 90 per cent of the raw silk available is consumed for producing goods for domestic market. Exports are growing at the rate of 12 per cent per annum during the last decade.

In India mulberry is grown in both irrigated and rainfed areas, the rainfed area accounts for as much as 42 per cent.³ The climatic conditions and soils prevailing in large parts of India are suitable for growing mulberry, and as it is possible to take 5 to 6 crops per annum, sericulture ensures periodic income at short intervals.⁴ India has a well developed market for silk and silk products and skills in reeling, weaving, printing and dyeing (for lower quality silk).

³ Mulberry can be grown in low rainfall (650-750 mm) areas and it can withstand drought.

⁴ Mulberry plant can be cultivated in fields with an elevation up to 4000 feet from the mean sea level on a wide range of soils. However, rearing of silkworm requires cooler climate (24-27° C) which, in many parts of the country is prevailing only during winter months. In these months 2 to 3 crops of silkworms can be reared.

Sericulture is a labour intensive enterprise. The activities requiring labour include brushing of disease free layings (Dfl's),⁵ harvesting of mulberry leaves, chopping of leaves, feeding silkworms, cleaning of rearing trays, mounting of silkworms on chandrike⁶ for spinning and then harvesting of the cocoons. The number of persons engaged in sericulture is more than 2.7 million (Sinha, 1989).

The sericulture industry is totally decentralized. The government is actively promoting sericulture by supplying seeds (silkworm eggs), mulberry plant cuttings, establishing markets and providing extension services. It is difficult for individual farmer to produce eggs as it involves sophistication in breeding and testing for disease freeness.

Data

The analysis in this study is based on the primary data obtained from 3 different areas in Karnataka state collected during 1988-89. Karnataka state produces nearly 60 per cent of the total silk production in the country. Out of the three selected areas two areas, namely Ramanagaram and Anekal taluks, represent traditional area and the remaining, namely, Sirsi taluk represent new areas⁷. Information on the cultivation of mulberry and alternative crops and silkworm reared were collected from 60 randomly selected farmers from Ramanagaram and 40 farmers each from the remaining areas. From these information the total cost incurred, labour employed and the net returns obtained per acre were computed for sericulture as well as competing crop enterprises.⁸

⁵ Disease free layings (Dfls) contain eggs laid by one silk moth (around 400) and is certified as free of trans-ovarial diseases.

⁶ Chandrike is an indigenously made equipment of bamboo used for mounting the matured silkworms for spinning.

⁷ Traditional sericulture areas are those where sericulture has been practiced since long time, while new areas refers to the areas where sericulture has been introduced recently.

⁸ 1 Hectare = 2.47 acres.

Results

Cost and Returns

The cost items considered for sericulture were labour, depreciation on fixed assets and apportioned establishment (planting) cost, variable costs including seeds, manures, fertilizers, chemicals, electricity charges, etc. These costs were computed for all the crops taken in an year.⁹ The cost components of competing crops were labour cost and other variable costs including seeds, manures, fertilizer, processing cost, etc.

In Sirsi and Anekal areas mulberry is taken up in irrigated conditions. The proportion of mulberry area under irrigation in Ramanagaram is 95.63 per cent. In Sirsi area most of the selected farmers had started sericulture during the last two to three years. Therefore, their operations had not yet stabilized fully.

The average size of holdings ranged from 5.52 acres in Ramanagaram to 8.61 acres in Sirsi area (Table 3)¹⁰. However, the area under sericulture was below 1.5 acres, i.e., 1.18 acres in Sirsi area, 1.31 acres in Anekal and 1.46 acres in Ramanagaram. Intensive care needed during rearing of silkworms is considered as the main reason for not increasing area under mulberry cultivation further. This suggests that sericulture is well suited to small and marginal farmers.

The percentage of marginal farmers in the sample were 63.3 in Ramanagaram, 22.5 in Sirsi and 40 per cent in Anekal area. This indicates that the percentage of large farmers taking up sericulture especially in new areas is high. This is because in sericulture the dependence of farmers on extension services is high and the reach of extension services is biased generally towards large farmers.

⁹ The life cycle for silkworms in India is around 45 to 50 days. Hence 5 to 6 crops are taken in an year. Five crops were taken in the three study areas.

¹⁰ Large area under other crops in Sirsi is accounted mainly by betelnut plantations which is not a competing crop for sericulture.

The net returns from irrigated areas is higher and the pattern of net returns reflects more or less the extent of irrigation. Irrigated areas can generate as much as Rs.9000/-per acre per annum (Table 4).¹¹

The average net returns for all the areas was Rs.8489.35. The average total cost was Rs.6846.69 which consists of Rs.3468.87 (51.18 per cent) towards labour cost. The share of labour cost in the total cost varied from a low of 36.57 per cent in Sirsi area to a high of 61.72 per cent in Ramanagaram area. Large part of the variable cost (91.50 per cent) incurred in rearing was accounted by the labour cost. This percentage was consistent across the study areas.

If large portion of the labour employed are accounted for by family labour the cash outflow will be substantially lower than the total cost indicated in the table. Adding labour cost to the net returns gives an idea of the cash realized by farmers in sericulture enterprise assuming only family labour is used. This amounts, on an average, to Rs.11958.22 for the study areas.

Cost and Returns from Sericulture in the Study Areas

The total cost incurred per acre in Ramanagaram area was Rs.7182.22, of which nearly 61.72 per cent (or Rs.4432.68) was incurred on labour. The total gross returns obtained was Rs.13875.34 per acre of mulberry garden.

The total cost incurred on an acre of mulberry garden in Anekal area was Rs.5830.85. This includes mulberry cultivation cost of Rs.1879.24 and silkworm rearing cost of Rs.2990.54. Labour cost is substantially lower compared to Ramanagaram area. This is because both labour employed and wages are lower in Anekal area. The gross returns obtained (Rs.17355.66) was higher than in Ramanagaram area by nearly Rs.2500/-. This difference is due to higher price realized by farmers as cocoons produced in Anekal area are of better quality,

¹¹ Other studies (Aziz and Hanumappa, 1986) have indicated that the returns from rainfed or irrigated sericulture were Rs.4291 and Rs.13906 per hectare, respectively.

The total cost incurred per acre of mulberry in Sirsi area was estimated at Rs.7527.01 which includes Rs.3394.52 on mulberry cultivation and Rs.2501.69 on silkworm rearing. The labour cost is lower here than in Anekal area. The gross returns is Rs.14787.12 per acre.

Cost and Returns from Competing Crops

In Ramanagaram area total cost incurred per acre was Rs.2968.47 for paddy and Rs.942.39 for finger millet (Table 5). The gross returns obtained from these crops were Rs.3612.07 and Rs.1021.50, for paddy and finger millet, respectively.

The cost incurred for competing crops in Anekal area were Rs.2713.70 for paddy, Rs.1966.83 for finger millet and Rs.8032.10 for tomato. The cost for finger millet is higher than in Ramanagaram by more than Rs.1000/-. This could be due to higher costs incurred in irrigated condition. The gross returns obtained for these crops were of Rs.4576.00, Rs.1707.55 and Rs.13800.00, respectively.

The total costs incurred in Sirsi area were Rs.2721.85 for paddy and Rs.6183.16 for sugarcane cultivation. The total gross returns were Rs.4117.50 and Rs.6358.42, for these crops respectively.

Comparison of Net Returns from Sericulture and Alternative crops

A comparison of net returns obtained in each of the study areas shows that sericulture fetches far higher net returns than the competing crops. Finger millets have very low returns and even negative net returns in Anekal area. This is because finger millet is taken on unirrigated land in Anekal. The net returns from sericulture is nearly 85 times more than this crop in Ramanagaram. The net returns from sericulture is almost ten times higher than paddy in Ramanagaram, and more than five times in Anekal and Sirsi areas. The net returns from sericulture is around 40 times the net returns of sugarcane in Sirsi area. The net return for tomato is just one third the net returns

obtained in sericulture in Anekal area.¹²

Comparison of Cash Flows

Cash outflow requirements indicate the amount of liquid assets needed to take up an enterprise. Since credit is considered as one of the major constraints in developing small holders agriculture we examined the cash outflow requirement of sericulture under two alternative assumptions.

- (i) Assuming only family labour is involved
- (ii) Assuming thirty per cent of labour requirement is hired.¹³

Assuming only family labour is involved, the cash outflow on an annual basis is higher in sericulture compared with alternative crops in all the three areas except for sugarcane in Anekal. However, as indicated earlier, several crops of sericulture is taken in an year. Therefore, the cash requirement based on per crop basis more accurately reflects the liquid asset requirements.

Under the assumption that only family labour is used, the cash outflow is higher in sericulture than in other crops in Ramanagaram (Table 6). That is, Rs.549.91 for sericulture compared with Rs.351.86 for paddy and Rs.193.39 for finger millet. However the cash inflow is substantially higher, which should be sufficient not only for repaying the cash outflows, if borrowed, but also to retain enough amount to meet the cash outflow in the next crop. It should be noted that the total cash inflow per annum is Rs.11125.80 in sericulture which is substantially higher than other crops.

In Anekal area the cash outflow per crop of sericulture is less than competing crops including paddy and finger millet. The cash inflow is nearly six times

¹² Other studies also have shown higher returns for sericulture than any other competing crops (Ramana, 1987; Hanumappa, 1986).

¹³ The estimates of percentage share of family labour in total labour varies from 30 per cent (Ramana, 1987) to more than 60 per cent (Hanumappa, 1986).

the cash outflow. The total cash inflow for sericulture is higher than for the competing crops.

In Sirsi area the cash outflow for per crop of sericulture is less than in paddy and sugarcane. The net cash inflow for sericulture in a year is more than three times the cash inflow for paddy.

When 30 per cent of labour is hired cash outflows per crop is lower in the case of sericulture compared with all other competing crops in all areas except for finger millet in Ramanagaram. However, it should be noted that the net cash inflow generated by finger millet is less than one third of the cash generated by each crop of sericulture. Sugarcane and tomato has higher cash outflow which indicates that only better off farmers can afford to go for these crops.

These results suggests that the annual net cash inflow is higher for sericulture than any other crop and is several times higher than the cash outflow. The cash requirement for individual crop is lower than the crops such as paddy and finger millet in most cases. This low cash requirements enables small holders to take up individual crops of sericulture once mulberry plantation is established.

Employment Generation

Employment generated from an acre of mulberry sericulture as well as alternative crop enterprises in different areas are presented in Table 7. For alternative crops exact break up of labour into mandays (MD) and womandays (WD) could not be obtained. However, woman labour involvement could be substantial especially in crops like paddy and finger millet. The total employment generated from sericulture enterprise is comparatively higher than from any other competing crop enterprises in the study areas except for tomato. Total employment generated in Ramanagaram study area from one acre of mulberry was 290.12 person days (with 158.54 man days and 131.58 woman days) and 145.37 and 41.61 man days for, paddy and finger millet cultivation, respectively. Employment generated from paddy and finger millet are 50 and 14

per cent, respectively, of the employment generated in sericulture. Though taking two paddy crops in an year could generate as much employment as sericulture the water requirement of paddy is high and more importantly, the net returns would still be substantially lower.¹⁴ In Anekal study area tomato cultivation employs more number of persons, i.e. about 370 man days, in one acre. Harvesting of tomatoes employs more labour as each fruit has to be individually picked and harvesting is done over a period of time. However, crops such as tomato cultivation are profitable only in places closer to metropolitan cities where there is good demand for vegetables. This crop may not be profitable in other areas and cannot be advocated everywhere as in case of sericulture. Also, price fluctuation in case of tomato is generally very high.

It should also be noted that labour requirement in sericulture is not during heavy seasonal employment period. Also the rearers can adjust the time of brushing Dfl's so as to avoid coincidence of heavy labour requirement of sericulture with planting or harvesting of other crops.

There is no scale economies in sericulture. In fact there is scale diseconomies, which suits the small holders most. In our survey we found (also clear from Table 3) that even the large farmers generally plant not more than 1.5 to 2 acres of mulberry, as silkworm rearing requires intensive care and is preferably done by family labour. Management is considered as a crucial factor in successful rearing of silkworms. The cocoon yield is directly proportional to the quality of management.

Another feature of sericulture is that housewives can use their spare time efficiently. Since rearing is done either inside or in close proximity to farmers residences, the housewives can use their spare time in cutting and feeding leaves, bed cleaning, etc. Also, there is no specific activity in silkworm rearing which inherently needs male labour. Since women are generally paid lower wages they have better employment prospects in sericulture. This is

¹⁴ The water required for one crop of paddy is 70 inches whereas it is 65 inches in case of sericulture (Ramana, 1987).

also true for post cocoon operations such as reeling cocoons.

The female labour participation is 43 per cent in the study area. Paddy, sugarcane and finger millet generated a meager 127, 83 and 59 man days. Considering even the labour days employed for the post harvest operation of paddy and sugarcane, which are not fully accounted for in our analysis, would not make much difference. Sericulture generates more than three times the employment generated by any one of the competing crops.¹⁵

The post cocoon processing such as reeling and weaving is also labour intensive in India. One hectare of mulberry plantation can provide employment for 12-13 persons in mulberry cultivation, silkworm rearing, reeling, weaving, processing, etc. throughout the year (Das and Mathur, 1988).

Exports

While silk exports have been growing at a rate of 10 per cent per annum, the competing crops in the study areas are not at all exported. Indian exports of silk products have increased from Rs.7.59 crores in 1971-72 to Rs.400 crores in 1989-90. With additional supply of raw silk the export could increase further. Moreover, India has been importing nearly 20 per cent of its raw silk requirements basically to meet the demand for higher quality raw silk. Higher quality cocoon production has been a constraint in producing higher quality raw silk.

Constraints in Indian Sericulture

Increase in the cocoon production should come from both increase in productivity and area expansion. Productivity of cocoon per acre in India is low due to lower leaf yield and low cocoon yield per 100 Dfl's.

The constraints in increasing area under sericulture in the new areas have been mainly supply of mulberry cuttings, supply of eggs, proper extension.

¹⁵ Ramana (1987) has reported that in Andhra Pradesh state (an adjacent state to Karnataka) the labour employed in sericulture, sugarcane, paddy and groundnut are 478, 141, 98 and 52 man days respectively. In his calculations labour employed for planting is also taken into consideration.

facilities, and absence of cocoon markets. In traditional areas better extension services and supply of good quality eggs could help increase the productivity. Supply of credit especially during establishment of mulberry garden is another constraint in the case of small farmers. Extension services are generally oriented towards large farmers.

Conclusions

In India the proportion of small holders is increasing over time. Employment situation is worsening especially in rural areas. This trend is causing hinderance in agricultural growth and adding to rural poverty. Moreover, increasing foreign debt is forcing the policy makers to emphasize on producing exportable agricultural crops.

Price policies have not been considered favorable to improve small holders agriculture. Moreover, the apparent self sufficiency in foodgrain is permitting India to diversify to other crops, at least for the present. In this paper we have examined the possibility of changing crop composition, a non-price factor as a source for growth. Specifically we examine how facilitating sericulture in crop composition could help address the immediate concerns of Indian economy.

For this purpose we have analyzed the net returns, cash flow, employment generation and export possibility from sericulture as well as competing crops.

Comparison of sericulture with alternative crop enterprises such as paddy, finger millet, sugarcane and the vegetable crops in traditional and new areas indicates that in terms of net returns, cash flow, employment generation and exports, sericulture generally performs better than alternative crops. The net returns were higher than paddy, finger millet, sugarcane, tomato in the study area. Even if we consider two crops for paddy and finger millet the net returns are still higher for sericulture. The employment generated is far greater compared to alternative crops except in the case of tomato. However tomato crop is profitable only near big cities.

Because of its labour intensive nature, sericulture is taken up by farmers in small areas (around 1.5 acres). It is therefore particularly well suited for marginal and small holders. Moreover, family labour especially the women labour who are otherwise would be idle could be productively involved in sericulture. This would help to increase family income and hence improve the living standards. It also would improve the intra-family power balance between men and women in rural households.

Cash requirements for sericulture at the time of establishment of mulberry plantation and rearing house could be fairly high¹⁶. However, once this is met the frequent cash inflow from each crop can easily meet the cash outflow requirements in subsequent crops. Since it is a highly profitable crop the credit recovery could be easier especially when farmers have to constantly depend on the government extension staff for advice.

Sericulture also has a large potential for export earning. At present both quantity and quality of cocoon production seems to be major constraints for exports.

Sericulture could be taken up in large parts of the country, since climatic conditions in most places in India are suitable and mulberry can be cultivated in both irrigated and rainfed conditions.

There are also other intangible benefits from sericulture. High net returns from sericulture is encouraging farmers to go for investments in irrigation, which could also benefit other crops. Also, it is observed during the survey that farmers closer association with extension staff is creating a positive attitude towards government agencies. Such change in attitude may encourage them to approach extension staff for other crops also.

¹⁶ Though it is advisable to have a separate rearing house, most farmers rear silkworm in these areas in their dwellings. In establishing mulberry garden the major cost involved is on labour.

Adoption of sericulture, thus, could be a principal means of developing small holders agriculture in many places in India. Faster adoption of sericulture could be achieved through appropriate measures, such as proper extension services, supply of mulberry cuttings, supply of good quality eggs and providing marketing facilities for cocoons. Expansion in area could be achieved by convincing small farmers the benefit of the sericulture. This should be supported by timely supply of input such as mulberry cuttings and Dfl's and credit. Since cocoons have to be sold quickly after their formation market facility is an essential component of sericulture development.

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Table 1 : Distribution of Size of Holdings and Area Operated in India

Size of Holding	Distribution of Holdings											
	Number of Holdings (Million Numbers)					Growth Rate	Holdings as per cent of total					Growth Rate
	1960-61	1970-71	1976-77	1980-81	1985-86	(%)	1960-61	1970-71	1976-77	1980-81	1985-86	(%)
Marginal	19.90	35.68	44.52	50.52	56.75	185.18	40.71	50.63	54.58	56.54	58.07	42.63
Small	10.88	13.43	14.73	16.08	17.88	64.34	22.26	19.06	18.06	18.00	18.30	-17.81
S. Medium	9.22	10.66	11.67	12.51	13.25	43.71	18.86	15.13	14.31	14.00	13.56	-28.12
Medium	6.57	7.93	8.21	8.09	7.92	20.55	13.44	11.25	10.06	9.05	8.10	-39.71
Large	2.31	2.77	2.44	2.15	1.93	-16.45	4.73	3.93	2.99	2.41	1.97	-58.21
All	48.88	70.47	81.57	89.35	97.73	99.94	100.00	100.00	100.00	100.00	100.00	
	Area Operated (Million Hectares)					Area as per cent of total						
Marginal	8.78	14.55	17.51	19.80	21.60	146.01	6.68	8.97	10.71	12.16	13.18	97.31
Small	16.00	19.28	20.90	22.98	25.33	59.56	12.17	11.89	12.78	14.11	15.58	27.97
S. Medium	26.23	30.00	32.63	34.56	36.58	39.46	19.95	18.50	19.95	21.23	22.32	11.85
Medium	40.07	48.23	49.63	48.34	47.01	17.32	30.48	29.75	30.35	29.69	28.68	-5.91
Large	40.38	50.06	42.87	37.13	33.19	-17.81	30.72	30.88	26.21	22.81	20.25	-34.08
All	131.46	162.12	163.54	162.81	163.91	24.68	100.00	100.00	100.00	100.00	100.00	

Note : Marginal refers to holding size less than 1 hectare
 Small refers to holding size between 1 and 2 hectares
 Small medium refers to holding size between 2 and 3 hectares
 Medium refers to holding size between 3 and 5 hectares
 Large refers to holding size more than 5 hectares

Source : 1. Basic Statistics relating to Indian Economy, CSO, 1989,
 2. CMIE, 1989.

Table 2 : Average Size of Holding

(in Hectares)

Size of holding	1960-61	1970-71	1976-77	1980-81	1985-86	Growth Rate (%)
Marginal	0.44	0.41	0.39	0.39	0.38	-13.64
Small	1.47	1.44	1.42	1.43	1.43	-2.72
S.Medium	2.84	2.81	2.78	2.76	2.76	-2.82
Medium	6.10	6.08	6.04	5.97	5.93	-2.79
Large	17.48	18.07	17.58	17.24	17.20	-1.60
All	2.69	2.30	2.00	1.82	1.68	-37.55

Note : Definitions for size of holding are same as in Table 1.

Source : 1. Basic Statistics relating to Indian Economy,
CSO, 1989,
2. CMIE, 1989.

Table 3 : Average Farm Size in the Study Areas

(Acres)

Study Area	Crops						Average Farm Size
	Sericu- lture	Paddy	Finger millet	Sugar- cane	Tomato	Others*	
Ramanagaram	1.46	0.69	2.88	1.94		0.49	5.52
Anekal	1.31	0.95	3.61		0.88	0.00	6.75
Sirsi	1.18	2.64	3.61	1.19		3.60	8.61
Average	1.32	1.43	3.37	1.56	0.88	1.36	6.96

* Others include fallow land also.

Table 4: Cost and Returns from Sericulture in Traditional and New Areas
(Rupees per Acre)^a

Items (Costs / Returns)	Taditional Areas		New Area Sirsi	Average
	Ramanagaram	Anekal		
Total Cost	7182.22	5830.85	7527.01	6846.69
<u>I Fixed cost^b</u>	659.53	961.11	1630.80	1083.81
AIC ^c	118.39	67.83	209.37	131.86
Depreciation ^d	541.14	893.28	1421.43	951.95
<u>II Variable cost</u>	6522.69	4869.73	5896.21	5762.88
a) Mulberry Cultivation	2395.28	1879.19	3394.52	2556.33
Labour cost i) Male	552.60	455.41	407.70	471.90
ii) Female	32.88	2.27	121.80	52.32
Other variable Cost	1809.80	1421.52	2865.02	2032.12
b) Rearing Costs	4127.41	2990.54	2501.69	3206.55
Labour cost i) Male	2301.12	1683.79	1533.60	1839.50
ii) Female	1546.08	1080.07	689.30	1105.15
Other variable Cost	280.21	226.68	278.79	261.89
Gross Returns	13875.34	17355.66	14777.12	15336.04
Net Returns	6693.12	11524.82	7250.11	8489.35
Labour cost in mulberry cultivation	585.48	457.67	529.50	534.22
Share of labour Cost in mulberry cultivation (%)	24.44	24.35	15.60	21.47
Labour cost in silkworm rearing	3847.20	2763.86	2222.90	2944.65
Share of labour Cost in silkworm rearing (%)	93.21	92.42	88.86	91.50
Total labour cost	4432.68	3221.54	2752.40	3468.87
Share of labour cost in total cost (%)	61.72	55.25	36.57	51.18
Net Returns + Total labour cost	11125.80	14746.35	10002.51	11958.22

^a One US dollar = Approximately Rs.18/-.

^b Applies to fixed cost incurred for both mulberry cultivation and silkworm rearing.

^c AIC is the apportioned initial cost incurred to establish an acre of mulberry plantation (life span of mulberry garden is taken as 15 years).

^d Depreciation on the implements such as rearing trays, chandrike, uzyfly net, baskets, chopping board, chopping knife and rearing house.

Table 5 : Cost and Returns of Competing crops in Traditional and New Sericultural Areas (Rupees per Acre)

Items (Costs/ Returns)	Traditional Areas					New Area	
	Ramanagaram		Anekal			Sirsi	
	Paddy	Finger millet	Paddy	Finger millet	Tomato	Sugar- cane	Paddy
Labour cost ^a	2616.61	749.01	1837.44	1160.60	5487.10	1246.32	1681.21
Other variable cost	351.86	193.38	876.26	806.23	2545.00	4936.84	1040.65
Total Cost	2968.47	942.39	2713.70	1966.83	8032.10	6183.16	2721.85
Gross Returns	3612.07	1021.50	4576.00	1707.55	13800.00	6358.42	4117.50
Net Returns	643.60	79.11	1862.30	-259.27	5767.90	175.26	1395.65

^a Average wage rates per day were Rs.18.00 in Ramanagaram, Rs.14.83 in Anekal and Rs.15.00 in Sirsi Area.

Table 6: Cash Flow from Different Crop Enterprises

(Rupees per Acre)

Crops	Items	Taditional Areas		New Area Sirsi	Average
		Ramanagaram	Anekal		
With only family labour					
<u>Sericulture</u>	Cash outflow	2749.54	2609.31	4774.61	3377.82
	Net cash inflow	11125.80	14746.35	10002.51	11958.22
	Number of crops taken	5	5	5	5
	Cash outflow per crop	549.91	521.86	954.92	675.56
	Net cash inflow per crop	2225.16	2949.27	2000.50	2391.64
<u>Paddy</u>	Cash outflow	351.86	876.26	1040.65	756.26
	Net cash inflow	3260.21	3699.74	3082.86	3347.60
<u>Finger millet</u>	Cash outflow	193.39	806.23		499.81
	Net cash inflow	828.12	901.33		864.73
<u>Sugarcane</u>	Cash outflow			4936.84	4936.84
	Net cash inflow			1421.58	1421.58
<u>Tomato</u>	Cash outflow		2545.00		2545.00
	Net cash inflow		11255.00		11255.00
With 30 per cent hired labour					
<u>Sericulture</u>	Cash outflow	4079.34	3575.77	5600.33	4418.48
	Net cash inflow	9796.00	13779.89	9176.79	10917.56
	Cash outflow per crop	815.87	715.15	1120.07	883.70
	Net cash inflow per crop	1959.20	2755.98	1835.36	2183.51
<u>Paddy</u>	Cash outflow	1136.84	1427.49	1545.01	1369.78
	Net cash inflow	2475.23	3148.51	2578.50	2734.08
<u>Finger millet</u>	Cash outflow	418.08	1154.41		786.25
	Net cash inflow	603.42	553.15		578.28
<u>Sugarcane</u>	Cash outflow			5310.74	5310.74
	Net cash inflow			1047.68	1047.68
<u>Tomato</u>	Cash outflow		4191.13		4191.13
	Net cash inflow		9608.87		9608.87

Cash outflow : All paid out costs.

Net cash inflow : Net returns + Imputed value of labour.

Table 7: Employment Generated from Different Crop Enterprises
(For one Acre)

Study Areas	Sericulture			Crops				
	Total Labour	MD	WD	Share of Total WD (%)	Paddy	Sugar-cane	Finger millet	Tomato
					Total MD	Total MD	Total MD	Total MD
Ramanagaram	290.12	158.54	131.58	45.35	145.37		41.61	
Anekal	247.33	144.25	103.08	41.68	123.90		78.26	370.00
Sirsi	210.53	129.42	81.11	38.53	112.08	83.09		
Average	249.33	144.07	105.26	41.85	127.12	83.09	59.94	370.00

MD: Mandays WD : Womandays

Figure 1: Shares of Holdings and Area

Operated during 1960-61 and 1985-86

