

GENDER DYNAMICS IN MANGO PRODUCTION SYSTEM IN INDIA

C.SEKAR¹, K.S.SUBRAMANIAN², JAYASHANKAR SUBRAMANIAN³ VIJAYA PRAKASH⁴

¹Professor, Post Harvest Technology Center, ²Professor, Department of Nano Science and Technology, Tamil Nadu Agricultural University, Coimbatore, ³Associate Professor, University of Guelph, Canada and L., ⁴MYRADA NGO, India.

Received: 3 August 2014, Revised and Accepted: 28 August 2014

ABSTRACT

A study conducted in mango growing domains in Tamil Nadu, India shows that the women's participation in farm decision making and involvement in post-harvest operations are not encouraging. The women own only about a tenth of farm land (6.91 per cent) and more than 95 per cent of the non-farm assets are in the name of men. Decisions on maintenance and sale of livestock are highly dominated by women (50.1 per cent). The income they acquired through animal rearing paved way to meet part of the household food consumption expenditure. The gender gap in wages was prominent in the project area. Women carry out harvesting and most of the post production operations like grading, packaging etc. but men largely control them. The outcome of the study suggested that redressing the gender gap in decision making, and improving the management skills of women through institutional intervention would be the key aspect in reducing post harvest losses, improving farm productivity and subsequently the income and household food security.

Keywords: Resource Ownership, Gender Participation, Decision Making, Post production, Income and Food Security.

INTRODUCTION

India is the part of the developing world, where agro-ecological conditions are highly favorable for growing tropical fruits, such as mangoes. Though India is the second largest producer of fruits and vegetables, the per capita availability is only 50% of the requirements. There is a wide gap between demand and supply which is closely associated with 30-35% of post harvest losses due to poor storage, processing and preservation facilities. This represents an annual economic loss of 2000 billion Indian rupees equivalent to US \$ 33.5 billion (Anonymous 2013^a).

Mangoes are an inexpensive fruit in India and a rich source of vitamin A and C. It is widely consumed in various forms in the diet of India's 1200 million people. India maintains over 650 varieties of mango. In recent decades, both imports and exports of fruits have increased with a slightly positive balance of exports (Pant 2014). Being the largest producer (15.19 million tons), India accounts for 41 per cent of global mango production followed by China, Thailand, Pakistan, and Mexico (Anonymous, 2013). Thus, India, being the leading mango growing country, provides a unique case to investigate the dynamics of mango production and post production systems in detail. The challenges of post harvest losses are endemic in the mango production system which is the context of this study. While India is globally competitive, it only satisfies half of the fruit requirement of the nation and there is significant potential for market innovations as well as meeting the needs of household food security (Pant et al. 2012).

Women play a significant role in mango production encompassing cultivation, management, harvesting, cleaning, grading, packaging and marketing. Their roles vary considerably between and within regions and are changing rapidly in many parts of India, where economic and social forces are transforming the agricultural sector (Sekhar et al. 2013). Rural women manage multifaceted household activities and perform various livelihood strategies. But the foremost concern is that many of these activities are not effectively recognized and acknowledged appropriately in spite of the fact that they are most important and essential to the household food security and welfare (Lal and Khurana 2011). Despite several strategies being adopted to minimize post-harvest losses in India, success at the farm level is limited due to the small and marginal farm holdings, lack of training on post harvest handling, inconsistent post-harvest management practices and poor infrastructure, including cold storage facilities. There is a classic *gender gap* between men and

women mango growers in farm level decision making, including choice of crops, pest and diseases management and post-harvest operations.

The major research issue addressed in this paper is that women's contribution in decisions with respect to production and post-production activities is limited, even though many of the farm operations are undertaken by them. Lack of technical skill on post-harvest handling has led to huge post harvest losses in the supply chain. To understand the above aspects, a pre and post evaluation survey involving mango farmers was conducted in Tamil Nadu, India. The study suggested that formation of Women Empowerment Groups and capacity building are areas that are required to ensure that women remain proactive members and assume important positions in leadership and decision making in economic activities to ensure household level food security.

In order to address the issue of the role of women and gender relatives to minimize post harvest losses in mangoes, the International Development Research Center (IDRC) has funded a project on "Enhanced Preservation of Fruits in South Asia" under the Canadian International Food Security Research Fund (CIFSRF). The study focuses on *ex ante* and *ex post* assessment of the participation of women in pre- and post production activities after the intervention of the project conducted in a mango growing area of Tamil Nadu State.

Objectives

This paper mainly addresses the issues of gender dynamics in mango production system. The specific objectives of the study are (i) to study the extent of participation of women in decision making with respect to cultivation of mango, (ii) to assess the involvement of women in post-harvest operations and value addition of mango and (iii) to estimate the impact of interventions in terms of change in decision making, post harvest losses and household income.

Review of Literature

In India, women play a significant role in the agricultural labour force and agricultural activities, although to a varying degree. Consequently, their contribution to agricultural output is extremely significant. It is difficult to quantify the contribution with any accuracy due to the lack of statistical information on women in this

sector. Women's participation in agricultural sector is estimated to be about 47 per cent in tea plantations, 46.8 per cent in cotton cultivation, 45.4 per cent in growing oil seeds and 39.1 per cent in vegetable production. While these crops require labour-intensive work, the work is considered quite unskilled. In rural India, percentage of women who depend on agriculture for their livelihood is as high as 84 per cent (Lal and Khurana 2011).

Women constitute 33 per cent of cultivators and 47 per cent of agricultural laborers in India. These statistics do not account for work in livestock, fisheries and various other ancillary forms of food production in the country. In 2009, about 94 per cent of the female agricultural labor force in crop cultivation was in cereal production, while 1.4 per cent worked in vegetable production, and 3.72 per cent engaged in fruits, nuts, beverages, and spice crops (Singh and Sengupta 2009). Studies on women in agriculture conducted in India and other developing and under developed countries led to the conclusion that women contribute far more to agricultural production than has generally been acknowledged (Lal and Khurana 2011).

Rural women in India are rarely consulted in development projects that may increase men's production and income, but add to their own workloads. Rural women suffer systematic discrimination in the access to resources needed for socio-economic development. Credit, extension, input and seed supply services usually address the needs of male household heads in India (FAO, 2009).

The asymmetries in ownership of, access to and control of livelihoods assets (such as land, water, energy, credit, knowledge, and labor) negatively affect woman's food production (IBRD 2009). Women are less likely to own land and usually enjoy only use rights, mediated through a man. On an average, the men's land holdings were almost three times the women's land holdings. This compromised land access leads women to make decisions with regard to crop choices and to obtain lower yields than would otherwise be possible if household resources were allocated efficiently (IBRD 2009). Women with assets such as land have greater bargaining power, which can lead to more gender-equal allocations of benefits even from male incomes. Women without independent resources are highly vulnerable to poverty. The study by Saxena (2012) suggested that tenure security and especially titles can empower women to assert themselves better with agencies that provide inputs and extension services.

Wage discrimination in favor of men undermines women's participation in the agricultural labor force in India. For instance, the marginal product of one day of agricultural labor in India for women is only 75 per cent of the wages of men (Ajani 2008). Despite their dominance of the labor force, women in India still face extreme disadvantage in terms of pay, land rights, and representation in local farmers' organizations. Furthermore, their lack of empowerment often results in negative externalities such as lower educational attainment for their children and poor familial health (Singh and Sengupta 2009).

Women's on-farm productive labor is often significant but under-recognized and under-valued, while at the same time women carry out the majority of household labor. Land owning farmers, most of whom are male, on the other hand, also seem to prefer women as agricultural workers. The farmer is faced with the increasing costs of production required for modern agriculture. He finds that he can reduce his labor costs by using lower paid women workers. Similarly, the work of women within family-based agriculture is preferred because it replaces hired labour. Women agricultural workers, although they represent a major proportion of all women workers are systematically disadvantaged because they continue to receive lower wages than men. The Indian Ministry of labour puts the difference at 60 per cent of men's wages, while the Indian Labour journal showed that women received 75 per cent of men's earnings (Lal and Khurana 2011).

In India, women contribute significantly to secondary crop production, such as legumes and vegetables, which provide essential nutrients for their families and are often the only food available during the lean seasons or in case the main crop fails. Women are fundamental for guaranteeing food security and household maintenance not only for their own families, but also for

their community in general (Oluwatayo 2012). Despite the fact that women's involvement in agricultural activities is well recognized, there is limited literature specifically focused on women's roles and gender relations in the mango production system.

METHODS

We have observed in the project area that critical resources such as farm and non-farm assets are unevenly distributed by gender. Women seldom enjoy property ownership rights directly in their names, and have little control over decision making in cropping patterns, sale of produce, choice of crops, crop production and post-harvest management practices. As a result, men tend to dominate decision-making in both farm and producer organizations. Women are primarily engaged in production and post production activities such as planting, weeding, fertigation, harvesting, collection, grading, sorting and packaging of mango fruits etc. but their technical incompetency led to huge post production losses, amounting to enormous monetary losses, which would otherwise be useful to improve household welfare. There is very little information available on the above issues and the number of studies conducted across the nation on gender participation in mango cultivation is also very limited and hence this study will provide the detailed information on the mango economy of India, particularly with respect to Tamil Nadu state.

A baseline survey was conducted in three major mango growing domains such as Krishnagiri, Theni and Kanyakumari districts of Tamil Nadu in Southern India (Fig.1 and 2). Both primary and secondary sources of data were collected through personal interviews with farmers using a standard questionnaire. Data collection techniques included document review, structured interviews with key informants, focus group interviews with farmers, and direct observation of service delivery, production, post-harvest processing and marketing of mango. Baseline data were also collected from the development departments, university research stations, mango producer's organization, farmers, traders and other stakeholders involved in mango production, processing and marketing.

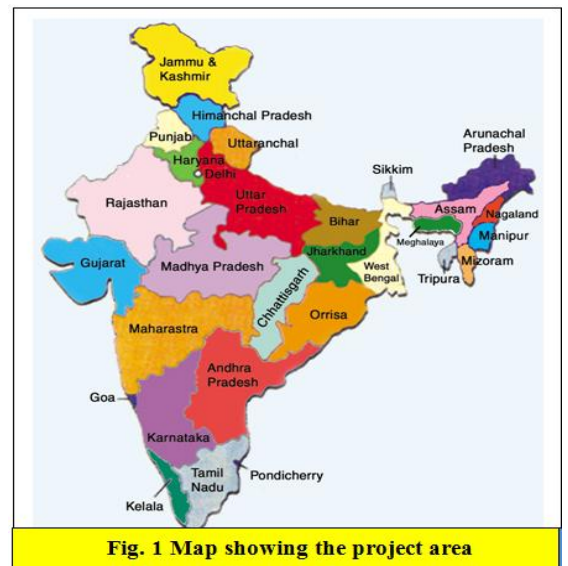


Fig. 1 Map showing the project area

Fig.1 States in India and the project state

Mango is cultivated in 1.92 lakh ha in Tamil Nadu with a production of 10.63 lakh tonnes. The average yield obtained is 5.25 tonnes/ha against the national (Indian) average of 7.02 tonnes ha⁻¹ during 2012-13 (Anonymous, 2013). In the study area, mangoes are cultivated in 51,485 ha in Krishnagiri, 13,499 ha in Theni and 2,556 ha in Kanyakumari districts, constituting 75, 20 and 5 per cent of area, respectively. For the baseline survey, 550 mango growing farmers were selected at the rate of 400, 120 and 30, respectively in the above three domains in accordance with the extent of area under mango cultivation.

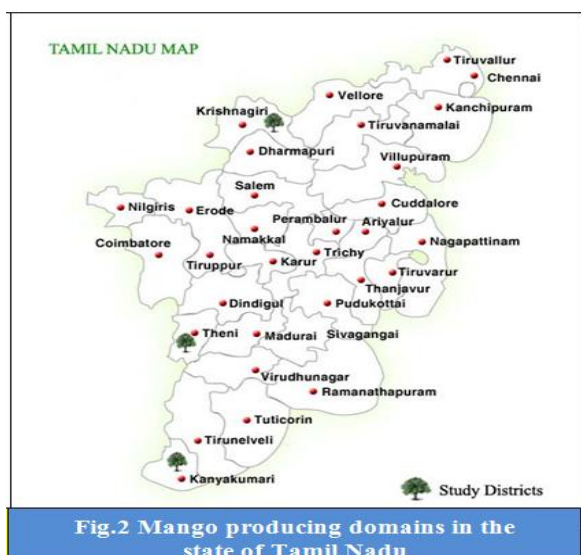


Fig.2 Three mango producing domains in the state of Tamil Nadu

The study primarily used information collected through interviews with the help of well-structured survey instruments. In addition, personal discussions, interviews and observations were employed to triangulate the survey data as well as to cross check the data for reliability. Information gathered included: i. Socio-economic and demographic profile of the farmers such as age of household head, gender/sex, marital status, education, occupation, household type, household size, and membership in association. ii. Information on decision making with respect to farm operations and access to resources such as land and decision on acquisition of assets by woman, access to own private property, food and non-food consumption expenditure etc. The farm respondents were post stratified into four categories based on the land area held by them. Farmers owning less than one hectare were grouped under marginal category and those owning 1-2 hectares of land were categorized as small farmers while farmers owning 2-4 hectares of land was grouped as semi-medium and the farmers having a land area of more than four hectares were categorized as medium and large farmers as per the classification adopted by the ministry of Agriculture, Government of India.

After the baseline survey of 550 farm households and follow on intervention of the IDRC-CIFSRF project, 45 Mango Producers' Groups (MPGs) were formed in which marginal and small women farmers represented more than 70 per cent of the group strength. The MPG members were involved in hands on trainings on production, post production, management, value addition technologies and decision making related issues. Subsequently, after 20 months, a post evaluation survey was also conducted in the project site involving 400 MPG households to study the impact of the interventions with respect to improvement in decision making, reduction in post harvest losses and changes in the availability of fruits for marketing and income. The expenditure share of different items under food and non food consumption was also estimated through a consumption survey in order to understand the change in food and non-food consumption expenditures. Descriptive statistics

was employed to analyze the socio-economic profile of the farmers' households and benefits among the MPG members. This helped to understand the impact of the training on decision making, household income and consumption expenditure.

Consumer Expenditure

Household purchasing patterns may change over time. The Consumer Expenditure Survey (CES) was used to collect information on how households allocate money across goods and services. Data on expenditure provided by the CES permit examination of spending patterns by households, both at fixed points in time and over time. Comparisons between time periods within the same region give knowledge on trends in consumer purchases. Prices which change significantly for items that account for a large portion of household budgets have more impact on the index than price changes for items not purchased in large amounts by households (Yocum 2007).

In this paper, the price change was captured by utilizing price indices for each available item (both food and non-food items). Monthly indices were averaged across the 24 months of a biennial period to define the average price level. This was then compared to the calculated average of the subsequent biennial period to approximate the change in prices for goods and services between 2012-2013 and 2013-2014. Expenditure was defined as the product of the cost of an item and of the number of items purchased. Therefore, if the expenditure and price were both known, quantity was a variable which could be defined in absolute numbers. By taking into the account price changes over a specified time period one was able to make a simplistic generalization on aggregate consumption of a specified item given corresponding expenditure change information. Following the example put forth by Mason and Butler, this method was used, in conjunction with consideration for other contributing factors, to derive implicit quantity change over time (Yocum 2007)

It is to be noted that during field level survey, farmers provided information from the memory and not had the habit of maintaining proper records and hence the changes of recall bias was likely but every possible effort was made to cross check the data with all doable means to get the right kind of information. The outcome of the study can very well represent the perennial crop system and generalization of the results for the annual crop system could be made with appropriate cross checks and caution.

RESULTS AND DISCUSSION

The major outcome the field level survey conducted in the three major mango producing domains of Tamil Nadu was analyzed and the key findings of the study are summarized here under.

Distribution of farmers

The farm respondents were post stratified into four categories based on the land area held by them as marginal, small, semi-medium, medium and large. Since the number of farm households under large farm group was less in number, it was included under medium category. The analysis showed that there were no significant differences among the farms in the three mango producing domains and hence the information was pooled together and further analysis was done for the entire sample as a whole (Table 1). The data revealed that marginal and small farmers constituted about 55 per cent of the sample farmers followed by medium and large farmers (26.55 per cent). The results clearly indicated that a vast majority of the mango growers were small and marginal farmers.

Table 1 Distribution of farmers and membership in CBO

S.No	Types of farmers	Distribution		Membership in CBO		Women in CBO	
		No	%	No	%	No	%
1.	Marginal	148	26.91	5	3.42	0	0
2.	Small	151	27.45	19	13.01	2	13.33
3.	Semi-medium	105	19.09	24	16.44	4	26.66
4.	Medium & Large	146	26.55	98	67.12	9	60.01
	Total	550	100.00	146	100.00	15	100.00

Membership in Community Based Organization (CBO)

Among 550 farmers surveyed, only 27 per cent of the members were in CBO and not many of them were represented by women. Among the various farm categories, the medium and large farmers constituted 67 per cent followed by semi-medium (16.44 per cent) small (13.01 per cent) and marginal (3.42 per cent) farmers. It is a matter of concern that overall, only 10 % of the CBO's members were women (Table 1). The results clearly indicated that only medium and large farmers were members in been reported to be very weak and they were operating farms in isolation and hence they were not able to understand and adopt the innovative farm technologies effectively and profitably. This demonstrates that there is a need for women to be involved in CBO in order to facilitate participation and confidence in community level decision making.

Family size and dwellings

The family size of the sample farmers showed that there was no significant difference in the family size of the respondents across farm categories. The overall family size of farmers was 3.91. The details of possession of dwelling indicate that majority of the farmers possessed *pucca*¹ (76 per cent) and *semi-pucca*² houses (15.82 per cent), which showed that the farmers had been inhabited in well-mannered residential accommodations.

Occupational distribution of the head of the household

About 91 per cent of the mango farmers were doing farming as their main occupation. For majority of the mango farmers, mango cultivation happened to be the primary source of income to meet the household's food and non-food consumption expenditures. For more than 75 per cent of the households, income from mango crop was the primary source of income, particularly for small and marginal holdings (Table 2).

Table 2 Occupational distribution of the head of the household

S. No	Type of farmers	Number	Percentage
1	Cultivator	501	91.09
2	Cultivator + Agricultural labour	13	2.36
3	Cultivator + Non Agricultural labour	1	0.18
4	Cultivator + Entrepreneur	13	2.36
5	Cultivator + Private Employee	11	2
6	Cultivator + Government Employee	11	2
Total		550	100

Size of farm land and experience

The overall farm size of the farmers was 5.83 ha. The marginal farmers possessed an average land area of 0.72 ha, small farmers 1.64 ha, semi medium 3.43 ha and medium & large farmers 17.54 ha (Table 3). The average holding of the medium and large farmers was found to high because some farmers, particularly in Theni areas owned more than 400 ha of farmland. The average years of experience in farming was more than 20 years across all farm categories; while it was 23 years for men, it was 22 years for women and it did not show any significant differences across gender.

Table 3 Average size of farm land

S. No	Type of farmers	Average Size (ha.)
1	Marginal	0.72
2	Small	1.64
3	Semi Medium	3.43
4	Medium & Large	17.54
Overall		5.83

Ownership of farm and non-farm assets

It is to be noted that a vast majority of the farm lands had been owned by men (67.45 per cent) and followed by women (6.91 per cent). Only in 25.64 per cent of the household, the farm lands were jointly held by both the partners of the family (Table 4). On many instances, it was found that the land would be in the name of the

women farmers to avail the institutional subsidy of the central, state and local government institutions. These institutions often extend concessions and subsidy to marginal, small and women farmers to promote farm activity in line with the other well-off farmers, having greater access to productive farm inputs and resources. These concessions have often been misrepresented and misused by dividing/fragmenting lands into different parcels and a few such parcels would be in the name of the women family members exclusively to enjoy institutional assistance. Practically, not many women farmers have rights with farmlands, even though most of the farm production related activities are carried out by them, this is in line with the findings of Saxena (2012) and Ajani (2008).

The results also indicate that non-farm assets were owned largely by male members of the family (Table 4). It is in fact hard to learn that more than 95 per cent of the non-farm assets are in the name of male members (leave alone the ornaments). It shows that many of the female members of the family as of now are not the owners of non-farm assets. This shows that the state of affairs needs to be improved through institutional and non-institutional interventions so as to empower them with due respect in the society, since they are the fulcrum for achieving grass root level household food security. The results of the study are similar to the outcome of the study conducted by FAO (2009) and IBRD (2009).

Table 4 Ownership of assets and decision on livestock management

S. No	Gender	Farm assets		Non-farm assets		Livestock	
		No	%	No	%	No	%
1	Male	371	67.45	540	98.18	90	25.64
2	Female	38	6.91	7	1.27	176	50.14
3	Both	141	25.64	3	0.55	85	24.22
Total		550	100	550	100	351	100

Farm wages-gender gap

The gender gap in wages was also not uncommon in the project area and the wage differences between men and women had been universally reported. There were certain farm operations like digging pits, forming bunds, guiding water, and pruning that are done entirely by men. Similarly, weeding, picking/harvesting matured fruits, cleaning, grading, and packaging are mostly executed by farm women. Female wages as a percentage of male wages in the project area was in the range of 50-60 per cent. For eight hours of field operations, men are normally paid Rs.300 against Rs.150-160 for women, which exhibit the gender disparity in wage structures.

It was reported in the recent past, due to non availability of men labors, some of the farm operations like guiding water, digging pits, harvesting mango which were previously performed by men are done by women but the wage remains unchanged. In some farms, the women laborers have been purposively engaged for all farm operations mainly to reduce cost of operations. This finding is supported by Khurana (2011) and Singh and Sengupta (2009). Had the women been paid the wage equivalent to man, the additional wage paid would have been used to meet the household food consumption expenditure. It is often a regular phenomenon that many of the male wage earners spend part of their earnings in the liquor shop unlike the women, who used to spend the entire wage for the welfare of the household members. At this context, payment of wages on par with men will yield additional income to women farmers, which would facilitate enhanced spending on food and ensure grass root level household food security.

Possession of livestock

Livestock, one of the largest non-land assets in rural asset portfolios, are widely owned by rural households and perform multiple functions. Livestock constitute a popular productive asset with high expected returns through offspring, sale or consumption of products and their use in farming systems (Njuki and Pascal 2013). Livestock have been described as an asset that women can own more easily and that have the potential to contribute to a reduction in the gender asset gap within households (Kristjanson et al. 2010).

In animal rearing, women have multiple role and they take care of animals, grazing, fodder collection, cleaning of farm and animal sheds, milking and value addition of livestock products. Mango farmers in Tamil Nadu had more number of cows (about 58 per cent) compared to other livestock. Only 13.39 per cent had both poultry and milking cows. The possession of cow and hen was highly preferred as it had been an additional source of income to the farm families and on many occasions, they were the source of indemnity to meet the unforeseen situations. The cows are normally allowed to graze in the mango orchards freely. In about 65 per cent of farm families, cows and poultry had been the source of income for household women to meet the day to day affairs of the households like purchase of provisions, vegetables, infant food, educational expenses etc. The poultry birds were the major source of income for women farmers during festivals, family ceremonies etc. Now-a-days, the demand for country (*desi*) hens and cocks are more, particularly during festive seasons and hence many women farmers are engaged in this activity. In the mango orchards, the *desi fowls* are allowed to roam freely in the field and they were occasionally fed with grains and hence the cost of rearing was almost nil.

In many of the farm households, the contribution of money by women during carnivals and unforeseen occasions through animal rearing had been well acknowledged by the men members of the family. The animal rearing in fact helps to keep the households' food security unchanged during the years of crop failures owing to poor monsoon, less fruit setting, severe wind and other unforeseen agro-climatic circumstances.

Decision making regarding the maintenance and sale of livestock

The decision making towards the maintenance and sale of livestock is highly dominated by the women members of the family. It was visible during the interaction with the farmers that a little over 50 per cent of the decisions with respect to maintenance and sale of livestock were taken care of by farm women (Table 4). This shows the predominant and leading roles played by the female members of the family towards livestock related activities in contrast to the farm dependent activities, where men had a principal role in making decisions.

Area under crops

It is to be noted that the average area under annual crops was 0.27 hectares while it was 5.50 hectares for perennial crops. Since the surveyed farmers of the study consisted of only the perennial crop growers, the area was obviously high under perennial crops in the sample farms (Table 5). The perennial crops occupied 5.50 hectares

Table 6 Decision making with respect to choice of crops and pest and disease management

S.No	Gender	Choice of Crops		Pest Management		Disease Management	
		No	%	No	%	No	%
1	Male	379	68.91	401	72.91	368	66.91
2	Female	51	9.27	58	10.54	56	10.18
3	Both	120	21.82	91	16.55	126	22.91
Total		550	100	550	100	550	100

Involvement of gender in executing the post harvest operations

In mango orchards, women's participation in the post-production activities is extensive. Right from harvest of fruits from the field to marketing, they undertake multifarious roles. The activities like harvesting, collection of harvested fruits, grading, sorting, packaging and marketing are profusely done by farm women.

Women carry out harvesting and most of the post production operations like collection, cleaning, grading, sorting, packaging, handling etc. but men largely control them. In about 73 per cent of the farm households, the harvesting decision was jointly taken up by both men and women against 24.91 per cent by men alone. In only less than two per cent of the households, the women decided the harvesting operations, even though many of the operations were done by them (Table 7). The above facts clearly emphasize the need for the intervention of the local and federal institutions to

strengthen the participation of women in post production operations. As far as grading is concerned, 75.47 per cent was done by women, 15.10 per cent by both men and women and only nine per cent by men alone. With respect to packaging, about 56 per cent of operations were carried out by women, 24 per cent by both the partners and the rest by men, clearly indicating the dominant role played by women growers.

Table 5 Area under crops

S. No	Name of the crop	Average area (ha)
I	Area under annual crop	0.27
II	Area under perennial crop	5.50
1.	Mango	2.33
2.	Coconut	2.04
3.	Others	1.13
Total		5.50

*Others include citrus, Guava, Sappota, amla, coffee, pepper, tamarind etc.

Decision making with respect to choice of crops and pest and disease management

The decision making with respect to choice of crops for cultivation was highly dominated by the male member of the family (68.91 per cent) followed by the joint decisions by both men and women to an extent of only 21.82 per cent (Table 6). The above fact clearly showed the dominance of men in making crop related decisions with respect to selection of crops to be cultivated in the season, choice of varieties etc.

Regarding the decision with respect to pest and disease related issues, the household head, obviously the male member (70 per cent) decides about the schedules of chemical spray and control measures. In more than 19 per cent of the households, the decision is taken jointly by both the partners. In only ten per cent of the households, the female members are provided the opportunity and freedom of making decisions towards plant protection related issues (Table 6). Farmers (male farmers) usually consult local dealers for buying chemicals for spray. The dealers try to promote the chemicals of their own brand. On many instances, the chemicals are supplied on credit during crop season and payment would be effected by the farmers after harvest of mango. At this juncture, it is important to understand that spraying is normally not done either by farmers or by pre harvest contactors. Farmers and contractors used to hire people owning sprayers on custom hiring basis and obviously more than 95 per cent of the operators are male. Another important aspect that needs mention here is that the farmers are bound to sell the fruit through the agents and they would take away the money from the sale proceeds for the inputs supplied on credit and pay only the left over returns to the farmers. In the perennial cropping system, like mango the said practice is more common.

Table 6 Decision making with respect to choice of crops and pest and disease management

strengthen the participation of women in post production operations. As far as grading is concerned, 75.47 per cent was done by women, 15.10 per cent by both men and women and only nine per cent by men alone. With respect to packaging, about 56 per cent of operations were carried out by women, 24 per cent by both the partners and the rest by men, clearly indicating the dominant role played by women growers.

Decisions regarding marketing of mango

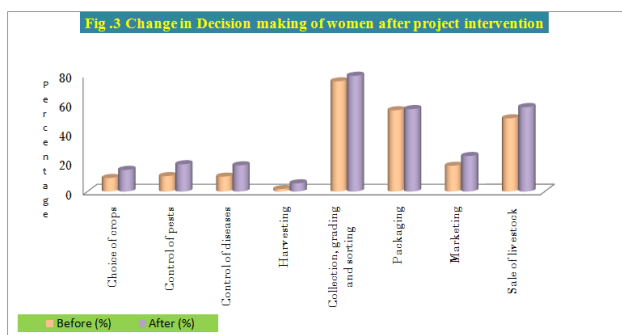
Women's role and participation in marketing of mango fruits is not encouraging. On many instances, their role ends with packaging and not many are actively associated in selling the produce, though their contribution in the production system is enormous. The decisions to market mango are taken by male members of the family in majority of farm families (60.72 per cent), whereas only in 17 per cent of the farm households, market related decisions are done exclusively by

the women members. Both men and women take joint decisions in about 22 per cent of the farm families (Table 7).The above facts clearly indicates the men’s preeminent role in marketing.

Table 7 Involvement of gender in executing post harvest operations

S.No	Farm activities	Gender	Total	
			Number	Percentage
1	Harvesting	Male	137	24.91
		Female	9	1.64
		Both	404	73.45
		Total	550	100
2	Grading and Sorting	Male	5	9.43
		Female	40	75.47
		Both	8	15.1
		Total	53	100
3	Packaging	Male	112	20.36
		Female	306	55.64
		Both	132	24
		Total	550	100
4	Marketing	Male	334	60.72
		Female	97	17.64
		Both	119	21.64
		Total	550	100

In order to enhance the participation of women in farm decision making, reduce post production losses through hands on training to women on good agricultural and management practices and value addition of mango, Mango Producer Groups (MPGs) numbering 45 were formed in the three mango producing domains and the impacts were assessed after the intervention through impact survey as detailed in the methodology section of this paper.



Impact of field intervention

Field level interventions carried out in the three major mango growing domains in Tamil Nadu, India, have unequivocally demonstrated that participation of women in the overall management of farm related decisions had enhanced by about seven per cent (Fig.3). Among the various activities, the extent of improvement in decision making with respect to harvesting, choice of crops and control of pest and disease (i.e. selection of right type of control measures like mechanical/chemical methods, integrated pest and disease management etc.) were high and significant. It was achieved through trainings, demonstrations, group meetings and field level interactions. It is also important to note that not much change in decision making was observed with respect to collection of fruits, cleaning, grading, packaging and sale of live stock, since already, the participation of women in these activities were reported to be high.

I feel proud that I have convinced my husband to consider my farm decision after associating with the Mango Producers Group formed under IDRC Project -Mrs.Dhanalakshmi, Mango Producers Group, Moramadugu Village, Krishnagiri, Tamil Nadu, India.

Reduction in post harvest losses and change in income

Post harvest losses of mango at the field level has come down by 800 Kg ha⁻¹ by adopting appropriate harvesting and post-harvest practices like use of right type of harvesting tools, adopting the right method of collecting fruits, cleaning, grading, sorting, packaging and transport practices. The hands-on trainings imparted to the women members of the 45 MPGs led to the production of value added products of mango like mango bars, pickle, ready-to-serve etc. This activity resulted in additional household income generation to a tune of about ten per cent. Altogether, these activities increased the household income to Rs. 7200 (equivalent to 120 USD) in the mango growing domains of Tamil Nadu after intervention through IDRC project. The additional income is being utilized for nutrition (purchase of nutrition rich and quality food stuffs), education (providing children high quality education in private schools) and health related expenses (consulting private physicians for health related issues etc.). This was reflected by enhanced allocation of money in the household budget estimated through consumption expenditure survey. In order to assess the impact of income on the household food consumption, the consumption expenditure survey was also conducted before and after our intervention.

Food and Non-food Consumption Expenditure

The per capita consumption expenditure indirectly indicates the extent of achieving food and nutritional security of the farm households and hence it was calculated based on the field level information. The consumption expenditure on food and non-food commodities before and after the intervention through the project was compared and the results obtained are really encouraging (Table 8). The per capita consumption expenditures for various food and non food commodities were derived at constant prices (adjusting the prices of goods and services with inflation) between the two periods of time and the same were compared to understand the changes in consumption of food and non food commodities. Overall, the per capita consumption expenditure increased by Rs.2113 (US\$ 35), which could be attributed to the enhanced household income consequent to the adoption of good agricultural and management practices. For majority of the farmers, mango farming was the only primary occupation and the source of income from other avenues was very meager and insignificant. There is clearly an enhancement in the percentage of expenditure towards cereals, pulses fruits and non vegetarian items under food category. Under non food category, there had been a significant increase in the expenditure share on education and health, which signifies the enhanced livelihood security of the farming communities.

Conclusion and recommendations

The study concluded that the gender inequality in terms of decision making in farm related decisions were very common, in spite of the fact that women shared majority of farm activities. Consequent to the baseline survey outcome, as a starting point, 45 Small and Marginal MPGs have been formed in the IDRC project domains to strengthen the participation of women farmers in the farm level decision making and post harvest handling of fruits. They were also trained on the value addition of fruits and the importance of involving themselves in participation of farm level decision making processes. The women members were taught the need of empowering themselves with active participation in decision making and adoption of improved methods of post production management to reduce post harvest losses, and enhance income and ultimately the household food security.

The (additional) income earned by women had been used only to meet the household food consumption expenditure, which would ultimately end up with enhanced food security. It is often a common phenomenon that many of the male wage earners used to spend part of their earnings in the liquor shop but the women wage earners always spend the entire wage for the welfare of the household members. At this context, payment of wages on par with men will enhance income and ensure household food security.

As suggested by the outcome of the study as well as the outcome of the study by Saxena (2012), although men control land ownership, supply of inputs, and the sale of cash crops, only women manage production that too under the guidance of men. Therefore,

improving women's skill and productivity in agriculture not only increases food availability for the household but also raises women's income and enhances food security due to women's spending patterns.

Redressing the gender gap in asset possession and decision making would be the key aspect in improving farm productivity and subsequently the employment, income and ultimate household food security. Policies and programs that strengthen greater share of assets by women will likely to have long-term impacts because they not only enhance women's ability to adopt remunerative livelihood

strategies, but also contribute to women's empowerment at the household and community levels. The formation of Women Empowerment Groups (WEGs) to improve rights and access to services would be a well-established means of social and economic empowerment in which members would increase productivity and incomes collectively. Capacity building is another important area that is required to ensure that women remain proactive members and assume important positions in leadership and decision making in economic activities to ensure household level food and nutritional security.

Table 8 Change in per capita food and non-food consumption expenditure

S. No	Items	Before Intervention		After Intervention	
		Amount(Rs.)	Percentage	Amount(Rs.)	Percentage
1	Cereals	1724	7.16	2082	7.95
2	Pulse	892	3.71	978	3.74
3	Edible Oils	987	4.1	1050	4.01
4	Fruits	1284	5.34	1483	5.66
5	Vegetables	1592	6.61	1708	6.52
6	Spices & Condiments	721	3	785	3
7	Non-Vegetarian	1586	6.59	1762	6.73
8	Beverages, refreshments and processed and semi - processed foods	1684	7	1793	6.85
9	Milk and milk products	1096	4.55	1156	4.42
10	Others	549	2.28	577	2.2
11	Clothing	1803	7.49	1986	7.59
12	Education	1549	6.44	1859	7.1
13	Travel & Recreation	1098	4.56	1163	4.44
14	Medical	1385	5.75	1595	6.09
15	Festivals & Functions	1653	6.87	1684	6.43
16	Fuel and lighting	1895	7.87	1908	7.29
17	Purchase of Durable	1349	5.61	1363	5.21
18	Others (Payment of taxes, insurance, consumers services, rent etc.	1220	5.07	1248	4.77
	Total	24067	100	26180	100

Note

¹ Pucca House: A pucca house is one, which has walls and roof made of the following material (Wall material: Burnt bricks, stones (packed with lime or cement), cement concrete, timber etc. Roof Material: Tiles, GCI (Galvanized Corrugated Iron) sheets, asbestos cement sheet, RBC, (Reinforced Brick Concrete), RCC (Reinforced Cement Concrete) and timber etc.

² Semi -pucca house: A house that has fixed walls made up of pucca material but roof is made up of the material other than those used for pucca house.

REFERENCE

- Ajani, Olubunmi Idowu Yetunde Ajani (2008) *Gender dimensions of agriculture, poverty, nutrition, and food security in Nigeria*. Nigeria strategy support program brief No.5. Nigeria: International Food Policy Research Institute.
- Anonymous (2012) *Season and Crop Report of Tamil Nadu*. Chennai: Department of Economics and Statistics, Government of Tamil Nadu.
- Anonymous (2013) *Post Harvest Profile of Mango*. Nagpur: Directorate of Marketing and Inspection, Ministry of Agriculture, Government of India.
- Anonymous (2013^a) *Press Trust of India* dt. September 1, 2013.
- FAO (2009) *Gender equity in agriculture and rural development*. A quick guide to gender mainstreaming in FAO's new Strategic framework, Rome, Italy.
- IBRD(2009) *Gender in agriculture*. Washington, DC: International Bank for Reconstruction and Development, World Bank.
- Kristjanson, P., Waters-Bayer, A., Johnson, N., Tipilda, A., Njuki, J. and Baltenweck, I. (2010) *Livestock and Women's Livelihoods: A Review of the Recent Evidence*. ILRI Discussion Paper No. 20. Nairobi: ILRI.
- Lal Roshan and Khurana Ashok (2011) Gender issues: the role of women in agriculture sector. *Zenith International Journal of Business Economics & Management Research* 1(1):29-39.
- Mason Charles and Butler (1987) New basket of goods and services being priced in revised CPI. *Monthly Labor Review* 110(1): 3-22.
- Njuki Jemimah and Sanginga Pascal (2013) *Women, Livestock Ownership and Markets: Bridging the gender gap in Eastern and Southern Africa*. New York: Routledge Publications.
- Oluwatayo I. B. (2012) *Gender considerations in decision making in rural Nigeria: implications on households' food security in Ekiti State* (<http://erd.eui.eu/media/oluwatayo.pdf>).
- Pant Laxmi Prasad (2014) Critical Systems of Learning and Innovation Competence for Addressing Complexity in Transformations to Agricultural Sustainability, *Agro-ecology and Sustainable Food Systems* 38(3): 336-365
- Saxena Naresh C. (2012) *Women in rural India, land and agriculture*, New Delhi: UN Women South Asia Sub Regional Office, Chanakyapuri,
- Sekhar C., Selvarajan, M., Pounraj A. and Prahadeeswaran, M. (2013) Production and export of mango in India. *American International Journal of Research in Humanities, Arts and Social Sciences* 13(337): 78-87.
- Singh R. and Sengupta, R. (2009). *The EU India FTA in agriculture and likely impact on Indian women* (<http://www.boell-india.org/web/112-535.htm>).
- Vijaya N., Bhagwan, A. Anitha, V. and Girwani, A. 2003. *Advances of mango research*. Hyderabad: Fruit Research Station, Acharya N.G. Ranga Agricultural University, Andhra Pradesh, India.
- Yocum C. (2007). *Household Spending Patterns: A Comparison of Four Census Regions* BLS Working Paper 412, U.S. Bureau of Labor Statistics.