

## TECHNOLOGIES FOR FARM WOMEN IN PLANTATION CROPS

### INTRODUCTION

Plantation crops, namely, tea, coffee, rubber, cashewnut, coconut, oil palm, arecanut, cocoa, cardamom, black pepper and tree spices are cultivated in India over an area of around three million ha. Though they occupy only two per cent of the total cultivated area in this country, their contribution to our national economy is most significant on various accounts. They earn a foreign exchange to the tune of about Rs 15745 million annually which accounts for nearly 80 per cent of the total export earnings from agricultural commodities. Table 1 presents the figures on the area production, export and export earnings in respect of different plantation crops in India during 1986-87. It could be seen in this Table that India ranks first in the world production of tea and arecanut ; second in cardamom and black papper ; third in coconut, fifth in rubber and tenth in coffee.

**Table—1. India's Plantation Crops Statistics**

Crop	India 86-87		World production ('000 tonnes)	India's position in world	Export from India	
	Area ('000ha)	Production ('000 tonnes)			Quantity ('000 tonnes)	Value (Million Rs.)
Coconut	1229.8	6404.4*	30957	Third	23.2**	314
Arecanut	176.3	209.4	225	First	0.4	14
Cocoa	22.6	6.3	1755	Very low	0.2	8
Oil Palm	4.3	0.2	34176	Very low	—	—
Cashew	575.5	245.6	408	First	44.5	3356
Small cardamom	94.3	5.2	11	Second	1.4	185
Black pepper	136.6	32.9	197	Second	37.1	2003
Tea	399.9	624.6	2184	First	203.7	6190
Coffee	234.5	192.3	5204	Tenth	86.2	3675
Rubber	369.3	200.5	4191	Fifth	—	—
Total	3243.1					15745

\*Coconut production in million nuts \*\* Coir and coir products

Another important aspect of plantation crops is that they provide employment to some 16 million persons in a year. Table 2 shows cropwise employment generation in plantation industry. The role of plantation crops in the welfare of the weakest section of our society is considerable, since a major group of plantation crops is raised in forests and the tribal people—mostly women—get an opportunity for employment and earning near their habitats.

Table—2. Labour force involved in plantation sector

Crop	Labour force (Million)
Tea	0.8
Coffee	0.4
Rubber	0.3
Coconut	10.0
Arecanut	4.0
Cashew	0.2
Pepper	0.2
Cardamom	0.1
Total	16.0

#### STATE OF ART

A general survey of employment in plantation crops reveals the importance of farm women both in production and processing sectors. Some of the specific areas of operations where women workers are preferred to men are : weeding and manuring in all sorts of plantation crops ; desuckering and BHC swabbing in coffee ; mulching and pot watering in cocount and arecanut gardens ; plucking/picking and sorting in tea and coffee ; tapping in rubber ; collection and transport of coconuts and arecanuts after harvest ; splitting, sundrying and shelling of coconuts for copra making ; drying, husking and grading of ripe arecanuts ; cutting, boiling, blending and drying of tender arecanuts ; plucking of cashew apples and nuts ; shelling, drying, peeling and grading of cashew- kernels ; picking and cleaning of cardamom capsules ; harvesting, drying, cleaning and packing of black pepper ; and like-wise. In coir sector, women workers are exclusively used in beating of husks, spinning of coir yarn, etc.

Depending on the nature of the crops and their operational requirements, the share of women workers in the total employment in production sector falls within a range of 30 to 54 per cent, while it varies between 20 to 80 per cent in processing sector (Table 3). Women workers are

also engaged in marketing sector, but their roles are marginal compared to men workers.

As far as wage rates are concerned, presently, there is no discrimination between men and women workers in plantation sectors. A uniform wage policy is now in vogue following the implementation of the Equal Remuneration Act. The existing wage rate for plantation workers is around Rs 20/- per day of eight hours work, though it slightly varies from State to State depending upon the local labour market. However, besides time-rate, piece-rate payment system is in operation in certain sectors. Incentives are also given to tea pluckers and similar workers for output above the standard or base output. In Kerala, for instance, an incentive at the rate of 20-22 Paise per kg of leaves plucked over and above the standard output is given to the women pluckers. Similarly, in Karnataka, for coffee picking an incentive at the rate of 15-20 Paise per Kg of berries is given to farm women over and above the standard harvest of 50 Kg for which the daily wage is paid.

Table—3. Percentage share of men and women labour force in plantation crops

	Production sector		Processing sector	
	Men	Women	Men	Women
1. Tea	51	49	86	20
2. Coffee	67	33	20	80
3. Rubber	64	36	64	36
4. Coconut	70	30	28	72
5. Arecanut	77	23	44	56
6. Cashew	50	50	16	84
7. Black pepper	80	20	30	70
8. Cardamom	49	54	68	32

### TECHNOLOGICAL OPTIONS

Plantations in general and tea, coffee, rubber, cardamom and black pepper in particular do not provide enough opportunity for mechanisation in production sector, because of their physiological features and characteristic forest/hill environments where they are raised. At the same time, the small holder plantation crops namely, coconut, arecanut, cashewnut and cocoa eventhough are raised in garden lands unlike other plantation crops, also do not provide opportunity for mechanisation as they, by and large, are grown in a mixture of crops, both perennials and annuals and rarely as sole crops. Small holders otherwise also do not enjoy technological option for labour saving-cum-capital intensive production for obvious reason.

In case of tea, coffee and rubber, however, there are some large plantations where chemical weedicides are now being used as a labour saving device. This is not because of the scarcity of labour but due to economic consideration. It is certainly a point of concern to all of us, who would like to see that technological innovations do not displace rural labour particularly tribal women whose employment opportunities are most limited. However, there are several technological options in plantation crops' production sector which could be used for increasing the productivity and/or reducing the drudgery of working force in general and farm women in particular. These technologies have been developed by R&D units in India namely, Central Plantation Crops Research Institute (CPCRI), Rubber Research Institute of India, Central Coffee Research Institute, UPASI Tea Research Institute, Tocklai Tea Research Station, Indian Cardamom Research Institute and State Agricultural Universities. Enough care has been given to see that instead of posing the problem of labour displacement, those technologies generate additional employment potential while meeting the desired goals. Technologies that are favourable towards farm women are highlighted here.

#### PRODUCTION OF ELITE PLANTING MATERIALS

In the production sector of plantation industry, one of the major constraints is the non-availability of quality planting materials (Das, 1983 ; Bavappa, 1986). In the case of coconut, cashew and black pepper the estimated figures on quality planting material requirements per annum are 15 millions, two millions and eight millions, respectively (Anon., 1988). India's annual demand for such input in other plantation crops also seems to be of very high order. Techniques for the production of high yielding and high quality planting materials and nursery management techniques in all these plantation crops have been standardized by the research institutions dealing with this group of crops. Raising of planting materials in polybags, vegetative propagations in cashew, rapid multiplication of black pepper (Bayappa, 1986) and such other technologies developed by the Central Plantation Crops Research Institute and other R&D units could provide gainful employment to a sizeable farm women in plantation areas. However, suitable vocational trainings on the production of planting materials and nursery management techniques is a prerequisite for developing the required skills of farm women.

#### DRIP IRRIGATION

Plantation crops in India, by and large, are raised under moisture stress during summer months, in rainfed system and it is one of the major

factors responsible for low productivity of these crops. A study reveals that less than 5% of coconut holdings in Kerala are irrigated (Das, 1987). Among all the available alternatives for reducing or removing moisture stress in plantations, drip system is considered ideal taking into the accounts the factors like topography, soil types, layout, fertilizer use efficiency and over and above, the availability of water during summer months (Yusuf and Dhanapal, 1987). Besides, the operation is so easy that farm women can effectively and efficiently handle the emitter clogging problem as well as drippers in a properly installed drip irrigation system and there has been a growing awareness on the need for drip irrigation system in plantations after realising the efficacy and cost effectiveness of this system. If the industry could be made to cooperate in manufacturing and supplying at a reasonable rate PVC pipes, filters, emitters and drippers ; and institutional supports in forms of loan and subsidy are extended, drip irrigation could provide job opportunity to a substantial farm women in plantation sector both directly and indirectly.

#### REJUVENATION PROGRAMME

Low productivity in plantation agriculture (mainly small-holder plantations) is also largely attributed to lack of fertilization and inadequate cultural energy application. In coconut, for instance, only 5-10 per cent of holdings in Kerala are applied with chemical fertilizers (Das, 1987). Proper rejuvenation programme in plantations if taken up in right direction could provide remunerative jobs to millions of farm women.

#### INTEGRATED PLANT PROTECTION

Being perennial in nature, plantation crops pose serious problems to disease and pest management. The estimated loss to these crops caused by some of the dangerous pathogens and pests is as high as 30-70 per cent (Bavappa, 1986 ; Das, 1988). Though several proven technologies on plant protection are already available for the control of some of the diseases, pests and nematodes ; most of them cannot be handled by farm women as they require climbing of palms and trees. However, a few of the technologies, such as, rodent pest management developed at CPCRI (Advani and Bhat, 1987) and phytosanitary measures for different plantations developed in the respective R&D units offer great promise to farm women.

#### POST-HARVEST TECHNOLOGY

We have already indicated that the farm women play a major role

in post-harvest operations of plantation commodities. The drudgery is, however, an integrated part of the traditional post-harvest operations. Husking of ripe and tender arecanuts, for example, is traditionally done by skilled women workers with the aid of knives fixed on horizontal wooden planks. While working they sit in bending position for more than eight hrs. a day and carryout most stereotyped job for their livelihood. Presently, there is a shortage of such skilled labour in most parts of arecanut growing areas in India, largely due to drudgery of work. Keeping this problem in view, a manually operated simple device for husking arecanut has been developed at CPCRI (Baboo and Annamalai, 1985) which costs Rs 600 per unit. Farm women can easily be trained for husking arecanut with the help of pedal operated dehusker. The device loosens the husk of the nuts, which can be easily peeled off by hand.

Dryer for plantation commodities using agricultural waste as fuel is a newly developed technology. This dryer is most useful for farm women who otherwise remain either unemployed or under employed during monsoon months due to lack of opportunity for sundrying of plantation produces. A small-holder dryer developed at CPCRI costs about Rs 2000 (Patil and Annamalai, 1986). The economics of copra making during rainy season with the help of CPCRI dryer was carried out under the field condition. It could be seen in Table 4 that a copra maker could make a net profit of Rs 6500 in one season (Das, 1983a). Another case study has revealed that a small-holder can make an additional net return of Rs 7500 per season by making Value Added Product instead of selling coconuts in the market during monsoon months (Das, 1985).

**Table—4. Profitability of copra making with CPCRI Dryer using agricultural waste as fuel**

Particulars	Rs.
I. Total overhead cost/annum	450
II. Cost of 24,800 nuts @ Rs 2.50/unit	62,000
III. Cost of dehusking, handling, transport, splitting, loading, unloading, fueling and bagging	6,914
IV. Fuel cost for 62 batches	1,550
V. Total operational cost	70,464
VI. Gross cost of 3968 Kg. of copra (I+V)	70,914
VII. Revenue from the sale of 24,800 husks	1,984
VIII. Net cost of 3968 Kg of copra (VI-VII)	68,930
IX. Revenue from the sale of copra @ Rs 19/- per Kg.	72,392
X. Net return from 3968 Kg copra making (IX-VIII)	6,462 or 6,500

Cashew processing industry in India provides employment to over 100,000 workers. Some 90 per cent of them are farm women who find seasonal employment in cashew factories in cashew growing areas. Table 5 indicates that the most labour intensive operations like shelling and peeling in cashew are done exclusively by women workers, while

**Table—5. Operation-wise and sex-wise distribution of labour in cashew processing industry**

Operations	Percentage of work done by	
	Male	Female
Shelling	—	100
Peeling	—	100
Grading	40	60
Roasting	100	—
Heating	100	—
Other works	100	—

about 60 per cent of grading of kernels is carried out by them (Kannan, 1983 ; Das, 1985). Realising the drudgery of work, the cashew processing industry has introduced improved leg and hand operated machines for shelling of raw nuts. Cashew workers have welcomed this technology as it does not pose the problem of displacement.

Similarly, in the case of coir industry of Kerala about 300,000 workers are engaged. Nearly 70 per cent of them are farm women who get non-farm employment in coir sector. The operation-wise and sex-wise distribution of labour in coir industry which is shown in Table 6, reveal that beating and cleaning of retted coconut husks and spinning of coir yarns are mostly carried out by women workers. (Anon., 1982). Significant technological innovations have been made in recent years in coir industry for reducing the drudgery and at the same time increasing the efficiency of women workers.

**Table—6. Operation-wise and sex-wise distribution of labour in coir industry**

Operations	Percentage of work done by	
	Male	Female
Retting	100	—
Beating & cleaning	—	100
Spinning	25	75
Weaving	100	—
Other works	100	—

## PLANTATION CROPS BASED ON FARMING SYSTEMS

Plantation industries often face the problems of production and price uncertainties. In order to overcome these problems and generate steady employment and income, the small-holder plantations are encouraged towards the crop diversification. Some of the plantation crops based on cropping/farming systems which have recently gained popularity among the planters are : tea + pear + pepper ; coffee + orange/acid lime + pepper ; cardamom + coffee + pepper ; arecanut + cocoa/banana + pepper ; coconut + cocoa/banana + pepper + pineapple; coconut + pepper + forage + milch animals + rabbit ; and cashew + cassava/elephant-foot-yam.

An economic analysis of coconut-based mixed farming system involving production of fodder (Hybrid Napier-NB 21 and Guinea grass) in the interspaces of coconut, training of black pepper on coconut palms, growing vegetables and banana around backyard, rearing of five heads of milch cows and 30 rabbits revealed that the employment generation could go up from 140 days/ha/yr. in coconut monocrop system to 850 days/ha/yr. in the integrated farming system. As far as the employment of farm wome is concerned, it could rise from 60 days/ha/yr. in monocropping of coconut to 545 days/ha/yr. in the above farming system and it comes to an increase by about 800 per cent (Table 7). In other words, two farm women can get full time employment in one ha coconut based system. Besides, it could be seen in Table 8 that the total return to the family under this model could rise to the tune of Rs. 40,300/ha/yr. from Rs 13,300/ha./yr. under coconut sole crop system (Das, 1988 a).

Table—7. Estimated labour requirement for coconut based farming system (Men and women days/ha./year)

Operations	Monocrop			Mixed farming		
	Men	Women	Total	Men	Women	Total
Fencing & repair	5	3	8	5	3	8
Manuring	4	20	24	6	30	36
Weeding & mulching	6	26	32	—	—	—
Irrigation	20	4	24	50	10	60
Plant Protection	10	2	12	12	4	16
Harvesting	35	5	40	42	8	50
Grass cutting	—	—	—	50	310	360
Milching	—	—	—	90	10	100
Cleaning & feeding cows	—	—	—	30	150	180
Miscellaneous (Rearing rabbits and raising subsidiary crops, etc.)	—	—	—	20	20	40
Total	80	60	140	305	545	850
% increase over Monocrop				381	908	607

**Table—8. Economics of coconut based Mixed Farming (Rs/ha.)**

Particulars	Monocrop	Mixed Farming system
Labour charge	4,050	23,800
Organic manure, fertilizers and plant protection	2,200	2,950
Cattle feeds & veterinary charges	—	16,620
Contingencies	650	2,430
Annuity value and depreciation	16,400	20,500
Gross cost	23 300	66,300
Gross return	27,150	86,100
Net return	10,400	19,800
Return from family labour	2,900	20,500
Total return to family	13,300	40,300

The National Commission on Agriculture, the Commodity Boards, namely, Tea Board, Coffee Board, Rubber Board, Spices Board, Coconut Development Board, and related development agencies have estimated the demand for plantation commodities in India by 2000 A.D. The targeted area, yield rate and production of these crops is shown in Table 9. It is revealed from this Table that in order to meet the requirements of

**Table—9. Future target of area, yield and production of plantation crops by 2000 A.D.**

Crop	Area ('000 ha.)	Yield (Kg/ha.)	Production ('000 T.)
Tea	450	2444	1100
Coffee	300	1023	307
Rubber	500	1250	625
Coconut	2100	5714*	12000*
Cacao	40	300	12
Pepper	126	476	60
Cardamom	110	150	17

\*Million nuts

plantation commodities in a short span of 12 years from now, both the area and productivity of these crops need substantial expansion. The challenges can be met from a multifront attack : rejuvenation and replanting in conventional areas ; new planting both in conventional and non-conventional areas ; adoption of low-cost, labour intensive and appropriate technologies ; vocational education and training for entrepreneurship development in new areas of production and processing technologies ; institutional supports such as credit, subsidies for accelerating the adoption of new technologies ; incentives for quality

products and productivity linked remuneration. The expansion of area as well as adoption of new technologies in the existing areas of plantation crops for increasing the productivity will provide millions of employment to farm women in production sector. At the same time, with the considerable growth in production of these commodities, the processing and marketing sectors will be in a position to absorb a vast section of farm women in gainful employment. Thus, the prospect for farm women in plantation sectors by the turn of the century holds great promise.