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Female Agricultural Workers in North East India: From the Perspective of Ergonomics and Safety in Agriculture

Agriculture plays a vital role in the development of any economy in rural India where the women contributions are very significant. Women are always involved in various stages of agricultural operations, such as, crop production including the sowing and transplanting of paddy, weeding manually as inter-cultural operations, harvesting followed by the threshing, winnowing and other post-harvest activities, cultivation of horticultural crops, tea planting, agro forestry and fish farming, etc. With time, the technological development in the sectors of agriculture brings out a significant change both in technology adoption and labour employments in terms of the rural women employability. As most of the rural women are engaged major part of their time either in their domestic activities or in the management of livestock, poultry, sericulture, aquaculture, dairy, apiculture and other agri-allied activities. However, they are not being rewarded at par with their male counterparts in terms of economic benefits. Due to these reasons, the productive activities done by the women went unnoticed or unrecorded in most of the cases, though they are contributing economically in one way or the other. In a patriarchal society of state like Assam, the roles of women in agriculture and agri-allied are undervalued and under estimated. In a country like India with multilingual states, the involvement

of workforce in agriculture varies from region to region, and the participation of the women is almost the same throughout the country. But, some regions had a different scenario, where the involvement of women is based on the caste system, classes and socio-economic status of the families. The development of improved agricultural tools by considering the ergonomical factors, modernization and digitalization provides the women with better income source and earning opportunities in the unexplored sectors, displacing them from their age old traditional roles in the rural community.

INTRODUCTION

India is an agrarian country whose rural economy depends primarily on agriculture and its allied sectors. As the mechanization in agriculture is in its initial stage, the involvement of women in the agricultural activities and their contribution in various agri-related sectors, agricultural policy making bodies, etc. had been realized gradually in the recent years. Till today, most of the women are engaged in agricultural activities as agricultural laborers for the physical output, quality and efficiency as well. Still today in some parts of the country, the participation of women in domestic and farming activities are determined by the factors like-social, economic and cultural conditions of the region. Though this criteria is not homogeneous throughout the country and states, but within the same region, their involvement varies depending on the socio-economic status and caste systems.

Unlike the earlier days, the involvement of women in all the agricultural activities starting from crop selection to processing of the harvested products and end products can be seen in most of the families.

It was observed that almost 80% of transplanting and harvesting are performed by women, but very less involvement and participation in activities like

purchasing of inputs, application of insecticides and pesticides, operation of heavy machineries like tractors and tractor mounted implements, etc.

ROLE OF WOMEN IN AGRICULTURAL SECTOR

The women workers involved in agriculture performs the operations including sowing, transplanting, weeding, inter-culture, harvesting and threshing in crop production. In the post-harvest activities, they are involved in cleaning, grading, drying, parboiling, milling, grinding, decortications and storage too. The various operations of commercial agriculture include tea plucking, tobacco leaf harvesting, lac cultivation and its processing, etc. In terms of livestock rearing, poultry, dairy, goatery, piggery, duckery, and other animal rearing activities are the major components. They perform in various positions in the agricultural sector, such as- as a worker, as an operator, as a manager, as an entrepreneur.

The participation of women is quite less in most of the activities, thus, resulting in the less labour force participation rate of women (63%) in the age group of 25-54 as compared to the participation rate of men (94%) in the same age group. In India, the gender wages gap of women is estimated to be around 23%. The national annual average daily wage rate for field labour (male) was Rs.330/day during 2018-19. Amongst all the states, Kerala pays the highest wage to field labour (male) Rs.673/day, while Chhattisgarh pays the lowest wage with Rs.214/day. The trend is similar in case of the female labour wages as well, Kerala paid highest wage of Rs.506/day, and Chhattisgarh paid the lowest wage of Rs.153/day. The annual average wage rate for field labour (female) is Rs.262/day at national level. There is a wage gap of approximately 21% at national level between men and women agricultural labourer for the same category of works. In Assam, the average daily wages of field labour male and female were Rs. 288 and Rs. 232 respectively during 2018-19.

Table 1. Population dynamics of Indian Agricultural workers (No. in millions)

Sl. No.	Particulars	2011	2020	2050 (projected)
1.	Country's population	1210	1347	1612
2.	Total number of workers	482	566	693
3.	Number of agricultural workers	263	281.8	228.7
4.	Percent of agricultural workers to total workers	55	49.8	33
5.	i) Number of male agricultural workers	165	171.9	114.5
	ii) Number of female agricultural workers	98	109.9	114.2
	iii) Percent of females in agricultural work force	37	39.8	50

(Source: Vision 2050 document of Central Institute of Agricultural Engineering, Bhopal, India)

ERGONOMICS

It is the scientific study of the relationship between a person and their working environment, which includes ambient conditions, tools and materials, methods of work and organization of work. The performance of any tools or equipments related to various agricultural operations and activities depends on both the constructional features and the workers/operators operating the instrument/machine.

Importance of improved farm tools and equipments:

The application of improved farm tools and equipments had the following advantages over the conventional ones:

- I. It reduces the drudgery
- II. It enhances the quality of work life of the agricultural labourers and the operators
- III. It increases the utilization efficiency of inputs
- IV. It ensures the timely sowing of crops and hence, allows for 300% cropping intensity with better irrigation facilities
- V. It increases the productivity of man-machine system
- VI. It conserves energy
- VII. It improves both the work and produce quality.

The important ergonomical data required for

designing of improved tools and equipments, work methods are:

- i) Anthropometric data
- ii) muscular strength data
- iii) maximum aerobic capacity
- iv) physiological cost of operation (heart rate and oxygen consumption rate)
- v) posture

Table 2: Indian Agricultural Workers' Anthropometric and Strength data (mean values)

Sl. No.	Parameters	Male	Female
1.	Height, cm	1636	1521
2.	Weight, Kg	55.1	47.8
3.	Strength of Push (both hands) at standing, N	220	143
4.	Strength of Pull (both hands) at standing, N	218	159

(Source: ICAR-CIAE, Bhopal)

AEROBIC CAPACITY

The maximum aerobic capacities of the agricultural workers are 2.2 l/min (Male) and 1.6 l/m (Female).

POSTURE

A good or ideal working posture requires a minimum of static muscular effort. Better work performance can be achieved whenever there is minimum body discomfort, for instance, if any work is to be done for longer duration, the sitting posture is better than the standing posture or vice-versa.

It can be seen that in the sectors like- sericulture, livestock, poultry and handloom, the majority of the important decisions were taken by female rather than

Table 3. Improved Equipments for Indian Agricultural Women

1. Seed treatment drum	2. Naveen dibbler
3. Seed drill	4. Paddy drum seeder (4-row)
5. Rice transplanters (three designs of 2-4 row)	6. Cono weeder
7. Mandwa weeder	8. Twin wheel hoe
9. Fertilizer broadcaster	10. Improved sickle
11. Sugarcane stripper	12. Tubular maize sheller
13. Rotary maize sheller	14. Maize dehusker sheller
15. Groundnut stripper	16. Groundnut decorticator sitting type
17. Pedal operated paddy thresher	18. Hanging type double screen/ Grain cleaner with sac holder
19. Cotton stalk puller	20. Hand ridger
21. Fruit harvester	22. Bamboo ladder for apple harvesting
23. Coconut tree climber	24. Coconut dehusker
25. Improved basket holder	26. Wheel barrow
27. Safety gloves for fish processing and improved platform	28. Cashew nut desheller
29. Pedal-cum-power operated areca-nut dehusker	30. Fish dressing platform

(Source: ICAR-CIAE, Bhopal)

their male counterpart. But, in case of agricultural field management activities, the decisions were taken by the male only.

One of the premier institute, namely, ICAR-CIWA (Central Institute for Women in Agriculture), Bhubaneswar is working on the various issues

Figure 1. Showing the various activities performed by women agricultural workers



Various farm activities of rice cultivation in north-eastern region of India



Land preparation



Transplanting in flat land



Paddy Transplanter



Manual Weeding



Harvesting by sickle



Threshing

GOVERNMENT INITIATIVES

The government of India has taken up many developmental schemes and activities in order to minimize the gender gap in terms of wages and economical benefits. In this regard, many nationalized institutions which are solely dedicated to the development of women had been set up through various organizations, such as ICAR and other institutions.

concerning women in agriculture. They are involved in multiple dimensions such as-participatory action research in different technology based thematic areas involving women from rural areas in order to test the suitability of technologies for the users and modify them to make it more user friendly, also to facilitate research and development (R&D) in collaboration with other institutions and to include farm women perspectives in their existing programmes. Few of the

thrust areas of research are technology assessment and refinement, gender issues in farming system, assessment of drudgery and reduction, research methodology and approaches, etc. Their extension education department provides latest technologies with the intention of serving the farmers and hence, increasing the economic status of the farming communities. In order to acquaint the farm women with the modern technologies, various extension activities like- field days, exhibitions, exposure visits, demonstrations, TOT through mass media, capacity building programmes, etc. are being organized by the institute.

DST SPONSORED S&T FOR WOMEN-PROGRAM

It is launched in 1981-82, focussed on the location-specific programmes, training and skill development of the women, income generation, awareness about the health, nutrition and reduction in drudgery, eg., Women Technology Parks (WTP). Umbrella scheme - Wise Kiran, Women Scientist Scheme (launched in 2002) having three categories: WOS-A, WOS-B, WOS-C; GATI (Gender Advancement for Transforming Institutions); CURIE (Consolidation of University Research for Innovation and Excellence in Women Universities) & VIGYAN JYOTI;

CONCLUSION

The north eastern states of India, including Assam had always practised the culture of active participation of women in various agricultural activities since ancient times. The development of proper tools and implements based on suitable ergonomical data can ensure the safety of women agricultural workers in a developing country like India and agrarian state like Assam in particular. It can be seen that the potentiality of women and men are almost same as far as the contribution in agricultural productivity is concerned. For the marginal farm households and landless farmers, the contribution of female workers' earnings plays a significant role in their household income. But, to the contrary, the proportionate females' contribution declines with increasing farm size. One of the reasons for this may be due to the fact that the rate of women participation in agriculture is regulated by that family's economic condition. Earlier, the women workers were treated as supplementary earners to their family income as because their participation declines with the improvement in the economic conditions of the family and for various health issues. At times, the women from economically

backward communities had to work under inferior working conditions for the sake of earning to assist their family. There should be proper and equal dissemination of the technological aspects of modern agriculture amongst the women of farming communities; also they should be assisted through various government schemes both financially and technically which can be easily accessible to the rural women in order to improve their way of living standard. The rural Indian women need to be taken into consideration for complete abolishment of such discrimination and gender inequality, have to empower them enough, provide equal opportunities and then only, the contribution of women towards agricultural sector will have an impact in our economy.

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