

# **CAPACITY BUILDING OF RURAL WOMEN IN HOMESTEAD GARDEN FOR SUSTAINABLE HORTICULTURAL DEVELOPMENT**

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**July, 2017**

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**CERTIFICATE – I**

This is to certify that the thesis entitled “**Capacity Building of Rural Women in Homestead Garden for Sustainable Horticultural Development**” submitted to the Faculty of Home Science, Assam Agricultural University in partial fulfillment for the degree of **Doctor of Philosophy (Home Science)** in **Extension and Communication Management** is a record of research work carried out by **Pritimoni Gogoi** under my personal supervision and guidance.

All helps received by her have been duly acknowledged.

No part of this thesis has been reproduced elsewhere for any degree.

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## ABSTRACT

The present investigation on capacity building of rural women in homestead garden for sustainable horticultural development was carried out in two agro-climatic zones of Assam. A multi stage purposive cum simple random sampling design was followed for selection of sample. One district from each zone namely Sivasagar district of Upper Brahmaputra Valley Zone and Kamrup (R) district of Lower Brahmaputra Valley Zone were selected randomly. Total 300 rural women from 12 villages of the selected zones and who were mostly engaged in fruits and vegetable cultivation were selected as respondents for the present study. Data collection was done by using structured interview schedules. The study revealed that majority of the rural women (54.00 %) were of middle aged group, married (87.67%), educated upto middle school level(54.32%), had farming as their main occupation (67.25%), had less than 1 hectares of cultivable land (70.33 %), had more membership in group organizations (65.81 %), had poor contact with extension personnel (87.33%) , took agricultural advice from friends and neighbours (58.10%), had not attended any intervention programme (57.62%). Among the rural women who had attended intervention programme earlier, majority 85.03 percent attended on the aspect piggery. Majority of the rural women had independent participation in selected farm and non-farm activities such as transplanting and weeding (79.02%), weeding (66.00%), cooking (65.66%) and weaving (69.67%). Majority (74.67 %) of rural women took independent decision on amount of food to be kept for consumption, preservation of fruits and vegetables (41.00 %) and weaving (73.64%). Majority of rural women had low level of knowledge in aspects like nursery raising (76.30%), land preparation (67.00%), production practices (80.00%) and plant protection (52.70%). The problems faced by rural women in participating in different horticultural activities which got first ranks in their respective categories of problem were lack of irrigation facility, growth retardation of plants due to higher weed growth, high cost of labour, lack of proper training, household workload and natural calamities. The outcome of the intervention programmes indicated that there were changes in knowledge gain and retention in rural women and technology adoption behavior. The knowledge retention by rural women in three aspects of production technologies of fruit and vegetable crops namely plant protection, nutritional management and land preparation were given first, second and third ranks after analysis. In case technology adoption, aspects plant protection measures, nutrient management and nursery raising practices got the first, second and third ranks respectively.

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2	Test II	To assess the knowledge level of rural women participants just after the intervention programme	Immediately after completion of the intervention programme on 11/11/16	Office of the Sub-divisional Agricultural Officer, Nazira, Sivasagar
3	Test III	To check the retention of knowledge by rural women participants of intervention programme	After thirty (30) days of completion of the intervention programme on 12/12/16	Residence of the respective rural woman participant of the intervention programme

## ABBREVIATION USED

ADO	:	Agricultural Development Officer
AEO	:	Agricultural Extension Officer
ATMA	:	Agricultural Technology Management Agency
DAO	:	District Agricultural Officer
GDP	:	Grows Domestic Product
GOVT.	:	Government
HA	:	Hectare
HYV	:	High Yielding Variety
KVK	:	Krishi Vigyan Kendra
LBVZ	:	Lower Brahmaputra Valley Zone
MANAGE	:	National Institute of Agricultural Extension Management
NAARM	:	National Academy of Agricultural Research Management
NABARD	:	National Bank for Agricultural and Rural Development
NATP	:	National Agricultural Technology Project
NGO	:	Non Government Organization
NRCWA	:	National Research Centre for Women in Agriculture
SAU	:	State Agricultural University
SDAO	:	Sub-Divisional Agricultural Officer
SHG	:	Self Help Group
UBVZ	:	Upper Brahmaputra Valley Zone
VLEW	:	Village Level Extension Worker

# **CHAPTER I**

## **INTRODUCTION**

Agriculture, the single largest production endeavor in India, contributing 25 per cent of GDP, is increasingly becoming a female activity (Dash, 2008). Agriculture sector employs 4/5<sup>th</sup> of all economically active women in the country. About 48 per cent of India's self-employed farmers are women (Das, 2015). Women today are central to the selection, breeding, cultivation, preparation & harvest of food crops. Apart from their pivotal role in cultivation of staple crops, they are primarily responsible for the production of secondary crops such as pulses and vegetables which are often the only source of nutrition available to their families. Beyond their conventional role as productive workers, almost all women in rural India today can be considered as farmers, managers due to widowhood and male out migration, agricultural labour and unpaid workers in the family farm enterprise. But despite this fact, majority of the rural women in India are concentrated in low paid, low skilled work and low productive job as well as women have remained as a neglected section of work force. They receive only small share in development opportunities and are often excluded from education, better jobs, better health care, decision making etc.

Agricultural development is a complex process and a challenging one as well. To work in harmony to bring about stable and sustainable growth in agriculture, four sub systems of the agricultural development process such as research, extension, support and client have been recognized. So far the client system is concerned, it encompasses both men and women as equal partners. Unquestionably women play a significant and crucial role throughout the third world. In addition to farm work, in which they are actively involved with men, the burden of almost all the household chores is on them. But despite the global consensus as to their vital role both on the farm and the household, their importance in contribution to the agriculture are not adequately reflected in the available statistics which is perhaps obscure more than they reveal. Moreover, it is found that agricultural extension networks do not provide them with satisfactory services and hence there is an urgent need for better understanding in



this regard for developing effective extension and training programmes to reach rural women.

Many studies show that in the effort to generate household food supply and income, a substantial burden falls on women. Besides their responsibility of household food production, women are also responsible for processing, storing and preparing food for the family. Rural women fetch water, collect firewood, engage as family labour and participate in other income generating activities like weaving, knitting, hand embroidery etc. In rural areas, a significant proportion of women spend two third of their time in traditional agriculture and rest of their time in household, social and livestock related activities.

Women are active partners in farming and undertake management along with men. There are certain unit operations in agriculture, which are women dominated like production, post harvest management and agro-processing. The women perform the maximum farm operations thereby contribute a lot towards the upliftment of the economic and social status of their families and finally, accelerating the pace of rural development. Horticulture is one of the fastest growing sectors of agriculture. The growth of this sector was about (5.5%) during last two and half decades (Anonymous, 2014). Apart from employment generation and income enhancement, the horticulture sector has vast scope of value addition which not only provides employment to farm family but also to landless household particularly women. Women play a significant and crucial role in horticultural development including production, post harvest operation and value addition (Tripathi et al., 2015).

But despite their extensive and active involvement in agriculture of India, they are not considered for decision making in farm activities. Majority of rural women have lack of access to land and poor sources of credit. Besides this rural women's access to agricultural extension services is only about one twentieth of that of men and technology is rarely designed to meet the needs of rural women. They face poverty, underemployment and lack of access to production resources and opportunities to improve their quality of life.

Women participation in agriculture will be acknowledged when women farmer will actively participate to build and improve their knowledge and gain access to new and necessary information to make use of most of them in their farming activities. By linking the knowledge and information flow amongst women socio economic

progress can be achieved. At present there has been greater emphasis on the reduction of poverty, improved nutritional status and increased self reliance in the rural areas particularly at the household level. To this end, there have been efforts to increase awareness among the planners and decision makers to better identify and respond to women's needs for intervention programmes and access to inputs and services for food production. Capacity building of rural women through intervention programme is one of the key initiatives focused on gender mainstreaming in agriculture. In recent years, the concept of capacity building has received unprecedented attention which emphasizes on training of women to strengthen their knowledge and skills in many areas including agriculture with a view to increasing productivity and income of poor households.

Practically capacity building is to develop the capabilities of people to analyze their environment, notice their problems, opportunities and set strategies to cope with the issues. So capacity building of rural women through training is the platform through which rural women can have scientific knowledge about improved agricultural production.

Sustainable agricultural development is concerned with ensuring food at all times in terms of quality and quantity. Despite the substantial progress made in India's food production, serious nutritional challenges continue to threaten her human resource development more, so rural women and her family are particularly vulnerable to malnutrition. Poor nutritional status of women during adolescence period and their vulnerability to nutritional deficiency disease like anemia during pregnancy period leads to giving birth low birth weight children and if the newly born is a girl child then the vicious cycle continues. Although food is available through markets at the district and village level, food security at the household level becomes a challenge because of low purchasing power of rural families. At this point homestead gardening is one of the best possible solutions to meet the household food requirement of a family. But with the growing population and existence of nuclear family, land holding pattern of family is shrinking. So, judicious use of available land by rural families is essential to meet the family food requirement specifically fruits and vegetable which are the major protective food of our diet. Thus, adoption of scientifically validated production technologies in cultivation of fruits and vegetables is one of the best options. In order to adopt a technology, one must have gain of knowledge regarding the technology. Therefore capacity building of rural women in terms of knowledge for sustainable horticultural development is the need of the hour.

## JUSTIFICATION

Agricultural development in India has direct relationship to the quality of life of the rural people as well as a pace of rural development, this is so as high percentage of rural families depend on agriculture directly or indirectly for their livelihood. Farming in rural areas is a family enterprise where all the members of the family participate. Horticulture is one of the major sectors of agriculture where more than 70 percent of the operations are carried out by women in rural areas (Gopal and Vijayabhinandana, 2012). It is generally assumed that farm managers and decision makers are men who pass on information to the women if they need and there are many inevitable barriers that prevent women from gaining access to information and technology of horticultural production. There are some evidences that rural women are not been well served by the present extension system. So, there is need to study the work profile of women in horticultural production, to assess their need areas to train them for improving their knowledge, skill and attitude on recommended existing production technologies of horticultural crops. Capacity building of rural women through intervention or training programme is one of the most important means of creating awareness and competency among the growers for sustainable horticultural development.

Cultivation of fruits and vegetables is one of the major components of horticulture and fruits and vegetables are the major component of our daily diet. Besides these, at the present scenario, with the changing life styles and food habits, the importance of fruits and vegetables in the diet is being increasingly realized. The present consumption of vegetables is only 135gm per person per day and a very negligible amount of fruit consumption per person per day in the country, compared to the ICMR recommendations of 300gms of vegetable and 100 gms of fruits per person per day for a balanced diet (Rao, 2013). However the production does not meet the fruits and vegetables requirement of the ever growing population. This will naturally call for the increase in our production of vegetables, through improvement in agro-techniques and their subsequent delivery to the farmers. There is some evidence that despite the contribution made by rural women in food security they are not being well served by the existing extension system in developing countries. They are in urgent need of understanding and acquiring new knowledge and skills on cultivation of horticultural crops, so that they could contribute more effectively to the production process. The above background therefore provides the necessary basis and justification

for the research study on - Capacity Building of Rural Women in Homestead Garden for Sustainable Horticultural Development.

### **OBJECTIVES**

- To assess the work profile of rural women of Assam in homestead garden for sustainable horticultural development.
- To identify the existing knowledge of rural women about recommended production technologies of horticultural crops.
- To build the capacity of rural women through intervention programme for sustainable horticultural development.

### **LIMITATIONS OF THE STUDY**

- i. Limited to two districts of two agro- climatic zones of Assam – Sivasagar district of Upper Brahmaputra Valley Zone and Kamrup (Rural) district of Lower Brahmaputra Valley zone.
- ii. Limited to source of data on the subject.
- iii. Limited to time.
- iv. Limited to fruits and vegetable cultivation only.
- v. Limited to existing knowledge of rural women about horticultural production technology.
- vi. Limited to 5 days of intervention programme.

# **CHAPTER II**

## **REVIEW OF LITERATURE**

Women play a vital and crucial role in agricultural development which is evident from the various reports prepared by various research institutions, agencies, educational institutes, literatures and research studies. In order to develop theoretical orientation, the available literatures including research studies related to the present study have been reviewed under the following sub-heads:

### **2.1 Concept of Capacity Building**

2.2 Participation of rural women in agricultural and household activities.

2.3 Decision making pattern of rural women in agricultural and household activities.

2.4 Time utilization pattern of rural women in different agricultural and household activities.

2.5 Problems faced by rural women in agricultural production.

2.6 Knowledge level of rural women about recommended existing agricultural production technologies.

2.7 Capacity building of rural women through training programmes.

### **2.1 Concept of Capacity Building**

Groot and Molen (2001) reported that the concept of capacity building entails the development of knowledge, skills and attitudes in individuals and groups of people relevant in the development and maintenance of institutional and operational infrastructure and processes that are locally meaningful.

Linnel (2003) reported that the capacity building may relate to leadership development, advocacy skills, training and speaking abilities, technical skills, organizing skills and other areas of personal and professional development. It may relate to almost any aspect of an organization. It can improve governance, mission and strategy, administration (including human resources, financial management and legal

matters), program development and implementation, fund raising and income generation, diversity, partnerships and collaboration, evaluation, advocacy and policy change, marketing, positioning and planning.

Macadam *et al.* (2004, cited in Mckenzie, 2007) took the view that capacity building is a concept involving people learning and sharing experiences together (co-learning), supported by people who have special expertise. It is not only through education, training or the transfer of technology. These are simply tools that can be used to develop capacity.

UNESCO (2007) reported that capacity building focuses on increasing an individual and organization's abilities to perform core functions, solve problems and objectively deal with developmental needs.

Adhikari *et al.* (2007) described capacity building as linked to personal development such as leadership development, advocacy skills, training and facilitating abilities, technical skills and organizing skills.

Ojha and Mishra (2013) took the view that capacity building is a part of empowerment of women and step to enhance the capacity of them to work as a group and play different roles necessary for development and maintenance of group.

Mohanty *et al.* (2013) reported that capacity building may relate to the decision making capacity of rural women in personal and family matters and saving of income spent on their personal items without any hesitation.

Amiri and Panah (2014) reported that capacity building is to help to develop the capabilities of people, NGOs, organizations and communities, analyze their environment and notice their problems, complications, requirements, opportunities and also set strategies to cope with the issues.

Mishra (2015) referred to capacity building as the action to create reform or support activities that facilitates sharing of experiences, knowledge and strategies and such sharing of actions demands and creates networks.

## **2.2 Participation of rural women in agricultural and household activities**

Devi (2000) revealed from her study that a large percentage of rural women (91.7%) in Assam were jointly involved in harvesting, storing (88.30%), seed collection from harvested crops (87.50%), seed cleaning (87.50 %), grading (85.00%),

crop selection (82.50%), application of manure (73.30%), irrigation (72.50 %), weeding (68.40%) and transplanting/planting (64.20%).

Seema and Candy (2000) revealed from their study in Haryana that the participation of rural women in post harvest activities such as cleaning, drying and storing were carried out independently by 37.70 percent of farm women and jointly with husband by 53.90 percent of farm women. Threshing was carried out jointly by 56.10 percent of farm women and some activities which were monopolized by farm women were dehusking (69.71%), shelling (96.70%), grading (92.90%) and marketing (92.00%).

Saikia (2000) found that about 80 percent of Assamese women performed transplanting and harvesting activities and 10 to 30 per cent performed other farm activities such as sowing, irrigation, hand weeding and post harvest activities, but they did not participate at all in spraying insecticides, pesticides and using tractors and power tillers.

According to the Census of India (2001) report, 25.67 per cent of the total female population of the country was agricultural workers. Among these female agricultural workers, 32.50 per cent were cultivators and 39.43 per cent were labourers. These showed that 71.93 per cent of female workers derived their livelihood directly from agriculture excluding livestock, fishery and poultry. Majority of the activities performed by women were collecting fuel, fodder and water, growing vegetables and keeping poultry for domestic consumption.

Sobha (2001) revealed from her study that rural women of Andhra Pradesh belonging to lower socio-economic groups being landless had to perform labour intensive activities. The activities which were performed mainly by them were sowing (55%), winnowing (90%), transplanting (85%) and poultry care (75%).

According to Database of Registrar General of India (2001) report, 32 per cent of farmwomen were involved in land preparation, 80 per cent in seed cleaning and sowing, 86 per cent in inter cultivation and 84 per cent in harvesting, reaping, winnowing, drying, cleaning and storage activities respectively.

Legg (2002) found that in India 90 per cent of work related to animal care and 95 per cent of household chores were done by women. It was also found that 50-66 per cent of agricultural labours and 48 per cent of self employed persons engaged in farming were women.

Hussain and Mishra (2002) from their study in Odisha revealed that majority of the respondents altogether 90.6 per cent were involved in backyard kitchen gardening whereas only 19.3 per cent were involved in plant protection measures. Their participation in harvesting was 76.6 per cent, sowing and planting (73.3%), intercultural operations (72.6%), preservation of fruits and vegetables (72%) and nursery raising 68.6 per cent was very encouraging. In general their participation in fruits and vegetables cultivation was also very significant.

Deka and Saikia (2002) revealed from their study that Karbi women of Assam had maximum and equal joint participation (23.11%) with family in transplanting and harvesting operations. In rest of the activities such as seed selection (38.68%) and land preparation and nursery raising 38.91 per cent of Karbi women performed jointly with male members. Among all the activities, percentage of no participation was high especially in the activities like seed treatment, nursery raising, land preparation for transplanting, application of manure and fertilizer, water management, weeding and plant protection measures.

Geethalakshmi *et al.* (2002) found from her study in Karnataka that majority of female farm labourers participated in weeding, harvesting, winnowing and transplantation in rain fed areas. Though digging of trenches by women was rare, grass cutting was the major job for women labourers.

Mali *et al.* (2003) from their study in Maharashtra revealed that the average annual employment of female was 196 days in which crop production and livestock activities were of 71percent.

Suleiman *et al.* (2003) reported that the female labour force in rural areas of India was 31.56 percent. Most of them 87 per cent were employed as agricultural labourers and cultivators.

Slathia *et al.* (2004) reported that farm women in Jammu and Kashmir performed enormous role in agricultural practices. Almost all farm women had an active role in storage of grains (100.00%), followed by hoeing and weeding operations (89.00%), harvesting (80.00%), threshing (75.00%), tillage (54.00%), sowing manure and fertilizer (28.00%), plant protection measures (22.00%) and irrigation (12.00%).

Nagabhusanam *et al.* (2005) found from their study conducted in Karnataka that during *kharif* season, cent percent of rural women participated in harvesting followed by 98.18 per cent in manuring of fields, 94.34 per cent in



transplanting of seedlings, 90.90 per cent in transportation and storage of produce, 70.90 per cent in field preparation, 67.27 per cent in threshing and 61.81 per cent in winnowing and cleaning. But during *rabi* season the highest participation of women was found in manuring of fields (43.63%).

National Commission for Women, New Delhi (2005) reported that about 32.00 per cent of Indian women were involved in land preparation, 80.00 per cent in seed cleaning and sowing, 86.00 percent in intercultural operations and 84.00 per cent in harvesting, winnowing, drying and storage operations of agricultural production.

Database on women of Bangladesh under IFAD Project (2005) reported that nearly 20 to 50 per cent of women from poor Muslim households carried out activities regularly such as transplanting, irrigation and other paddy cultivation activities.

National Research Centre for Women in Agriculture, Bhubaneswar (2005) reported that majority of the farm women were involved in drying and storage (77.30%), followed by intercultural operations (73.90%) and harvesting (72.10%).

Arunachalam (2006) found that farm women in Tamil Nadu engaged independently in drying (32.00%), cleaning (32.00%) and storage of grains (21.00%). Findings further showed joint participation of women in activities like collection of seeds for future use (78.00%), irrigation (57.00%), earthing up (56.00%) and preparation of farm yard manure (53.00%).

Shilparani (2007) reported that rural women of Karnataka were involved in most of the farming and allied activities besides their domestic activities. Traditionally women did the exclusively tedious, time and labour intensive works like sowing, transplanting, weeding and intercultural operations, harvesting, threshing, transportation and post harvest operations like shelling, cleaning, grading and processing.

Fabiyi *et al.* (2007) revealed from their study in Gombe State of Nigeria that the participation of farm women in land clearing was 58.00 per cent, in planting 72.00 per cent, in weeding 80.00 per cent, in transporting of products 82.00 per cent, in harvesting 93.00 per cent, in processing 93.00 per cent and in marketing was 88.00 per cent.

Aflobi (2008) found that rural women in Ondo State of Nigeria were the major contributor to food production. Besides performing household duties, women performed almost all agricultural activities and produced more than 70 per cent of household food consumed by rural families.

Nataraju *et al.* (2008) revealed from their study in Karnataka that the largest percentage of farm women participated in sowing (93.3%), storage (88.3%), harvesting (86.6%), scaring birds (81.6%), weeding (80.0%), threshing (70.0%), fertilizer application (66.6%), land preparation (63.3%), irrigation (63.3%) and plant protection operations (51.6%). In addition to that farm women were also involved in cooking and serving (88.3%), bringing water (83.3%), cleaning utensils (70.0%), cleaning home (66.6%), cleaning clothes (66.6%), child care (63.3%) and fuel collection (53.3%), while less number of them were involved in family budgeting (15.0%), children's education (28.3%) and shopping (30.0%).

Kakade and Toppo (2009) reported that farm women of Gujarat had an overall participation in dairy occupation to the extent of 53.71 per cent. They had the largest participation 63.59 per cent in the aspect of milk and milk products followed by feeding of animals 60.97 per cent, breeding 57.55 per cent and management of animals 57.45 per cent, respectively

Documentation Centre for Women and Children, NIPCCD (2009) reported that more than 80 per cent of female workers in rural India were engaged in the agriculture sector. Independent participation of women was found to be very marginal such as in major crop production 1 per cent, post harvest activity 2 per cent and livestock management 6 per cent.

Mazumdar (2009) revealed from his study that women labourers were mainly involved in homestead gardening, harvesting and post harvest activities of agricultural production. The most important factors behind their participation in agricultural activities were to meet family needs and to increase family income.

Barooah and Pathak (2009) from their study in Assam revealed that although men performed heavy tasks like hoeing and bed establishment, fence building, pond digging and tree harvesting in establishment of traditional homestead garden or Bari, the women managed the day to day maintenance tasks of homestead garden like weeding, providing scaffold to climbers and creepers, pest and disease management and

harvesting of produce like vegetables, spices and picking leafy vegetables, medicinal plants including processing, seed selection and storing.

Mishra *et al.* (2009) found that in case of vegetable production rural women participated in large numbers in practices like nursery management 63.5 per cent, seed storage 52.5 per cent, transplanting 41.5 per cent, weeding 40.5 per cent and grading 40.5 per cent.

Ogunlela and Mukhtar (2009) revealed in their study that ironically women were known to be more involved in agricultural activities than men in Sub-Saharan African countries including Nigeria. As much as 73 per cent were involved in cash crops, arable and vegetable gardening, while 16 per cent in post-harvest activities and 15 per cent in agro-forestry.

Chayal and Dhaka (2010) found that women's participation was regularly as high as 81.67 per cent in harvesting and post harvest operations, 80.83 per cent in sowing, 75.83 per cent in weeding and inter-cultural operations and 74.17 per cent in animal husbandry activities. The other agricultural activities in which women participated regularly were land preparation (22.50%), selection of crop and variety (15.83%) and irrigation of crops (15.83%), respectively. The study indicates that the level of participation of women in agricultural and allied activities varies greatly depending on the nature of the activity and also skill required for the activity.

Baba *et al.* (2010) revealed from their study in the State of Jammu and Kashmir that the horticultural activities performed predominantly by women were uprooting and transplanting of seedlings (55.00%), preparation of produce for sale (58.00%), intercultural operation (80.00%), carrying head load (98.75%), supervision of farm operations (68.75%), harvesting (80.00%) and on farm sale of produce (71.25%).

Das and Puzari (2010) from their study revealed that the highest percentage of involvement of Assamese women (30%) was in agriculture, followed by weaving (26.7%), pickling (13.5%), confectionery and animal rearing (11.6%).

Sethi and Sharma (2011) reported that the nature and extent of women's involvement in Indian agriculture varied greatly from region to region, ecological sub-zones, caste, class and stages in the family life cycle. The overall contribution of women in farm operations amounted to 61 per cent, whereas in livestock farming they contributed about 71 per cent. The work profile of Indian farm women was that they put manual work daily on farming operation, livestock rearing, collecting and carrying

fodder, fuel, water from distant places. They were involved in operations like feeding, breeding, management, health care and marketing of animal produce under livestock farming.

Oyang (2011) revealed from her study in the State of Arunachal Pradesh that cent percent of Apatani women participated independently in farm activities such as seed sowing, nursery raising, leveling of field, weeding, gap filling, application of organic manure and cleaning of seed. About 62.04 per cent of women jointly participated in collection of seed from harvested crops, 47.22 per cent in threshing, 46.30 per cent in land preparation and winnowing, 45.37 per cent in harvesting, 31.48 per cent in transplanting, 18.52 per cent in seed selection, 17.59 per cent in land selection, 11.11 per cent in water management, 10.19 per cent in bunding, 9.26 per cent in plant protection measures and a very negligible 4.63 per cent in application of chemical fertilizer.

Gopal and Vijayabhinandana (2012) revealed that in rural India agriculture and allied sectors employed 89.5 per cent of the total female labour. In overall farm production, women's average contribution was 55 to 66 per cent of the total labour force.

Pagaria (2012) revealed that Thar women of Rajasthan constituted a significant volume of available farm labour and carried out various operations in production of vegetables. Out of total labour used in vegetable production, 19.99 per cent operation was carried out by women. Among different operations, maximum 32.50 per cent of sowing or transplanting was done by women followed by 26.89 per cent harvesting operations. Operations like irrigation and application of fertilizer and manure were mostly carried out by men where contribution of women was only 3.98 per cent.

Achampong *et al.* (2012) found that more than 65 per cent of rural women farmers of Ghana participated in almost all farm operations and only 38 per cent of them were engaged in non-farm activities to generate extra income.

Goswami (2013) from his study on female agricultural workers in Assam revealed that a large number of Assamese women were found to be engaged in agriculture because agriculture is an occupation which provides work opportunities to women, irrespective of their age, level of education or any formal training. Women between the age group of 15 to 60 years, illiterate women to graduates were found to be engaged in agriculture.

Khan (2013) reported that in Assam, women were engaged in various fields of agriculture like tea plantation, crop production, livestock production, horticulture, floriculture, social forestry, fisheries etc. Out of the total population of Assam nearly 80 per cent were engaged in agriculture who's one third were women.

Tyabo *et al.* (2014) from their study in Nigeria revealed that young adult women (61.17%) within the age range of 20-40 years participated in agricultural activities and among the agricultural activities which were mostly performed by women were threshing (77.8%), harvesting (75%) and seed preparation (70.80%).

Sharma *et al.* (2014) found from their study in Madhya Pradesh that more number of farm women had high level of participation in agricultural operations (47.50%) followed by medium participation (33.33%) and low participation (19.17%), respectively.

Mulugeta and Tadesse (2014) reported that majority of rural women of Ethiopia 98.90 per cent of rural women regularly participated in cleaning of animal sheds, preparing milk products and gathering dung followed by 94.40 per cent in selling of milk and milk products, 85.50 per cent in selling of egg, 84.40 per cent in egg collection and 77.80 per cent in selling of poultry. In case of participation of women in household activities, all rural women regularly involved in food preparation, looking after all family members, preparation of local beverages, cleaning the house, cleaning up after meals, washing clothes, child care, fetching water and embroidering.

Saikia (2015) from her study found that majority of the farm women of Assam contributed independently in transplanting (55.08%), harvesting (54.75%), cleaning (55.17%), winnowing (51.08%), drying of grains (50.16%) of rice cultivation.

Tripathi *et al.* (2015) from their study in the State of Odisha revealed that in fruit production, the activities carried out by farm women were weeding (80.00%), field preparation (40.00%), Irrigation (40.00%), collection of fruit (40.00%) and sorting and grading (40.00%). Their participation was low in pit digging (10.00%), planting (15.00%), training and pruning (5.00%). But in vegetable cultivation, the participation of farm women was more than 80 per cent in activities such as field preparation, stable collection, seed cleaning, seed sowing, transplanting of seedlings, weeding, sorting and grading of vegetables. Their contribution was between 60 to 80 per cent in manure application, harvesting, cleaning and collection of vegetables. They had less than 50 per cent participation in some activities of vegetable production such as cleaning of bunds

(42.00%), irrigation (38.00%), fertilizer application (24.00%), crop watching (24.00%), application of insecticides and pesticides (28.00 %) and marketing (35.00%).

Das (2015) revealed that homestead gardening was the second most participated activity of rural female agricultural labourers in Odisha. About 47.70 per cent of rural female agricultural labourers were involved in homestead gardening regularly and 29.50 per cent were involved occasionally.

Kaur and Mavi (2015) found from their study in Punjab that cent percent of rural female labourers were involved in storage of vegetable grains followed by 95.60 per cent in picking of vegetables, 94.40 per cent in collection and disposal of animal dung, 93.30 per cent in manual harvesting, 88.90 per cent in grading, 87.80 per cent in weeding, 83.30 per cent in thinning, 80.00 per cent in drying and cleaning of grains, 55.60 per cent in transplanting, 55.50 per cent in winnowing, 44.40 per cent in nursery raising and 22.20 per cent in threshing, respectively.

Bharali (2016) reported that in vegetable cultivation majority of rural women of Assam were involved independently in post harvest activities such as cleaning (88.33%), grading of harvested crops (86.25%) and seed collection from harvested crops (83.33%).

### **2.3 Decision making pattern of rural women in agricultural and household activities**

Ozkan *et al.* (2000) revealed that only 12 per cent of women farmers of Turkey took independent decision and 33 per cent of them took joint decision with husbands regarding the type of vegetables to be grown. The independent decision making level of women farmer was very low on crops to be grown in the new season.

Devi (2000) revealed that majority of rural women (81.6%) of Assam had medium level of involvement followed by 10.8 percent had low level and 7.5 per cent had high level of decision making in homestead gardening.

Tuteja (2000) from his study in Haryana found that 61.54 per cent of farm women were involved independently in decision making on farm credit, 77.00 per cent on sale and purchase of animals and 44 per cent had on spending of earned income.

Zhang (2002) reported that the rural Chinese women, particularly younger generation women had increased control on household income and made

decisions regarding sale of agricultural products, investments and purchase of large implements both for home and farm.

Boreth *et al.* (2002) reported that 72.80 per cent of farm women of Rajasthan were consulted by their male heads in decisions related to the harvesting of crops, selection of crops and crop rotation. More than 50 per cent of women were not involved in decision making activities requiring technical competences like seed rate, seed treatment, soil treatment, use of rhizobium culture, method of sowing and fertilizer application which was due to lack of technical knowledge of women and their limited exposure to training and other information sources.

Deka and Saikia (2002) found that Karbi women of Assam had maximum joint participation with male members of the family in activities like pre sowing (61.32%), sowing (62.67%), crop care and nurturing (62.26%), harvesting and post harvesting activities (42.45%), marketing (68.16%), purchase of farm inputs (63.44%), obtaining bank loan for farming (56.13%), repayment of loan (49.29%), employment and management of hired labour (44.34%), seed treatment and storage (56.37%), retention of seed (46.23%), retention of farm produce for household consumption (34.67%) and a very less 4.39 per cent in seeking employment as farm labour.

Chand (2003) revealed that the participation of women of Tamil Nadu in decision making process of different activities were increased by 85 per cent in household activities, 87 per cent in agriculture, 57 per cent in social activities and 41 percent in educational activities.

Kunwar (2004) revealed from his study that women in Uttar Pradesh had marginal role in decision making. All the major decisions within the family were taken by the men of the household. Although women were allowed to be independent in child rearing and housekeeping, she was not consulted in matters dealing with investment, expenditure and development activities. Husbands were the key decision makers in pre-sowing activities and joint decisions by husbands and wife were made in sowing, post sowing, harvesting and post harvesting activities.

Singh *et al.* (2004) revealed that in Uttarakhand only 13.26 per cent of women participated in joint decision making with husbands and very few of women (7.14%) participated in independent decision making regarding post harvest technologies.

According to a report of National Agriculture Technology Project (2004), more than 60 per cent of rural women of Assam took independent decision on amount of food to be kept for consumption. A large percentage of them took joint decisions regarding selling of crops (63.80%), selection of types of crops to be planted and buying of inputs (62.40%), sowing of seed (62.00%) and adoption of new variety of seeds to be planted (61.50%). In case of decision making related to household activities, majority of rural women took joint decision regarding purchase of household articles (76.70%), purchase of clothing for family members (64.30%), renovation of house (63.80%), family expenditure on rituals and special occasions (60.50%), medical treatment of sick person (57.90%) and purchase of fodder (62.50%).

Antwal *et al.* (2005) found from their study in Maharashtra that a negligible (1-4%) of rural women took independent decision in farm related matters. They took joint decisions regarding retention of farm produce for consumption (26.70%), employment and management of hired farm labour (24.80%) and harvesting, post harvesting and storage (20.00%). In case of decisions related to animal husbandry, 23.40 per cent of rural women took independent decision regarding shed management, 21.90 per cent regarding sanitary management and 15.60 per cent regarding feeding of animals respectively. About 33.00 per cent of rural women had joint decision regarding pre and post natal management of animals, 30.60 per cent regarding yard management and 30.50 per cent regarding feeding of animals.

Praveena *et al.* (2005) reported that the majority of rural women (70.80%) of Andhra Pradesh, participated in joint decision making with husband in seed preparation. But they made independent decisions mostly in matters like gap filling and storage and did not prefer to take self decision in all market related activities such as selection and procurement of seed material, purchasing or hiring of agricultural inputs and disposal of farm produce.

Vaneth (2006) revealed that more than 76.67 per cent of Indian farm women had joint decisions with husband and family members regarding farm and home activities.

Wasnik (2005) reported that women in Maharashtra took independent decision in the activities of technical nature like grading of produce (68.30%), use of chemical fertilizers (66.70%) and selection of variety (63.40%). More than 60.00 per cent of them were involved in joint decision making process prominently in activities



like use of Farm Yard Manure, sale of produce, choice of market, food processing and selection of crop.

Damisa and Yohanna (2007) from their study in Nigeria found that women's participation in decision making related to farm management was quite minimal. In each of the farm related aspect such as land preparation, time of sowing, manure and fertilizer types and time of application, time of weeding, number of hired labours and wages to be paid, time of harvesting, storage and marketing of farm produce, purchase and sale of farm implements, purchase and sale of farm lands and farm credit, less than 20.00 per cent of women were consulted, except in the sourcing of farm credit where about 28.00 per cent were consulted and less than 13 per cent of rural women had their opinion considered in each of the farm operations. Women's participation in farm management decision making process was increased with age and so, older women participated more in decision making in different areas of agriculture than their younger women.

Chauhan (2008) reported that tribal farmwomen of Gujarat took independent decision regarding selection of food and fodder (81.67%) followed by sale of milk and milk products (52.50%). They took joint decisions with family members regarding sale and purchase of animal (65.00%), selection of animal breed (60.00%) and keeping size of herd (40.00%).

Mishra *et al.* (2009) reported from their study that the in Jharkhand, husbands consulted always with their wives in respect of practices such as application of manure in the field, type of vegetable, harvesting time and grading. Regarding joint decisions taken by men and women, the highest percentage of responses were found in the cases of seedling preparation (51%), field preparation (49%) and taking loan (45%).

Chauhan (2009) revealed that tribal farm women of Gujarat took independent decision regarding decoration of house (79.17%) and selection and preparation of food (70.83%). About 81.67 per cent of them took joint decision regarding children's marriage followed by 75.83 per cent selling and purchasing of ornaments. In case of decision making in farm management activities, 87.50 per cent of tribal women had joint decision with husband regarding irrigation of fields followed by 85.00 per cent quantity and type of fertilizer used on the farm, 82.50 per cent introduction of a new crop variety, 80.00 per cent buying farm machinery, 76.67 per cent plant protection measures, 70.00 per cent borrowing money for farm operations,

66.67 per cent maintenance of electric motor, 65.00 per cent selection of seed and 62.50 per cent selection of area for sowing of seeds respectively.

Baba *et al.* (2010) reported that in Jammu and Kashmir, 72.00 per cent of farm women took joint decision with husband regarding sale of vegetables followed by custom hiring in and out of capital stock (70.00%) and investment on farm capital (67.00%). About 18 per cent of the farm women had monopolizing role in decision making related to choice of vegetable crops to be grown. It was interesting to note that male head of the family consulted their female counterpart while making decisions that were associated with risks and huge investments.

Khanduri and Dev (2011) revealed that rural women of Uttarakhand performed more than 80 per cent of home and farm related activities, but their participation in decision making had been less than 20.91 per cent. Rural women belonged to middle age group and above middle age group participated more in the decision making process of different areas of agriculture as compared to younger age group women.

Singh and Nayak (2011) reported that the major decision makers in agricultural activities were men even though women performed more in agriculture related activities. In rural areas of our country, both husband and wife were jointly responsible for making decisions related on matters like family obligations, specific housing charges and purchase of household articles. But women's suggestions were not given due consideration in the decisions pertaining to agricultural sector and imported family matters.

Gondaliya and Patel (2012) reported that in case of all of major activities such as sowing practices, nutrient management, crop protection, harvesting and post harvest activities, majority of Indian farm women had taken joint decision with family members or with husband while independent female decision was negligible. Discussions were made with them regarding the selection of seeds, type of pesticides and time of harvesting, but decisions were mainly taken by men.

Dawit *et al.* (2012) revealed that the roles of Indian rural women in final decision making on purchase or sell of farm implements was quite minimum (6%) and for selecting the drudgery reducing implements 45 per cent of women took their own decision and purchased them according to their own choice.

Sharma *et al.* (2013) found that only 2 per cent of farm women of Jammu and Kashmir took independent decision and 27.30 per cent took joint decision regarding money to be spent for purchase of seeds. Decision making regarding wages to be paid to the labourers, only 1.3 per cent of farm women had independent decision and 35.30 per cent had joint decision. Majority 88 per cent of farm women had no involvement in decision making and 12 per cent had joint decision regarding purchase of land and buying and selling of surplus land. Regarding purchase of farm machinery and purchase of insecticides and pesticides 36.00 per cent and 36.60 per cent of farm women had joint decision making respectively. In case of production and harvesting of crops only 15.30 per cent of farm women had independent decision making.

Saikia *et al.* (2013) revealed from their study that majority of Assamese rural women took independent decision in the activities related to poultry farming like keeping the nest boxes (80.00%) followed by cleaning of nest boxes (73.33%), breeding of birds (61.67%) and selection of feed to be provided (57.50%). A large percentage of Assamese rural women took joint decision regarding identification of site (75.33%), quality of produce to be marketed (70.00%), disease control measures (67.50%), vaccination (61.66%) and consulting with veterinary doctor for treatment of sick bird (57.50 %).

Sharma *et al.* (2014) from their study in Madhya Pradesh found that the higher number of farm women (58.33%) belonged to the category of low decision making followed by medium decision making (22.50%) and high decision making (19.17%), respectively. The study further revealed that age, education, size of family, size of land holding, social participation, information seeking behaviour, cosmopolitaness, economic motivation, exposure to training and management orientation factors had significantly influenced the decision making pattern of farm women.

Fartyal and Rathore (2014) reported that rural women of Uttarakhand took independent decisions regarding seed treatment (94.89%) followed by nursery raising (84.69%) and transplanting (39.79%) of vegetable cultivation. They took joint decisions with husband regarding cleaning of fields (25.51%) followed by land preparation (18.36%) and weeding (17.34%).

Tiwari and Tripathi (2014) revealed that majority 52.93 per cent of farm women of Rajasthan had no involvement in decision making regarding kitchen

gardening and the decisions were taken by the elders of the family. But in cases of household activities, more than half (50.97%) of farm women had independent decision making regarding daily preparation of meals followed by income of the family (49.00%) and preservation of fruits and vegetables (48.00%).

Thungon (2015) reported that 60 per cent of farm women of Arunachal Pradesh had medium level of participation in decision making, followed by 22.67 per cent had low level and 17.33 per cent had high level of participation in decision making related to cultivation of vegetable crops.

Saikia (2015) revealed from their study that majority of farm women of Assam took joint decision in farm related activities such as purchase of implements (73.66%), retention of grain for sale (72.42%), amount of land used for nursery raising (63.25%) and crop harvesting and transplanting (62.75%). In case of non-farm activities, majority of farm women took joint decision regarding purchase of household items (78.75%), buying of cloths for family members (67.25%) and children's education (58.67%).

Roy and Kadian (2015) found that in case of farm related decision making, about 47.50 per cent of farm women of West Bengal took individual decision regarding selection of cropping pattern and cultivars. About 31.67 per cent of farm women took joint decision with husband regarding capital allocation to different crops followed by 35.83 per cent regarding sale of farm produce, 47.50 per cent regarding purchasing or hiring of land, 30.00 per cent regarding borrowing for agriculture and 66.66 per cent regarding adoption of improved farming practices. In case of decision making in household matters, husband-wife joint participation was found predominant regarding building of new house and renovation of house (38.33-41.67%) followed by household purchasing (32.50-35.83%), selection of occupation for children (25.83-30.00%), education of children (25.00-27.50%), financial activities of home (24.17-27.50%) and marriage of children (43.30-46.60%).

Landge *et al.* (2016) revealed from their study that in Maharashtra rural women took joint decisions with male head of the family in agriculture related activities such as engagement of wage labour (49.17%), crops to be grown (48.33%), number of crops to be grown and area under each crop (47.30%), selection of seed (49.17%), use of seed (50.84%), use of fertilizer (55.84%), irrigation (55.84%), plant protection (53.34%) and in post harvest protection (47.50%).

## **2.4 Time utilization pattern of rural women in different agricultural and household activities**

Food and Agricultural Organization (2000) reported that in Asia and Africa, rural women worked for more than 13 hours per week. They spent 1 to 4 hours per day in gathering fuel and carrying water.

Vepa (2000) reported from her study that women of Gujarat, Haryana, Madhya Pradesh, Meghalaya, Odisha and Tamil Nadu had spent an average of 10.20 hours per week on agricultural activities and an additional 10.37 hours per week on non-agricultural activities. The total time spent by women on agricultural activities was about 20.57 hours per week.

Antwal and Bellurkar (2000) found that rural women of Maharashtra spent 13.41 hours per day in productive work during slack period and 14.10 hours per day during peak period.

Census of India (2001) reported that Indian women spent about 2.1 hours per day on cooking food, 1.1 hours per day on cleaning the households and utensils and 3.16 hours per day on taking care of children.

Database of Registrar General of India (2001) about the average time spent by Indian farmwomen in household and agricultural activities revealed that in the peak season an active farmwoman spent five to nine hours per day on the farm. Agriculture and allied activities almost took the equal time and energy at par with household activities.

Kanwar *et al.* (2003) revealed from their study conducted in Himachal Pradesh that during peak period, rural women spent maximum 5 hours per day in farming activities followed by 3.20 hours in kitchen work, 2.20 hours in management of animals and animal shed and 1.59 hours in mid work rest. During slack period maximum time was spent in kitchen work (3.19 hours) followed by mid work rest (2.30 hours), management of animal shed (2.20 hours) and farm activities (1.36 hours). The unaccounted time plus sleep spent by rural women during peak period was 7.42 hours and 8.36 hours during slack period.

According to the NATP report (2004), rural women of Assam spent an average of 3.32 hours per day on farm activities followed by 3.7 hours per day on

kitchen work, 1.45 hours per day on household works and 1.28 hours per day on weaving.

According to a report of NRCWA (2005), the utilization of time in agriculture by Indian farm women varied from 3.5 hours to 7.3 hours during lean to active season with an average of 5.3 hours per day time spent in agricultural activities.

Oguz (2008) reported that in Turkey during summer time women spent more than 15 hours per day in agricultural activities.

Nataraju *et al.* (2008) revealed from their study in Karnataka that on an average rural women spent 38.00 per cent of their time on household activities, 22.00 per cent on agricultural activities and 40.00 per cent on sleeping, resting, social and leisure time activities. Among different economic categories, farm women of middle and high income category spent more time on household activities (40.70%) compared to rural women of low income category (23.60%). Regarding percent utilization of time on sleeping, resting and leisure time activities, women of high economic group spent (56.70%), middle economic group (41.50%) and low economic group (33.30%) of their time. It was also found that low economic category rural women spent more time per day (34.10%) in agricultural activities compared to farm women of middle (18.80%) and high income group (12.50%).

Mikalista (2010) reported from her study that rural women of Kenya on an average spent 8 hours per day on household activities and another 8 hours per day on farm operations.

Singh *et al.* (2010) revealed that tribal women of Uttar Pradesh belonging to nuclear family spent 6.88 hours per day during rainy season, 6.31 hours per day during winter season and 4.8 hours per day during summer season in farm and non-farm activities. On the other hand tribal women belonging to joint families spent 6.4 hours per day during rainy season, 5.86 hours per day during winter season and 4.38 hours per day during summer season in different farm and household activities.

Singh and Nayak (2011) found that on an average, an Indian woman spent 14 hours a day on activities in and outside the home. During harvesting season of crops she spent about 16 hours a day.

Borgohain and Akand (2011) revealed from their study that tribal rural women of Assam spent 29.33 minutes per day in preparing feed for animals followed by

21.24 minutes per day in providing water to the animals and 19.28 minutes per day in grazing animals under livestock activities.

Kumar *et al.* (2011) found from their study that majority of the horticulture farmers of Karnataka (71.67%) irrespective of the gender spent between 403.96 to 483.20 mandays per year in horticultural activities and had a medium level of time utilization. The women farmers spent 57.56 man days per year time in activities related to land preparation, 12.75 man days per year time in planting and sowing, 23.67 man days per year time in inter cultural operations, 13.61 man days per year time in harvesting, 4.18 man days per year time in post harvest activities.

Pagaria (2012) reported that in Rajasthan, out of total 113.09 mandays, 22.61 mandays were contributed by women labour on production of vegetables. Women's participation in production of vegetables ranged from 21.10 mandays in large farms to 23.47 in small farms.

Risteska *et al.* (2012) revealed from their study that rural women of Macedonia spent more time in activities such as food preparation, dish washing, cleaning of the house and the physical care and supervision of children than men. They spent 4.14 hours per day on domestic activities, which constituted a form of unpaid work and spent 1.22 hours per day on paid work and left 1 extra hour per day on free time activities.

Nwosu and Onyeneka (2012) reported that rural women of Edo State of Nigeria spent on an average 10.81 hours per day in farm activities followed by 6.30 hours per day in non-farm activities and 6.90 hours per day in leisure activities.

Navalawala (2013) found that rural women managed all the household matters, looked after the family assets and livestock, handled the purchases and finance, worked for almost 14 to 16 hours per day in both farm and non-farm activities.

Vepa (2013) reported that rural women were engaged in other economic activities like livestock, fisheries and forestry besides farming and on an average they spent 23.6 hours per week on these economic activities.

Badodiya *et al.* (2013) found from their study that tribal women of Madhya Pradesh worked for about 12 to 15 hours per day involving in agriculture and allied activities.

Pandey *et al.* (2014) reported that rural women of Uttar Pradesh spent 5 hours per day in land preparation followed by 2.0 hours in seed treatment, 3.5 hours per day each in winnowing and irrigation, 3.2 hours in storage, 3.0 hours in sowing and transplanting, 1.5 hours each in harvesting, weeding and intercultural operation, 1.2 hours each in plant protection measures and cleaning of seeds, 1.0 hour in use of chemical fertilizer and manure and a very less 0.5 hour in marketing of farm produce of agricultural production.

Saikia (2015) revealed from her study that farm women of Assam spent an average 4 hours 27 minutes on farm activities during peak period and 2 hours and 5 minutes in slack period of cultivation.

Bellurkar *et al.* (2016) found that rural tribal women of Maharashtra during peak period spent 365.22 minutes per day in farm activities followed by 114 minutes in kitchen works, 109.62 minutes per day in household works, 90.15 minutes per day in taking care of children and family members, 59.22 minutes per day in personal care, 48.82 minutes per day in mid work rest, 40.20 minutes per day in collection of fuel and making dung cakes, 37.47 minutes per day in fetching water for household works, 26.27 minutes per day in religious work, 19.70 minutes per day in livestock activities, 11.85 minutes per day in entrepreneurial activities, 6.00 minutes per day in cash earning outside home and 3.60 minutes per day in grazing of animals. During slack period they spent less time (32.40 minutes per day) in farm activities and 2.40 minutes per day in cash earning outside home, but more time in other activities.

## **2.5 Problems faced by rural women in agricultural production**

Gaikwad and Dhane (2001) reported from their study that women farmers of Maharashtra faced problems like lack of knowledge regarding plant protection measures (96%), lack of capital (62%), unavailability of sanctioned loan at a time (50%) and lack of scientific knowledge regarding the use of inputs (45.35%).

Vaish *et al.* (2002) reported from their study on barrier for involvement of farm women of Uttar Pradesh in decision making related to rice production technology that 100 percent of respondents faced lack of technical knowhow as a common constraint followed by lack of education (92%), men's thinking that they know better than women (72%), dominance of men in agriculture (69%), opportunities were not provided by men (59%), women's thinking that men know better than women (54%).



Dhuware and Pande (2003) found from their study that the major problems faced by women farmers of Madhya Pradesh were lack of irrigation facilities (57.50%), untimely availability of production technology (35.08%), high cost of inputs like seed, fertilizers and pesticides (33.33%), lack of finance (15.83%), uncertainty about availability of irrigation water (30%), lack of transportation facilities (25.83%) and lack of training institute (20%).

Sujatha *et al.* (2003) reported that the major constraints faced by women farmers of Andhra Pradesh were lack of training facilities, inadequacy of finance, poor identification of beneficiaries, non-availability of raw material and poor marketing facilities.

Meer and Parhiar (2005) reported from their study on rural women of Sindh region of Pakistan, that though agriculture dependent rural people struggled to improve their economic condition, problems like shortage of water, dry spell cycles, decrease in cultivable area due to soil deterioration, extension of towns and villages, contraction of infrastructure, rising cost of inputs, non-availability of high yielding variety of seeds to small farmers, un-checked population growth had adversely affected the lives of them.

Thelma *et al.* (2006) from their study on male migration in Eastern India found that women had the difficulty in hiring labour for land preparation during peak season of cultivation. To overcome the problem wives of migrant workers exchanged their labour for rice production. This translated in to the marked increase in agricultural work aside from their traditional roles in crop, livestock and post harvest activities, heavier work load and less time for domestic tasks.

Birthal and Joshi (2006) reported that lack of access to output market, agri-inputs, improved technology, market information, credit and risk mitigating instruments were the major problems faced by women farmers of the country in participating in high value agriculture.

Dash (2008) found that the inadequate access of Indian farm women to various resources like land, credit, appropriate technology, opportunities and different market related services remained as the crucial bottleneck in their development and decision making ability. On the other hand lack of education on the part of farm women also prevented them from taking advantage of emerging technological knowhow and other useful information and acted as the barrier for their capacity building.

Dhananjaya *et al.* (2009) revealed from their study that the problems faced by women farmers of Karnataka in Jasmine cultivation were the low yield in winter season (92.00%), pest and disease attack (88.00%), non availability of recommended chemicals (80.00%), work pressure (72.00%), more labour requirement (56%), financial shortage (44%) and marketing (12%).

Kelkar (2009) reported that in India, agricultural extension and information on new technologies were almost directed to men, even when women were traditionally responsible. Though vegetable growing is almost women's work universally, various projects aimed at providing training on commercial vegetable growing to men only. So, women were deprived of gaining scientific knowledge of vegetable production.

Ogunlela and Mukhtar (2009) found that in Nigeria, a number of barriers had affected women's participation in agricultural activities such as customs, beliefs and attitudes that confined women mostly to the domestic sphere, women's economic and domestic workloads that imposed severe time burdens and laws and customs that impeded women's access to credit, production inputs, employment, education and medical care.

Aktar *et al.* (2009) reported that in West Bengal, most of the tribal farm women (44.17%) faced health hazards like skin irritation and allergies, cut, wound and injuries, body ache frequently in performing agricultural operations, 34.17 per cent of farm women faced sometimes and 21.66 per cent of tribal farm women faced rarely.

Mikalista (2010) found from her study that women of Kenya were always constrained by access to extra income due to their limited time to engage in income generating activities in addition to having limited skills. This was made even more difficult due to their limited access to credit.

Pandey *et al.* (2010) revealed from their study that majority of the respondents confirmed frequent occurrence of swollen, sore hands and feet during irrigation (25.83%), digging, weeding and harvesting (52.50%) operations. Body ache was another common problem found to occur frequently after performing hard operations like digging, sowing and weeding (51.17%), harvesting and post harvesting work (52.50%), cleaning shed and making dung cake (59.17%) and marketing of milk and milk products (54.17%). Eye irritation was found to be frequently occurring due to the smoke of traditional chullah during cooking times (58.33%). The highly prevalent

problem was the bite of insects and poisonous animals during performing operations like weeding, irrigation and harvesting (50.00%).

Sahu *et al.* (2011) revealed that lack of knowledge about improved variety, seed rate and sowing time (88.33%), lack of knowledge of IPM technologies (85.00%), unavailability of improved seeds of vegetables (83.33%), lack of irrigation facilities (80.00%), non-remunerative price (78.33%), lack of training of scientific vegetable production technology (75.00%) and lack of subsidy (75.00%) were some of the major constraints faced by women farmers of Uttarakhand.

Singh and Nayak (2011) found that in rural areas of our country, women's suggestions were not given due consideration in decision making process related to agricultural and household matters because of patriarchal nature of the society. Besides these due to higher rate of illiteracy, less self confidence among rural women, lack of knowledge about different credit facilities available for farming offered by financial institutions, less access to information about production resources, little time to know about the latest techniques of farming because of household workload, restricted mobility due to several cultural taboos were some of the problems faced by rural women affecting their participation in cultivation.

Kumar *et al.* (2011) revealed from their study that most of the rural women of Karnataka perceived drudgery in tasks like field preparation (55.00%), carrying farm yard manure (58.33%), seed treatment (55.00%) and use of implements with inappropriate shape (63.33%). Besides these the modern methods of farming had made agricultural activities easier, but pushed the women workers to the background. It was not only the physical incapacity that kept women in background, but also their illiteracy, social restriction, low self esteem and lack of facilities for technical training were also the reasons.

Patel (2012) found that Indian women shouldered the entire burden of looking after of livestock, bringing up children and doing other household chores. The extent of health hazards faced by farm women in farm activities included 50 per cent in transplanting, 26.5 per cent in harvesting of farm activities, 50 per cent in threshing, 33 percent in drying and 67 per cent in parboiling of post-harvest activities, 47 per cent in shed cleaning, 23 per cent in fodder collection and 27.5 per cent in milking of livestock management. Besides these they had got low wages, unrecognized work, less ownership

of land, less involvement in decision making and less control over household finance which affected their participation.

Chayal *et al.* (2013) reported that in Rajasthan, low self confidence of rural women in farm related matters (75.83%), followed by lack of knowledge about farming (58.33%), belief that women are subordinate to male counterparts (57.50%), illiteracy (52.50%) and poor access of farm women to farm information (48.33%) were the major constraints which obstructed the women to participate in farm activities.

Badodiya *et al.* (2013) revealed from their study that tribal farm women of Madhya Pradesh faced problems and challenges in getting a sustainable livelihood and a decent life due to environment degradation and the interference of outsiders. Tribal women were discriminated, though they made enormous contribution to the agriculture and allied sectors. They had very little access to the knowledge and skills of modern farm technologies and other related resources.

Mohanty *et al.* (2013) revealed that the major constraints faced by vegetable growers specifically the women farmers in Sikkim were inadequate marketing networks, inadequate soil management, poor sources of information, lack of awareness on improved technologies due to lack of training, absence of proper storage facility and lack of mechanization in agriculture.

Patel *et al.* (2013) revealed from their study on constraint faced by female tomato and brinjal growers of North Gujarat that higher production expenditure (84.00%), higher prices of plant protection materials (63.10%), lack of information about high yielding varieties (60.40%), lack of credit (58.00%) and unavailability of labour when needed (58.37%) were the major constraints faced by respondent farmers.

Fartyal and Rathore (2014) found that in Uttarakhand though most of the activities in vegetable cultivation were carried out by women, yet their participation in decision making was very poor. This kind of gender gap in decision making in agriculture affected their participation and was an obstacle to women's development.

Kaur and Mavi (2015) reported that the major problems faced by female agricultural labourers of Punjab while performing various farm operations were low wages paid to them (95.60%) followed by dual burden of family and work (91.10%), drudgery prone labour (88.90%), musculoskeletal problems (83.30%), lack of access to technology (80.00%), unhygienic conditions at farm (77.80 %) and safety threat at farm (44.40%).

Joshi *et al.* (2016) revealed from their study that socio-cultural barriers among rural women of Uttar Pradesh (60.00%) was the main cause for less participation and decision making in farm related matters and got the first rank followed by lack of knowledge of improved scientific practices (53.00%) which got second rank, less training opportunities (47.02%) which got third rank, poor access to information (47.00%) which got fourth rank, less recognition to work (33.00%) which got fifth rank, less support from families (30.00%) which got sixth rank, disinterest and lack of motivation (27.00%) which got seventh rank, low self esteem (13.00%) which got eighth rank and lower educational status (7.00) which got ninth rank.

## **2.6 Knowledge level of rural women about recommended existing agricultural production technologies**

Barooah and Pathak (2009) found from their study that rural women of Assam had deep knowledge on growth habit and utility of each plant in homestead gardening, and they devised to allocate plants to make full use of limited space adjusting such plant's tolerance against water logging, shade, direct sunshine and drought.

Naik *et al.* (2009) from their study on knowledge level of farmers of Haryana on organic farming practices reported that majority (46.25%) of farmers had high level of knowledge about organic farming practices, 38.75 per cent had medium level and 15.00 per cent had low level of knowledge respectively.

Popat *et al.* (2011) from their study on beneficiary and non-beneficiary farmers of Gujarat under Integrated Horticultural Development Programme revealed that a majority (70.31%) of beneficiary farmers had medium level of knowledge, whereas 15.63 per cent and 14.06 per cent had high and low level of knowledge about Integrated Mango Production Technology. In case of non-beneficiary farmers a majority (68.75%) had medium level of knowledge, 18.75 per cent and 12.50 per cent had low and high level of knowledge about Integrated Mango Production Technology respectively.

Mohanty *et al.* (2013) reported that women farmers of Sikkim were very much lacking in knowledge on some important areas such as conservation of natural resources, regular soil testing programme, mechanization of agriculture, integrated pest and disease management of vegetable production.

Das and Saikia (2014) revealed from their study that majority of the rural women of Assam had low level of knowledge in nursery production (74.53%), nutritional management (60.33%), plant protection (54.00%), followed by production practices of horticultural crops (48.06%), seed production (46.80%), land preparation (46.13%) and harvesting (30.93%).

Saikia (2015) from her study found that majority of farm women of Assam (52.83%) had low level of knowledge on rice production technology. Majority of farm women (62.17%) had low level of skills on rice production technology and (54.00%) of had medium level of attitude on improved agricultural production technologies.

Nirmala (2015) revealed from her study in Telangana that farm women possessed high knowledge on soil fertility and production practices, medium knowledge on soil water conservation practices and low knowledge on integrated pest management and mulching.

Bharali (2016) reported from their study that majority of the Assamese rural women (49.00%) had low level of knowledge in vegetable cultivation whereas (31.00%) and (21.00%) had medium and high level of knowledge respectively.

Antim *et al.* (2016) revealed from their study that majority of the rural women of Uttar Pradesh (59.00%) had medium level of knowledge followed by (21.00%) had low level of knowledge and (20.00%) had high level of knowledge about food grain treatment methods.

## **2.7 Capacity building of rural women through training programmes**

Chander (2013) found that in India, in total 641 Krishi Vigyan Kendras are organizing trainings for farm women on various aspects such as crop production and management, post harvest technology and value addition, nursery management, livestock, fisheries, income generating activities including food processing and preservation, capacity building and group dynamics etc.

Likhi (2013) found that National Rural Livelihood Mission aims at creation of opportunities of wage employment and skill development through training for the rural youth, who lacks skill in many areas of agricultural production and

processing. Their main agenda is the skill development to build the capacity of rural youth so that they are meaningfully employed in rural areas itself.

Meti and Satish (2014) reported about the extent of participation of farm women in capacity building programmes, organized for twenty (20) farm women of Raichur district of Karnataka during the year 2011-12 that out of the eight training programmes majority of farm women (85.83%) actively participated in trainings on vermiculture, 74.17 per cent on use of agricultural waste as organic manure, 64.17 per cent on vermin wash production, 80.83 per cent on dairy production, 70.00 per cent on clean milk production technologies and 65.83 per cent on preparation of milk by-products.

Njoku *et al.* (2015) found that in Nigeria regarding involvement of agents in capacity building of rural women, majority of the vocational training and entrepreneurship development activities for women through thrift and cooperative initiatives undertook by women organizations (79.4%), followed by government (69.4%), churches (66.7%), private individuals (47.2%) and NGOs (38.9%).

Hegde and Venkattakumar (2015) found that capacity building organizations like NAARM, SAU, MANAGE design customized programmes and build platforms for training, knowledge sharing and policy making on different aspects of agricultural production for rural people including women.

# **CHAPTER III**

## **MATERIALS AND METHODS**

The main purpose of this chapter is to describe the research design followed in conducting the study. According to A. B. Rao (2008) “a research design can be defined as the outline that provides the specifications for the careful collection of relevant data and appropriate analysis so as to fulfill the objectives of research with precision, economy and perfection”. The methodologies adopted for conducting the whole investigation are presented under the following heads:

### **3.1 Locale of the research study**

### **3.2 Sample and sampling procedure**

#### **3.2.1 Selection of the agro climatic zones**

#### **3.2.2 Selection of the districts and sub-divisions**

#### **3.2.3 Selection of blocks**

#### **3.2.4 Selection of villages**

#### **3.2.5 Selection of respondents**

#### **3.2.6 Selection of trainees for intervention programme**

### **3.3 Selection of the variables and instruments used**

### **3.4 Operational definitions and measurement of variables**

### **3.5 Construction of tools for data collection**

### **3.6 Pre-testing of the tools**

### **3.7 Procedures of data collection**

### **3.8 Formulation of hypothesis**

### **3.9 Statistical analysis of data**



### **3.1 Locale of the research study**

The present study was carried out in the state of Assam which is one of the eight North Eastern states of India. The state of Assam has twenty eight ( 28) districts distributed across six (6) agro climatic zones namely North Bank plain Zone, Upper Brahmaputra Valley Zone, Central Brahmaputra Valley Zone, Lower Brahmaputra Valley Zone, Barak Valley zone and Hills zone (Fig: 3.1 ).

### **3.2 Sample and sampling procedure**

A multi-stage purposive – cum - simple random sampling design was followed for selection of sample for the present study. The sampling plan of the study is presented in (Fig: 3.2) and described under the following sub-heads.

#### **3.2.1 Selection of the agro climatic zones**

Out of the six agro-climatic zones of the State of Assam, two agro - climatic zones namely Upper Brahmaputra Valley Zone and Lower Brahmaputra Valley Zone were purposively selected for conducting the research study because after reviewing literature it was found that, there are large numbers of rural women in these zones who are primarily engaged in fruits and vegetable cultivation for their livelihood.

#### **3.2.2 Selection of the districts and sub-divisions**

A list of districts agro-climatic zone wise, having average vegetable production yield of above 15000 kg/ha and fruits production yield of above 5000 kg/ha was prepared on the basis of the information collected from the Directorate of Horticulture & Food Processing, Khanapara, Guwahati, Government of Assam. From the prepared list, Sivasagar district of Upper Brahmaputra Valley Zone and Kamrup (Rural) district of Lower Brahmaputra Valley Zone were selected through simple random sampling method (Fig. 3.3). From each selected district, two sub-divisions were selected randomly. Thus, all the four (4) sub-divisions, Sivasagar and Nazira sub-divisions of Sivasagar district and Kamrup Sadar and Rangia sub-division of Kamrup (R) district were selected randomly for the study.

#### **3.2.3 Selection of Blocks**

A list of developmental blocks from each selected sub-division was prepared separately based on the information about the fruits and vegetable production dominance areas, collected from the Krishi Vigyan Kendra, Kamrup and Krishi Vigyan



Fig. 3.1. Map of Agro-climatic zones of Assam

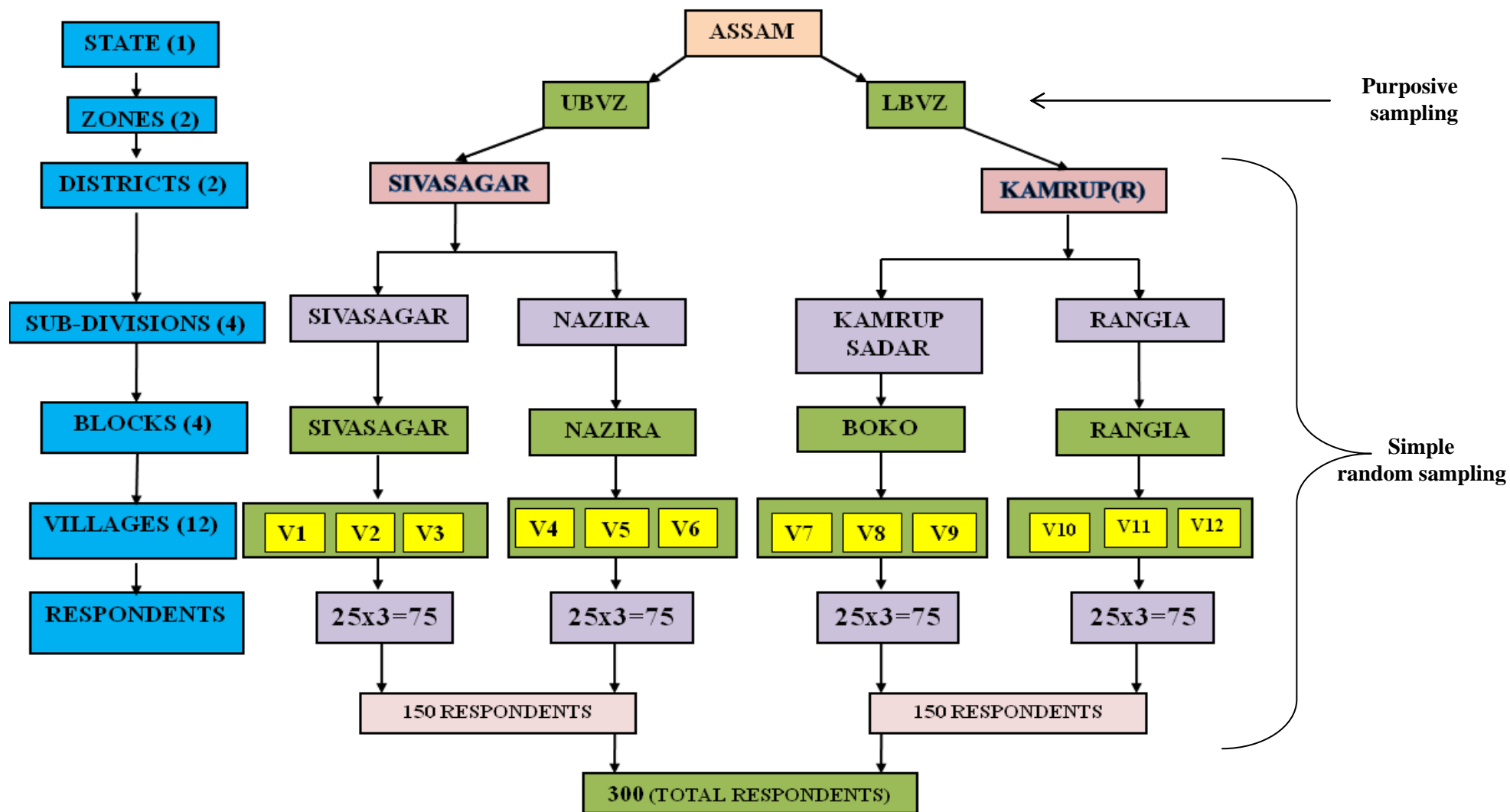
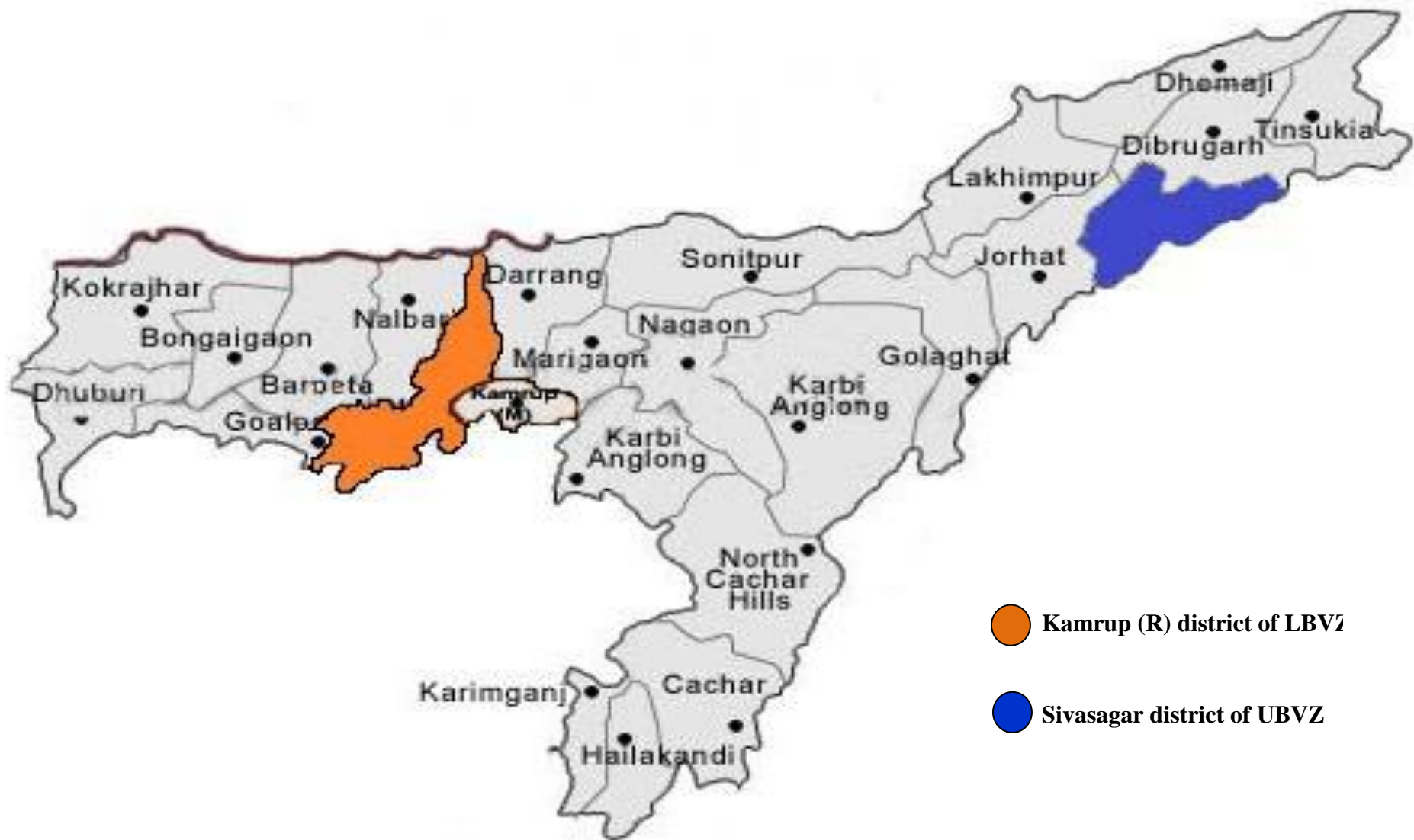


Fig. 3.2. Sampling plan of the study



**Fig. 3.3. Map of Assam showing study districts**

Kendra, Sivasagar. From the list, one (1) block from each sub-division was selected for the study by simple random sampling method. The Sivasagar block of Sivasagar sub-division and Nazira block of Nazira sub-division were selected by simple random sampling method. Further the Boko block of Kamrup Sadar sub-division and Rangia block of Rangia sub-division were selected by simple random sampling method. Thus, the total blocks selected for the research study were four (4).

#### **3.2.4 Selection of villages**

From each selected block a separate list of villages was prepared in consultation with the Sub-divisional Agricultural Officers of the selected sub-divisions and Block Development Officers of the selected blocks. From the prepared list, three (3) villages were selected from each block by using simple random sampling method. All total twelve (12) villages were selected for carrying out the present study.

#### **3.2.5 Selection of respondents**

From each village, a separate list of rural women who were actively engaged in cultivation of both fruits and vegetable crops was prepared in consultation with the Village Level Extension Workers, officials of Agricultural Technology Management Agencies, Agricultural Development Officers and Subject Matter Specialists of Krishi Vigyan Kendras. From the prepared list, twenty five (25) rural women from each village were selected by simple random sampling method. Finally, all total three hundred (300) rural women from twelve (12) villages of the selected zones were included as respondents for the present study.

#### **3.2.6 Selection of trainees for Intervention programme**

From the prepared list (Sl.no.3.2.5), twenty five (25) rural women from the three (3) sampled villages of Nazira block and two (2) sampled villages of Sivasagar block were selected by using simple random sampling method to fulfill the third objective of the present study.

### **3.3 Selection of variables and instrument used**

The variables included in the study were selected on the basis of an extensive review of literatures, discussions with the experts, knowledgeable persons, field functionaries and personal observations.

For measurement of variables in quantitative form, two procedures were followed. For measurement of socio-economic status of rural women of the present

study Trivedi and Pareek scale (1963) was used. The selected variables are age, marital status, caste, family type, family size, occupation of the head of the family, educational level of rural women, organizational membership, size of land holding, type of house, material possession and socio-economic status. A structured interview schedule constructed was used for measuring the other variables such as access to production resources, contact with extension personnel, sources of information, frequency and areas of training programme attended by rural women, problems faced by rural women in attending training programme, felt needs of rural women, mass media exposure, types and varieties of the crops grown in homestead garden, participation of rural women in different activities related to cultivation of horticultural crops, participation of rural women in household activities, decision making pattern of rural women in different activities related to cultivation of horticultural crops, decision making pattern of rural women in household activities, average time utilization pattern of rural women in cultivation of horticultural crops and household activities, problems faced by rural women in different activities of cultivation of horticultural activities (Appendix I, Part I and II).

To identify the existing knowledge of rural women about recommended production technologies of horticultural crops, scale developed by Devi and Das (2002) with slight modifications was used (Appendix I, Part III).

To identify the pre-intervention knowledge, post-intervention knowledge and knowledge retention about recommended production technologies of horticultural crops same structured schedule was used by the researcher (Appendix I, Part III).

Further to assess the impact of the training programme on rural women structured interview schedule developed by the researcher was used (Appendix II).

The list of variables along with the instruments used in the present study is presented in the Table 3.1.

**Table 3.1. List of variables and instruments used**

<b>Variables</b>	<b>Instruments used</b>
<b>Independent Variables</b>	
<b>Personal variables</b>	
Age	Chronological age of the respondent
Marital status	Socio-economic status scale (Trivedi and Pareek, 1963)
Religion	
<b>Socio-economic variables</b>	
Caste	
Family type	
Family size	
Occupation of the head of the family	
Educational level of rural women	
Organizational membership	
Size of land holding	
Type of house	
Material possession	
<b>Other variables</b>	
Access to production resources	Structured interview schedule
Contact with extension personnel	Structured interview schedule
Sources of information	Structured interview schedule
Frequency of training programme attended by rural women	Structured interview schedule
Areas of training programme attended by rural women	Structured interview schedule
Problems faced by rural women in attending training programme	Structured interview schedule
Felt needs of rural women	Structured interview schedule

<b>Variables</b>	<b>Instruments used</b>
Mass media exposure	Structured interview schedule
Types and varieties of the crops grown in homestead garden	Structured interview schedule
Participation of rural women in different activities related to cultivation of horticultural crops	Structured interview schedule
Participation of rural women in household activities	Structured interview schedule
Decision making pattern of rural women in different activities related to cultivation of horticultural crops	Structured interview schedule
Decision making pattern of rural women in household activities	Structured interview schedule
Time utilization pattern of rural women	Structured interview schedule
Problems faced by rural women in different activities of cultivation of horticultural crops	Structured interview schedule
Existing knowledge of rural women about recommended existing production technologies of horticultural crops	Knowledge scale (Devi and Das, 2002) with slight modification
Impact of intervention programme on the knowledge gain and retention of rural women about recommended existing production technologies of horticultural crops	Structured schedule
Impact of intervention programme in terms of behavioral and technological changes among rural women	Structured schedule



### **3.4 Operational definitions and measurement of variables**

Every scientific investigation faces the necessity of measuring the variables of relations. An operational definition according to Bhatnagar (1981) is a specification of the activities of the researcher in measuring variables or in manipulating it. The variables used in this study may carry a number of meaningful dimensions of definitions.

#### **3.4.1 Operational definitions of some dependent variables**

##### **3.4.1.1 Capacity building of rural women**

In the present study, capacity building of rural women is operationally defined as increasing the existing ability of rural women in respect of their knowledge on recommended production technologies during cultivation of horticultural crops through intervention programmes.

##### **3.4.1.2 Homestead garden**

In the present study, homestead garden is operationally defined as the available land around the house utilized by rural families for cultivation of fruits and vegetables for household consumption as well as generating additional income for their livelihood.

##### **3.4.1.3 Sustainable horticultural development**

In the present study, sustainable horticultural development is operationally defined as maintaining the homestead garden effectively by adopting scientific techniques for production of fruits and vegetable crops by the rural women.

##### **3.4.1.4 Knowledge of recommended production technologies**

In the present study, knowledge is operationally defined as the extent of scientific information possessed by rural women with specific reference to cultivation of horticultural crops such as nursery raising practices, land preparation and planting, production practices, nutritional management, plant protection measures, harvesting and seed production.

##### **3.4.1.5 Impact**

In the present study impact is operationally defined as the influence of intervention programme in terms of gain and retention of technological knowledge by the rural women for performing different activities of production of horticultural crops

and taking active part in decision making with their family members and its use for better production in the homestead garden.

### **3.4.2 Operational definition and measurement of independent variables**

#### **A. Personal variables**

##### **3.4.2.1 Age**

In the present study, age refers to the chronological age of a rural woman expressed at the time of investigation in years rounded off to the nearest age. On the basis of age rural women were categorized and scored as follows:

<b>Category</b>	<b>Range(years)</b>	<b>Score</b>
Young	18-33 years	1
Lower middle	34 - 47 years	2
Upper middle	48 - 60 years	3

##### **3.4.2.2 Marital status**

In the present study, marital status refers to the marital position of rural women at the time of investigation. On the basis of marital status rural women were categorized and scored as follows:

<b>Category</b>	<b>Score</b>
Unmarried	1
Married	2
Widow	3
Divorced	4
Separated	5

### 3.4.2.3 Religion

Religion is operationally defined as the internal beliefs of the respondents which bind them with the supernatural power. On the basis of religion, rural women were categorized and coded as follows:

Category	Code
Hindu	3
Muslim	2
Any other	1

## B. Socio-economic variables

### 3.4.2.4 Caste

Caste is an endogamous group where the status of an individual in a group is determined by his or her birth. It is the hereditary group which had a direct bearing on the individual's socio-economic status in the society. For analysis purpose, caste was categorized and scored as follows:

Category	Score
Scheduled Tribe(ST)	1
Scheduled caste (SC)	2
More Other Backward Class(MOBC)	3
Other Backward Class(OBC)	4
General	5

### 3.4.2.5 Family type

Family type is operationalized as nuclear family, joint family and extended family in this study. Nuclear family is that type of family where the rural woman after her marriage lives with her husband and children being away from her in-laws. Joint family is that type of family where the rural woman after her marriage live together with her husband, children and in-laws in the same household. Extended family is that type of family where the rural women after her marriage live together with her husband, children, in-laws and some relatives in the same household.

Thus the family types of rural women were categorized and scored as follows:

Category	Score
Nuclear	1
Joint	2
Extended	3

#### 3.4.2.6 Family size

It is the total number of members in the family of a rural woman which includes husband, wife, children and other dependents of the head of the family. It was categorized and scored as follows:

Category	Score
Small ( up to 4 members)	1
Medium (5-8 members)	2
Large (9 & above members)	3

#### 3.4.2.7 Occupation of head of the family

Main family occupation refers to the type of engagement of head of the family for their livelihood. It was categorized and scored as follows:

Category	Score
Daily wage earner	1
Independent profession (mason, carpenter, electrician, mechanic, tailor)	2
Farming	3
Business	4
Service	5

### 3.4.2.8 Educational level of rural women

Educational level of rural women may influence their ability to gain knowledge, participation and decision making pattern in horticultural and household activities.

In the present study, it is operationally defined as the level of literacy or formal education acquired by the rural woman that affects the manner in which she gathers information and relates herself to environment. It was categorized and scored as follows:

Category	Score
Illiterate	0
Can read only	1
Can read and write	2
Primary level	3
Middle school level	4
High school level	5
Higher secondary level	6
Graduate	7
Above graduate	8

### 3.4.2.9 Organizational membership

It is operationally defined as the extent of participation of rural women in activities of different socio-political groups or organizations such as Mahila Samiti, Self Help Group, Co-operative, Village Panchayat, NGO, Religious Group and others like Bandhan, Pathar Parisalana Samiti as member, office bearer and distinctive feature. The organizational membership of rural women was categorized and scored as follows:

Category	Score
No membership	0
Member of one organization	1
Member of more than one organization	2
Office bearer in one organization	3
Office bearer of more than one organization	4

#### 3.4.2.10 Size of land holding

It refers to the amount of cultivable land outside and around the house expressed in hectare, possessed by the families of rural women and utilized for production of fruits and vegetables.

On the basis of size of land holding, the rural women were categorized as per the criteria of Department of Agriculture, Govt. of Assam (Economic Survey, 2012-13, Assam) and scores assigned to them as follows:

Land holding (in hectare)	Category	Score
Below 1.0	Marginal	1
1.0-2.0	Small	2
2.1-4.0	Semi-medium	3
4.1 – 10.0	Medium	4
Above 10.0	Large	5

#### 3.4.2.11 Type of house

House is a building for human habitation, especially one where a family or small groups of people live together. In this present study, type of house refers to the type of construction of the house where a rural woman lives with her family. For the present study, the type of house was categorized and scored as follows:

Category	Score
Katcha	1
Mixed	2
Pucca	3

### 3.4.2.12 Material possession

It is operationally defined as the household materials such as refrigerator, electric fan, sanitary latrine, traditional chullah, gas stove, kerosene stove, furniture, pressure cooker etc., livestock such as bullock, cow, buffalo, goat, poultry, pig etc., farm assets such as bullock cart, pump set, tractor, hoe, improved plough, sprayer, thresher etc., transportation materials such as bullock cart, cycle, hand cart, two wheeler, car etc. and communication media such as radio, television, dish television, mobile, newspaper, magazine, etc. possessed by families of rural women at the time of investigation. Based on the type of material possessed by families of rural women, material possession was categorized and scored as follows:

#### 3.4.2.12.a Household material possession

Sl. No.	Category	Score
1.	Refrigerator	3.5
2.	Electricity	2.0
3.	Electric fan	2.0
4.	Improved chullah	1.5
5.	Traditional chullah	0.5
6.	Gas stove	3.0
7.	Furniture (sofaset, almirah, dining table)	2.5
8.	Pressure cooker	1.5
9.	Sewing machine	2.5
10.	Washing machine	2.5
11.	Mixture grinder	2.0
12.	Electric oven	2.0
13.	Iron	2.0
14.	Sanitary latrine	2.0
15.	Kerosene stove	1.5
16.	Bio-gas	1.0

**3.4.2.12.b Livestock possession**

<b>Sl.No.</b>	<b>Category</b>	<b>Score</b>
1.	Cow	2.5
2.	Buffalo	3.0
3.	Goat	2.0
4.	Poultry	1.5
5.	Pig	2.5
6.	Duck	1.5

**3.4.2.12.c Farm material possession**

<b>Sl. No.</b>	<b>Category</b>	<b>Score</b>
1.	Bullock	1.5
2.	Pump set	2.0
3.	Tractor	3.5
4.	Power tiller	3.0
5.	Desi wooden plough	1.0
6.	Hoe	0.5
7.	Improved plough	1.5
8.	Hand tools (sickle, khurpi, khanti, spade)	0.5
9.	Sprayer	1.0
10.	Duster	1.0
11.	Shallow Tube well	2.0
12.	Vermicompost or bio-compost unit	2.5
13.	Thresher	2.5



**3.4.2.12.d Transportation material possession**

Sl. No.	Category	Score
1.	Bullock cart	1.5
2.	Cycle	1.0
3.	Hand cart	0.5
4.	Two wheeler	2.5
5.	Three wheeler	3.0
6.	Four wheeler (Car)	4.0

**3.4.2.12.e Communication media possession**

Sl. No.	Category	Score
1.	Radio	2.0
2.	Television	3.0
3.	Dish T.V./ cable connection	2.5
4.	CD Player	1.5
5.	Newspaper	1.5
6.	Magazine	1.0
7.	Mobile phone	3.5

**3.4.2.13 Socio-economic status**

It refers to the position of rural women in the society and was determined by various social and economic variables such as caste, education, occupation, family type and size, type of house, organizational membership, land holding and material possession of rural women. The socio-economic status of rural

women was measured by following the socio-economic scale developed by Trivedi and Pareek (1963) with slight modification. The respondents were categorized with respect to their socio-economic status into following three groups:

Category	Score range
Low	Below ( $\bar{X} - Sd$ )
Medium	( $\bar{X} - Sd$ ) to ( $\bar{X} + Sd$ )
High	Above ( $\bar{X} + Sd$ )

#### **3.4.2.14 Access to production resources**

It is operationalized as the rural women's access to different production resources such as ownership of cultivated land, sources of water for irrigating the crops, sources of improved varieties of seeds, fund, fertilizer, pesticide and marketing facilities.

##### **3.4.2.14.a Ownership of cultivated land**

In the present study, ownership of cultivated land refers to sources of land such as personally owned, husband owned and family land used as homestead garden.

##### **3.4.2.14. b Sources of water for irrigating the crops**

In the present study, it refers to the type of sources such as tube well, canal, river, pond and well from where rural women got water for irrigation of fruits and vegetables crops.

##### **3.4.2.14.c Sources of improved varieties of seeds**

In the present study, it refers to the type of sources such as farm shop, neighbours, Govt. recognized seed farm, block office, middle men, weekly market, KVK, DAO and SDAO office and ATMA office from where rural women got improved varieties of seeds for cultivation of fruits and vegetables.

##### **3.4.2.14.d Sources of fund**

In the present study, it refers to the type of sources such as own saving, financial institution like Bandhan, Self Help Groups, Co-operatives, Agricultural Banks

like NABARD, relatives, neighbours and middlemen from where rural women got fund for cultivation.

#### **3.4.2.14.e Sources of fertilizer**

In the present study, it refers to the sources such as open market, Govt. office, farm shop, KVK, middlemen, neighbours and own home from where rural women got fertilizer for cultivation of fruits and vegetables.

#### **3.4.2.14.f Sources of pesticides**

In the present study, it refers to the sources such as farm shop, State Agriculture Dept., open market, KVK and own home from where rural women got pesticides to control pest and diseases in cultivation of fruits and vegetables.

#### **3.4.2.14.g Mode of marketing**

In the present study, it refers to the various channels or ways such as wholesale, retail and middleman through which rural women sold their produce of homestead garden.

#### **3.4.2.15 Contact with Extension personnel**

By contacting extension personnel, rural women may gain knowledge and motivation for adoption of new scientific techniques of production. Besides this an increased number of contacts with extension personnel enable a rural woman to bring clarity in thinking and helps in decision making.

In this present study, contacts with extension personnel was operationally defined as the nature and frequency of contacts the rural women have with extension personnel such as Village Level Extension Workers, Agricultural Extension Officers, ADOs, KVK personnel, Block officials, SDAOs, ATMA officials and NGO personnel of their own areas for gaining knowledge and motivation for adoption of new ideas related to cultivation of horticultural crops. It was measured with the help of a structured schedule and was categorized and scored as follows:

<b>Category</b>	<b>Score</b>
Frequently	2
Occasionally	1
Never	0

#### 3.4.2.16 Sources of information

It refers to the sources like KVK Personnel, ATMA officials, Sub-divisional Extension Officers and ADOs, block officials, husband, neighbours and friends, relatives etc. from which rural women get various farm related information. The sources of information were categorized and coded as follows:

Category	Code
Frequently	2
Occasionally	1
Never	0

#### 3.4.2.17 Frequency of training programmes attended by rural women

It refers to the number of training programmes attended by rural women provided by Department of Agriculture, Assam. On the basis of frequency of training programmes attended by rural women, they were categorized and coded as follows:

Category	Code
None	0
Attended one	1
Attended more than one	2

#### 3.4.2.18 Areas of training programmes attended by rural women

It refers to the types of training programmes attended by rural women on various aspects such as homestead gardening, nursery raising, flouriculture, vermicomposting, mushroom cultivation, poultry farming, food processing and preservation, animal husbandry and dairying, piggery and duckery etc.

#### 3.4.2.19 Problems faced by rural women in attending training programmes

It refers to the different problems such as transport and communication problem, lack of time due to overburden of household works, lack of money, lack of interest on the training aspect, organizing training programmes during peak season of

planting and harvesting of other crops and lack of awareness about the training etc. faced by rural women while attending the training programmes.

#### **3.4.2.20 Felt needs of rural women**

It is operationally defined as the gap between existing knowledge and desired knowledge areas related to homestead gardening. It is categorised as nursery raising, land preparation and planting, production practices, plant protection measures, harvesting and seed production, about which rural woman expected to know more through training programmes.

The rural women were asked to mention whether the training was ‘most needed’, ‘somewhat needed’ and ‘not needed’. These were scored as 3, 2 and 1, respectively.

#### **3.4.2.21 Mass media exposure**

It refers to the extent of using various communication media such as radio, TV, newspaper, educational films, farm publications, mobile phone etc. by rural women to gain or improve knowledge about agricultural programmes. In the present study, it was categorized and scored as follows:

<b>Category</b>	<b>Score</b>
Frequently	2
Occasionally	1
Never	0

#### **3.4.2.22 Types and variety of crops grown**

It refers to the types of crops such as fruits and vegetable crops and varieties of crops such as local and hybrid varieties grown in the homestead garden.

### **3.4.2 Work profile of rural women**

#### **3.4.2.1 Participation of rural women in different activities related to cultivation of horticultural crops**

It refers to the actual role performed by rural women in different activities related to cultivation of horticultural crops.

The extent of participation of rural women in different activities related to cultivation of horticultural crops was categorized and scored as follows:

Category	Score
No participation	0
Joint participation	1
Independent participation	2

According to the maximum obtainable score and scores obtained by the respondents, they were classified as follows:

Category	Score range
Low	Below ( $\bar{X} - Sd$ )
Medium	( $\bar{X} - Sd$ ) to ( $\bar{X} + Sd$ )
High	Above ( $\bar{X} + Sd$ )

Thus, the overall extent of participation of rural women in different horticultural activities was known.

#### 3.4.2.2 Participation of rural women in different household activities

It refers to the actual role performed by rural women in different activities of home.

The extent of participation of rural women in different household activities was categorized and scored as follows:

Category	Score
No participation	0
Joint participation	1
Independent participation	2

According to the maximum obtainable score and scores obtained by the respondents, they were classified as follows:

Category	Score range
Low	Below ( $\bar{X} - Sd$ )
Medium	( $\bar{X} - Sd$ ) to ( $\bar{X} + Sd$ )
High	Above ( $\bar{X} + Sd$ )

Thus, the overall extent of participation of rural women in different household activities was known.

#### 3.4.2.3 Decision making pattern of rural women in different activities related to cultivation of horticultural crops

It refers to the pattern of rural women's involvement in making decisions in important matters of homestead garden. The decision making pattern of rural women in activities related to the homestead garden was categorized and scored as follows:

Category	Score
No involvement in decision making	0
Joint involvement in decision making	1
Independent involvement in decision making	2

According to the maximum obtainable score and scores obtained by the rural women, they were classified as follows:

Category	Score range
Low	Below ( $\bar{X} - Sd$ )
Medium	( $\bar{X} - Sd$ ) to ( $\bar{X} + Sd$ )
High	Above ( $\bar{X} + Sd$ )

Thus, the decision making pattern of rural women in activities related to homestead garden was known.

#### 3.4.2.4 Decision making pattern of rural women in household activities

It refers to the pattern of rural women's involvement in making decisions in important matters of home. The decision making pattern of rural women in household activities was categorized and scored as follows:

Category	Score
No involvement in decision making	0
Joint involvement in decision making	1
Independent involvement in decision making	2

According to the maximum obtainable score and scores obtained by the rural women, they were classified as follows:

Category	Score range
Low	Below ( $\bar{X} - Sd$ )
Medium	( $\bar{X} - Sd$ ) to ( $\bar{X} + Sd$ )
High	Above ( $\bar{X} + Sd$ )

Thus, the decision making pattern of rural women in household activities was known.

#### 3.4.2.5 Time utilization pattern of rural women

It refers to the time utilized by the rural women in different activities per day in hours. The time utilization pattern of rural women was operationalized as the time in minutes/ hours/day utilized by them in performing various farm and non-farm activities.



### 3.4.3.6 Problems faced by rural women in different activities of cultivation of horticultural crops

According to the Advance Learner Oxford English Dictionary, the meaning of ‘problem’ is something which is difficult to deal with or to understand.

In this study problem refers to the difficulties or obstacles faced by rural women in performing various activities related to the homestead garden.

A list of problems such as Infrastructural, physiological, economical, educational/technological, socio-psychological and environmental problems were identified and prepared after reviewing related literature. The problems were administered to the rural women in a three point scale i.e. always, sometimes and never. The scores were assigned as follows:

Category	Score
Always	2
Sometimes	1
Never	0

### 3.4.3 Existing knowledge of rural women about recommended production technologies of horticultural crops

This variable was measured by using the standardized scale developed by Devi and Das (2002). It includes ten (10) basic questions on each of the parameters i.e. nursery raising practices, land preparation and planting, production practices, nutrient management, plant protection, harvesting and seed production of cultivation of horticultural crops.

The responses of rural women were recorded on a three point continuum as know thoroughly, know somewhat and not known and scored as follows:

Category	Score
Know thoroughly	3
Know somewhat	2
Not known	1

On the basis of the scores obtained by rural women, they were categorized as follows:

Category	Score range
Low	Below ( $\bar{X} - Sd$ )
Medium	( $\bar{X} - Sd$ ) to ( $\bar{X} + Sd$ )
High	Above ( $\bar{X} + Sd$ )

### 3.5 Construction of tools for data collection

Based on the objectives of the study, two structured interview schedules were constructed (Appendix I and II).

#### 3.5.1 Construction of Interview schedule I:

The interview schedule consisted of three parts-

**Part-I** of the schedule dealt with the personal and socio-economic characteristics of rural women and other variables such as access to production resources, contacts with extension personnel, sources of information, frequency of training attended by rural women, areas of training programme attended by rural women, problems faced by rural women in attending training programme, felt needs of rural women and Mass media exposure.

**Part-II** of the schedule dealt with questions pertaining to types and varieties of crops grown in homestead garden, participation of rural women in different activities related to cultivation of horticultural crops, participation of rural women in household activities, decision making pattern of rural women in different activities of cultivation of horticultural crops, decision making pattern of rural women in household activities, time utilization pattern of rural women and problems faced by rural women in different activities of cultivation of horticultural crops.

**Part-III** of the schedule consisted of ten (10) questions on seven (7) aspects of cultivation of horticultural crops i.e. nursery raising practices, land preparation and planting, production practices, nutrient management, plant protection measures, harvesting and seed production.

### **3.5.2 Construction of Interview schedule II**

The schedule dealt with questions pertaining to seven packages of practice of the intervention programme. The participants were asked closed ended questions as 'yes' or 'no' regarding whether they have decided to adopt the package of practices or already adopted these package of practices in the practical field of cultivation of horticultural crops. The responses were recorded for further analysis.

### **3.6 Pre-testing of the tools**

The interview schedule I was administered on a group of thirty (30) rural women in one non-sampled village of Sivasagar district before final data collection. On the basis of the experiences gained and information obtained, few modifications were made in the schedules and finalized these for data collection.

### **3.7 Procedures of data collection**

The data were collected through personal interview and by using an interview schedule to fulfill the first and second objective of the present study. All the respondents were interviewed by using the structured schedule during the period of January, 2015 to August, 2016.

To fulfill the third objective of the study, an intervention programme of five (5) days duration i.e. 7<sup>th</sup> to 11<sup>th</sup> November, 2016, was organized for twenty five (25) rural women. After completion of the intervention programme successfully, certificates were distributed among the participants for encouraging them for further participation (Plate 69). Data regarding pre knowledge test, post knowledge test and post knowledge test after one month of completion of training were recorded (Appendix II).

### **3.8 Formulation of hypothesis**

#### **Hypotheses No.1**

There is no significant relationship between participation of rural women in different horticultural and household activities with some selected independent variables such as age ( $X_1$ ), marital status ( $X_2$ ), caste ( $X_3$ ), education ( $X_4$ ), Land holding ( $X_5$ ), family size ( $X_6$ ), mass media exposure ( $X_7$ ), organizational membership ( $X_8$ ), main family occupation ( $X_9$ ) and contacts with extension personnel ( $X_{10}$ ).

$$H_0 : r_i = 0$$

$$H_1 : r_i \neq 0$$

Where,  $r$  = Correlation coefficient

$$i = 1, 2, 3, 4, 5, 6, 7, 8, 9$$

### **Hypotheses No.2**

There is no significant relationship between decision making pattern of rural women in different horticultural and household activities with some selected independent variables such as age ( $X_1$ ), marital status ( $X_2$ ), caste ( $X_3$ ), education ( $X_4$ ), Land holding ( $X_5$ ), family size ( $X_6$ ), mass media exposure ( $X_7$ ), organizational membership ( $X_8$ ), Main occupation ( $X_9$ ) and contacts with extension personnel ( $X_{10}$ ).

$$H_0 : r_i = 0$$

$$H_1 : r_i \neq 0$$

Where,  $r$  = Correlation coefficient

$$i = 1, 2, 3, 4, 5, 6, 7, 8, 9$$

### **Hypotheses No.3**

There is no significant relationship between existing knowledge level of rural women about the scientifically validated production technologies of horticultural crops with some selected independent variables such as age ( $X_1$ ), marital status ( $X_2$ ), caste ( $X_3$ ), education ( $X_4$ ), farm size ( $X_5$ ), family size ( $X_6$ ), mass media exposure ( $X_7$ ), organizational membership ( $X_8$ ) Main occupation ( $X_9$ ) and contacts with extension personnel ( $X_{10}$ ).

$$H_0 : r_i = 0$$

$$H_1 : r_i \neq 0$$

Where,  $r$  = Correlation coefficient

$$i = 1, 2, 3, 4, 5, 6, 7, 8, 9$$

### **3.9 Statistical analysis of data**

After data collection, the gathered data were coded, tabulated and statistically analyzed by using appropriate tests and techniques.

The statistical techniques along with their uses are:

- 1. Percentage :** It is a fraction expressed with hundred as its denominator. It is used to any set of data for comparison. The percentage was calculated with the following formula-

$$\text{Percentage (\%)} = \frac{\text{Frequency}}{\text{Total respondents}} \times 100$$

- 2. Mean:** It refers to the arithmetic average and was used to measure the type of observation as a whole. The formula of calculating mean for all the readings was as follows.

$$\text{Mean } (\bar{X}) = \frac{\sum X}{n}$$

Where,  $\sum X$  = Summation of item values

$n$  = Number of item

- 3. Standard Deviation:** To find out the extent of variability shown by the variables, i.e., the dispersion of the variables around the mean, standard deviation (SD) was used. The formula of calculating standard deviation is mentioned below:

$$SD = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}}$$

Where, SD = Standard Deviation

$n$  = Total number of rural women

$x_i$  = Variables of the study

$\bar{x}$  = Mean of the distribution

- 4. Co-efficient of correlation:** It is a statistical technique used to find out the relationship between dependent and independent variables. Here the Karl Pearson's product moment Co-efficient of correlation short cut method was used.

The formula used for calculation of co-efficient of correlation is:

$$r = \frac{\sum xy - \frac{(\sum x)(\sum y)}{n}}{\sqrt{\left\{\sum x^2 - \frac{(\sum x)^2}{n}\right\} \left\{\sum y^2 - \frac{(\sum y)^2}{n}\right\}}}$$

Where,  $r$  = Correlation coefficient

$x$  = Independent variable

$y$  = Dependent variable

$\sum xy$  = Summation of total product of x and y

n = Total number of respondents

**5. Fisher's 't' ratio:** To test the significance of the observed correlation co-efficient, Fisher's 't' ratio was used. The formula used for the test is as follows.

$$T = \frac{r}{1-r} \times (n-2) \text{ with } (n-2) \text{ d.f.}$$

Where, r = observed co-relation co-efficient

n = number of observation

d.f. = degrees of freedom

The calculated values of 't' were compared with the table value of 't' at 1 to 5 percent of probability in a two tailed test.

# **CHAPTER IV**

## **FINDINGS AND DISCUSSIONS**

The data collected from the respondents were systematically coded, tabulated and analyzed keeping in mind the objectives of the present study. The findings of the study and relevant discussions are presented under the following headings:

- 4.1 Background profile of the rural women.
- 4.2 Assessment of work profile of rural women of Assam in homestead garden for sustainable horticultural development.
- 4.3 Identification of existing knowledge of rural women about recommended production technologies of horticultural crops
- 4.4 Building the capacity of rural women in homestead garden through intervention programme for sustainable horticultural development

### **4.1 Background profile of the rural women**

A brief introduction about rural women as respondents of the present study is given here under the following heads:

#### **4.1.1 Personal characteristics of rural women**

##### **4.1.1.1 Age**

Age is considered as one of the most important personal characteristic of rural women which influences their participation and decision making pattern in various horticultural and household activities. Moreover, maturity and knowledge achieved through experiences varies according to age level of the rural women.

Table 4.1 reveals that majority of rural women (54.00%) in the study area belonged to the lower middle age group followed by 26.00 per cent young age group and 20.00 per cent upper middle age group. It is presumed that rural women of lower middle aged group are much more active and energetic in performing most of the horticultural and household activities as compared to rural women of young and upper

middle aged group. This finding is in line with the findings of Saikia (2015) and Bharali (2016).

**Table 4.1. Distribution of rural women according to their age**

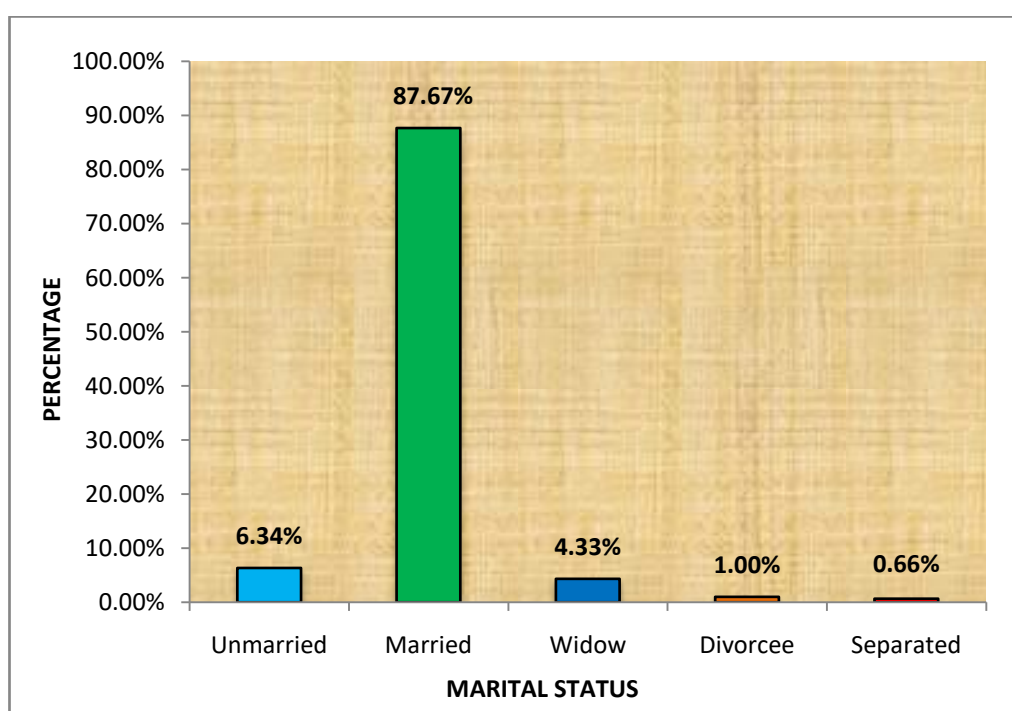
**N= 300**

Characteristic	Category	Frequency	Percentage
Age	Young (18-33years)	78	26.00
	Lower middle (34-47years)	162	54.00
	Upper middle (48-60 years)	60	20.00

#### 4.1.1.2 Marital status

It is clear from the Fig. 4.1 that a large percentage of the rural women were married (87.67%) followed by unmarried (6.34%). Very negligible percentage of rural women belonged to the category of widow (4.33%), divorcee (1%) and separated (0.66%).

From this it can be concluded that married women had much more responsibilities for gathering fruits and vegetables during preparation of food for their family members.

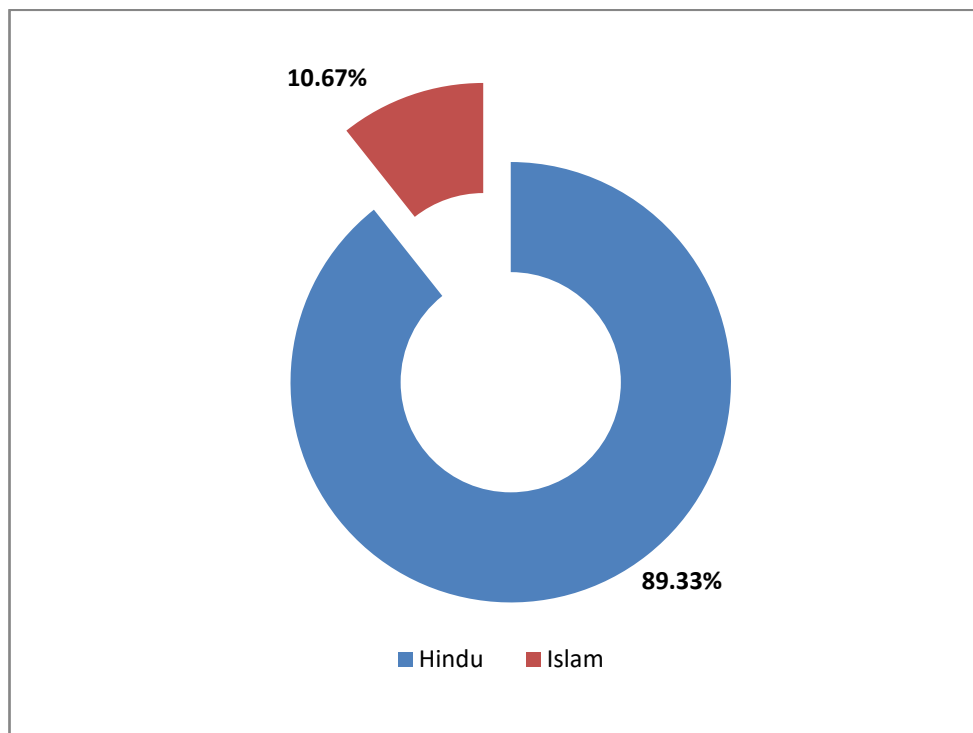


**Fig. 4.1. Distribution of rural women according to their marital status**



### 4.1.1.3 Religion

It is indicated in Fig. 4.2 that majority of rural women (89.33%) belonged to the Hindu religion, followed by 10.67 per cent Islam religion.

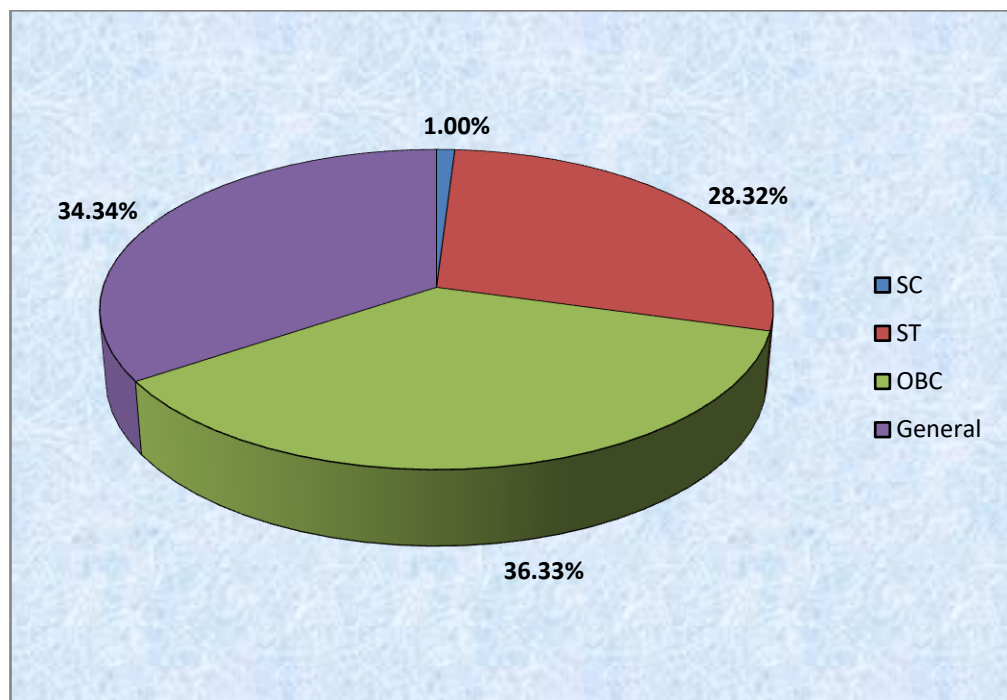


**Fig. 4.2. Distribution of rural women according to their religion**

## 4.1.2 Socio-economic characteristics of rural women

### 4.1.2.1 Caste

It is observed from Fig. 4.3 that 36.34 per cent of rural women belonged to OBC category, followed by 34.34 per cent general category and 28.23 per cent ST category. Very less 1 per cent of rural women belonged to SC category. It indicates that the categories of castes of rural women which had predominance in the study areas were OBC and General category. These findings are in conformity with the findings of Landge, Deshmukh and Suradkar (2016).

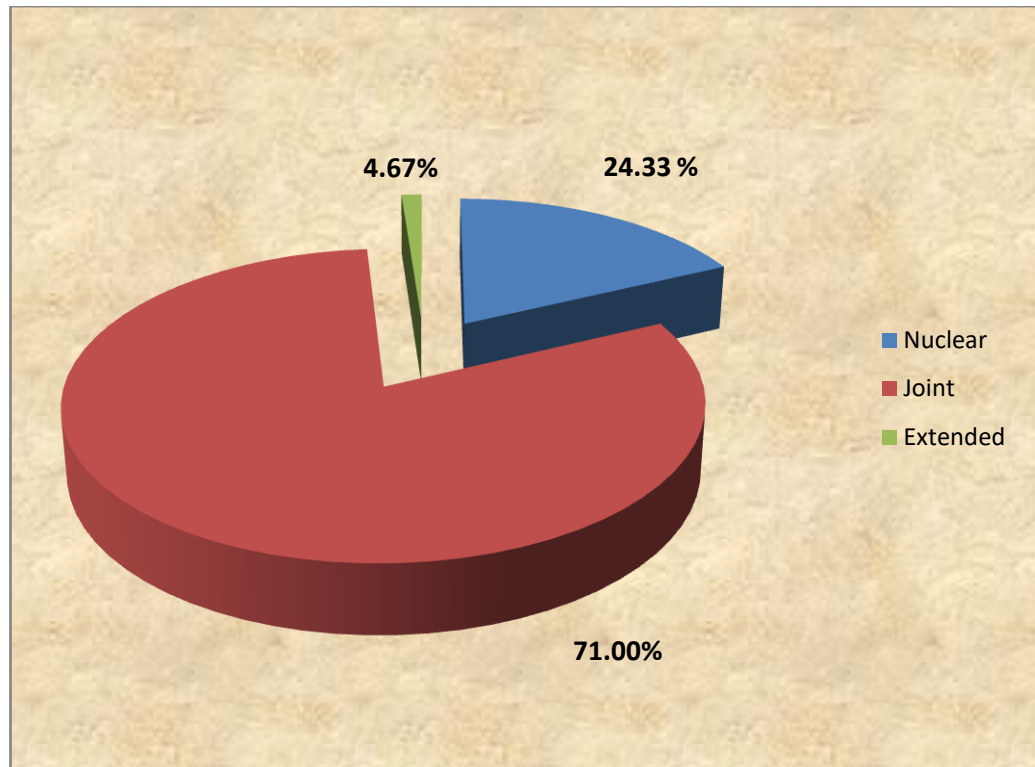


**Fig 4.3. Distribution of rural women according to their caste**

#### **4.1.2.2 Family type**

The significance of rural families is that they possess some cultivable land and have to manage agricultural business besides managing their personal and family affairs. The different types of families found in the study are presented in Fig. 4.4. It is observed that majority of the families of rural women (71.00%) were nuclear families, followed by 24.33 per cent joint families and very less 4.67 per cent extended families.

This might be due to the fact that disintegration of family system is prevailing in rural areas also besides the urban areas, so majority of the families were found as nuclear families. These findings are in accordance with the findings of Bora (2004) and Oyang (2011).

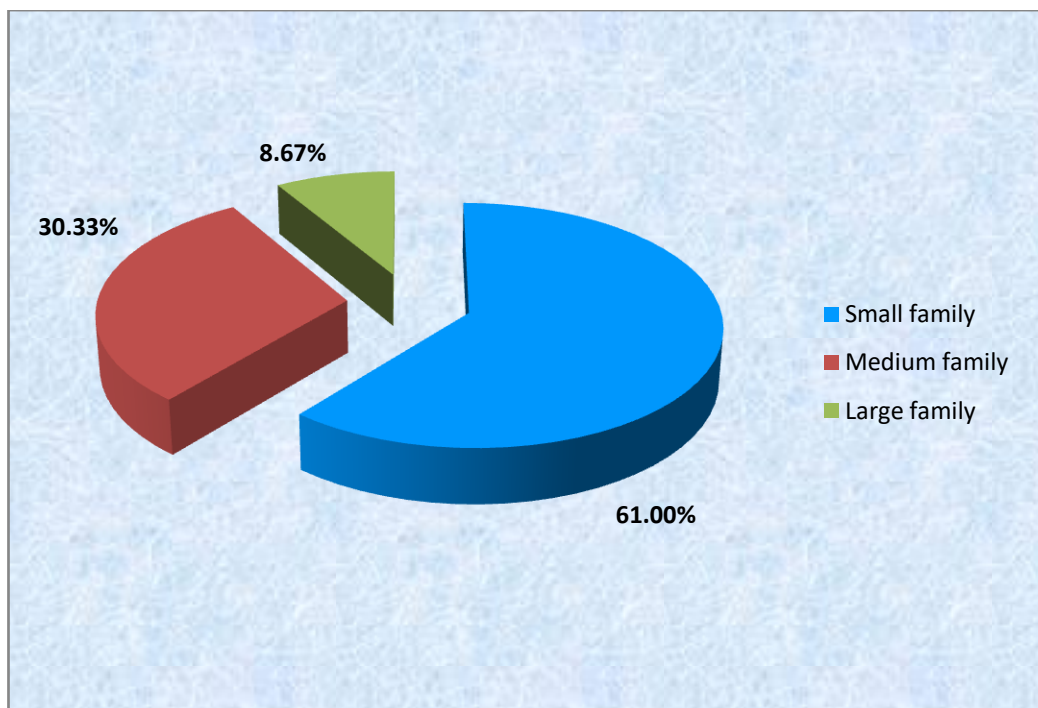


**Fig. 4.4. Distribution of rural women according to their type of family**

#### **4.1.2.3 Family size**

Family size refers to the total number of members in the family. Fig. 4.5 reveals that majority of the rural women (61.00 %) belonged to small family category followed by 30.33 per cent to medium family category and 8.67 per cent belonged to large family category respectively.

It might be due to the increasing awareness about small family norms created through various communication media and increasing cost of living that compels people to adopt family planning measures. These findings are in line with the findings of Meti and Sathish (2014).

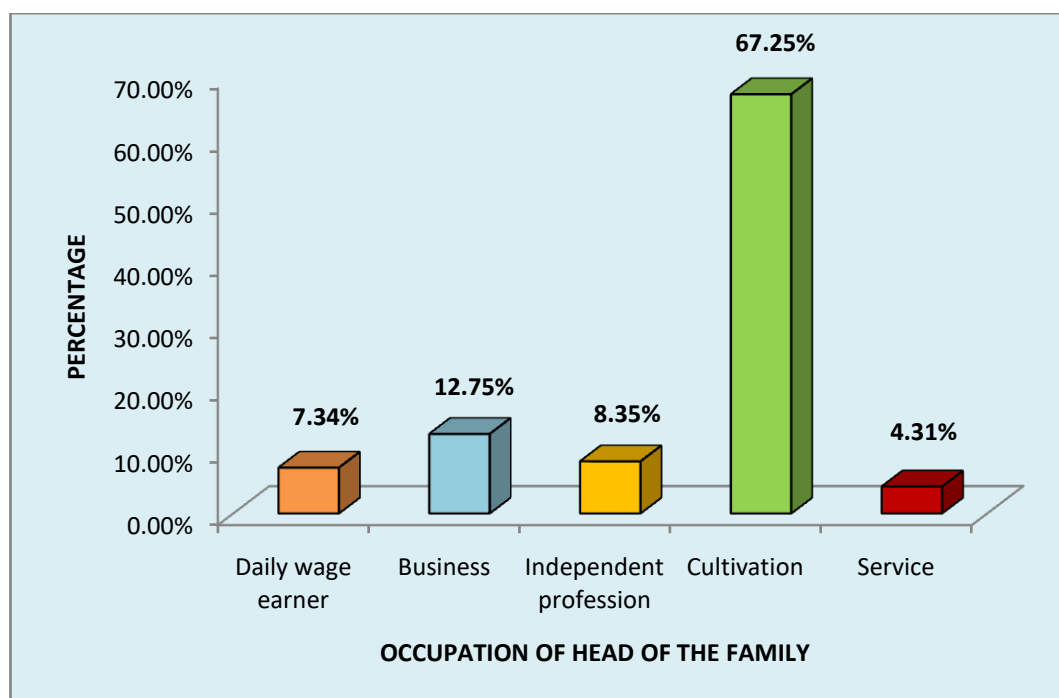


**Fig. 4.5. Distribution of rural women according to family size**

#### **4.1.2.4 Occupation of the head of the family**

It refers to the income source from which the head of a rural family earns their income by devoting his maximum time to it. It reflects the status and standard of living of the family. Fig. 4.6 reveals that 67.25 per cent of the heads of rural families had cultivation as occupation, followed by business (12.75%), independent profession (8.35%), daily wage earning (7.34 %) and service (4.31%) respectively.

It indicates that agriculture is still the backbone of our economy and majority of our population specifically rural population depend on agriculture for their livelihood. So extension services can motivate these rural families through different need based intervention programmes, so that they adopt scientifically validated production technologies for better production and family income leading to better standard of living.



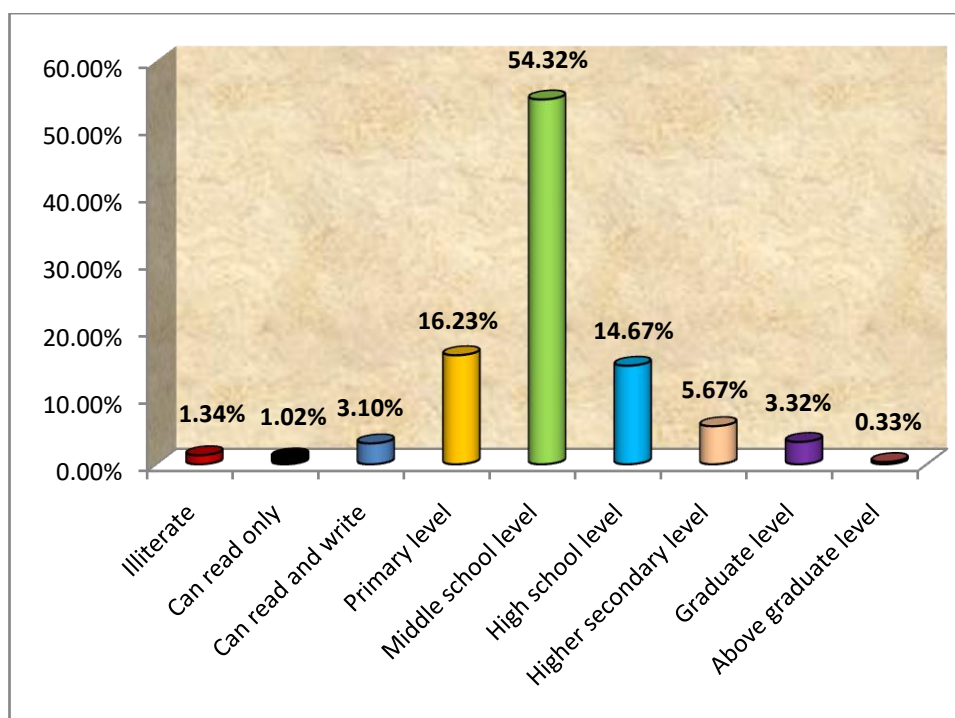
**Fig. 4.6. Distribution of rural women according to occupation of head of the family**

#### **4.1.2.5 Educational level of rural women**

Education is the most important tool to bring desirable changes in the behaviour of people. A highly educated person has more knowledge, is able to access more information and can offer solution to problems easily.

The educational level of rural women is presented in Fig. 4.7. It is observed from the figure that majority of rural women (54.32%) had formal education up to middle school level followed by 16.23 per cent primary school level, 14.67 per cent high school level, 5.67 per cent higher secondary level, 3.32 per cent graduate level and 0.33 per cent above graduate level. Very less percentages of rural women 3.10 percent, 1.34 per cent and 1.02 per cent were identified as rural women who can read and write, can read only and illiterate respectively. These findings are supported by the findings of Devi (2000) and Wasnik (2005).

So, it can be perceived that rural women have the ability to access the scientifically validated production technologies of horticultural crops through intervention programme.

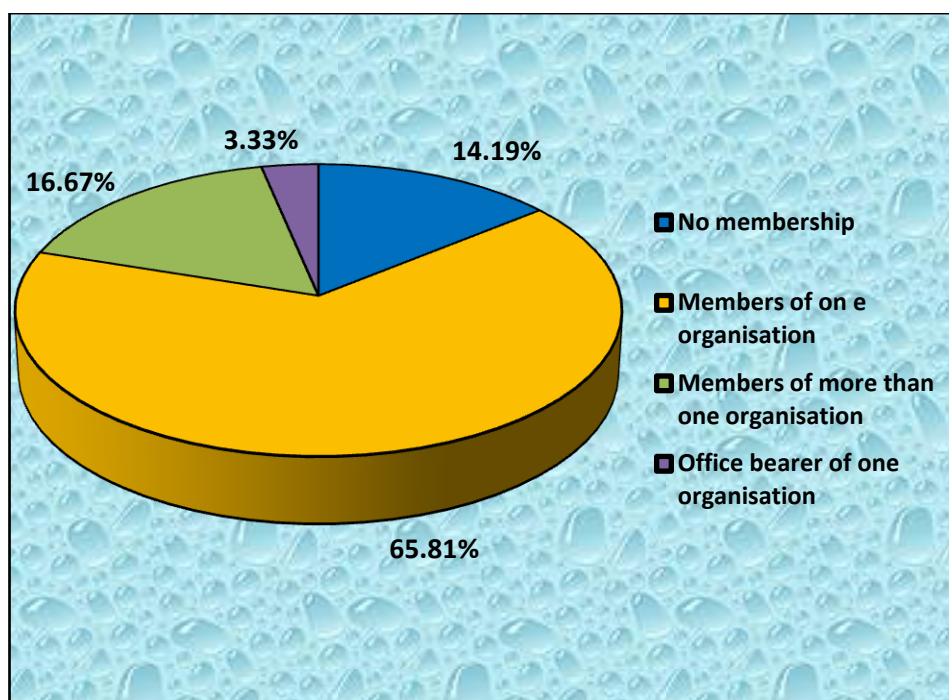


**Fig. 4.7. Distribution of rural women according to their educational qualification**

#### **4.1.2.6 Organizational membership**

Membership in any registered organization enables rural women to gain more knowledge, share experience and broaden the horizon of their views. They get more scope to take part in various training programmes, which enhances their knowledge and they are allowed to take active part in decision making process. The organizational membership of rural women of the study is presented in Fig. 4.8. The figure reveals that majority of rural women (65.81%) were members of one organization followed by 16.67 per cent were members of more than one organization and 14.19 per cent of women had no membership in any organization. The data further reveals that a very less percentage of rural women (3.33%) had the responsibility as office bearers of one organization.

It was assumed that organizational membership of rural women might have influence on their participation, decision making in various horticultural and household activities and adoption of recommended production technologies.



**Fig.4.8. Distribution of rural women according to their organizational membership**

#### **4.1.2.7 Size of land holding**

Land is one of the most important physical factor for agricultural productivity. Generally it is the only resource of income to majority of the farm families. Moreover, the size of land holding and area under the crops decide to some extent the level of socio-economic status of an individual in a society. The size of land holding of rural families of the study is presented in Table 4.2.

It is indicated from Table 4.2 that majority of rural women (70.33%) belonged to the category of marginal farmer followed by 25.92 per cent small farmer and 3.13 per cent semi-medium farmer. A very negligible 0.62 per cent of rural women belonged to the category of medium farmer. These findings are in conformity with the findings of Thapa (2007) and Bharali (2016).

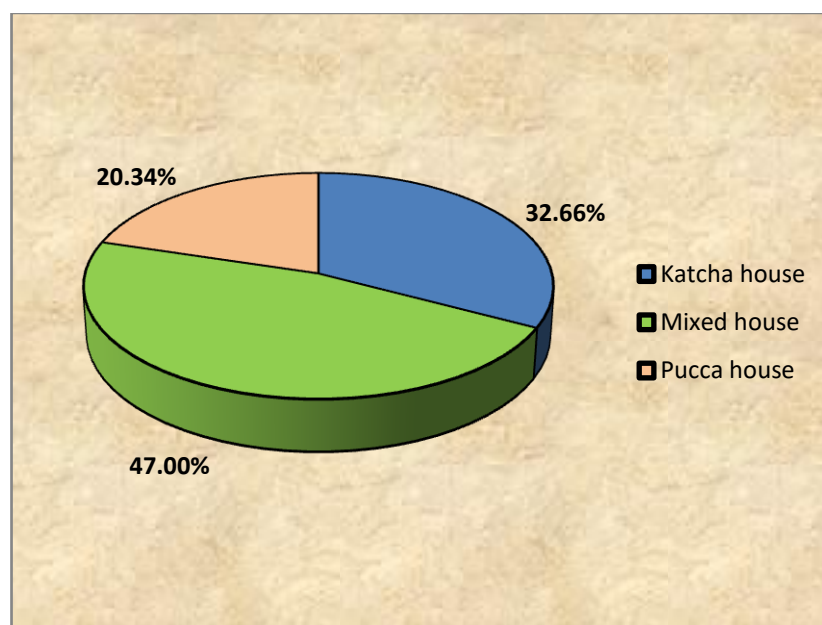
It is perceived that though small land holding is a disincentive to rural women, they can utilize these lands to gain maximum agricultural outputs by adopting recommended production technologies introduced to them through intervention programmes organized by extension services.

**Table 4.2. Distribution of rural women according to size of land holding****N= 300**

Sl. No	Category	Frequency	Percentage
1	Marginal farmer (below 1.0 hectare)	211	70.33
2	Small farmer (1.0 – 2.0 hectare)	76	25.92
3	Semi-medium farmer (2.1 – 4.0 hectare)	11	3.13
4	Medium farmer (4.1- 10.0 hectare)	2	0.62

#### 4.1.2.8 Type of house

The type of house where a family lives is an indicator of their socio-economic status. The categorization of rural women according to the types of house where they lived is presented in Fig. 4.9. It is observed from Fig. 4.9 that nearly 47.00 per cent of rural women had mixed type of houses followed by 32.66 per cent had kutchha houses and 20.34 per cent had pucca type of houses. These findings are supported by the findings of Dhananjaya, Kumar and Nataraju (2008).

**Fig. 4.9. Distribution of rural women according to their type of house**

#### 4.1.2.9 Material possession

Material possession by the families of rural women is the indicator of their socio-economic status.



#### 4.1.2.9a Household material

It refers to the household equipments possessed by families of rural women used to perform various household activities. Table 4.3 indicates the various household materials possessed by families of rural women.

It is observed from Table 4.3 that cent percent of rural women possessed traditional chullah followed by sanitary latrine (59.66%), electricity and electric fan (58.66%), iron (50.66%), gas stove (47.33%), pressure cooker (46.33%), furniture (36.33%), kerosene stove (24.00%), sewing machine (10.66%), mixture grinder (6.00%), refrigerator (5.00%), electric oven (4.33%) washing machine (1.66%) and Bio-gas (1.33%), respectively. Very negligible percentage of rural women families (0.66%) possessed improved chullah.

**Table 4.3. Distribution of rural women families according to their household material possession** **N= 300**

Sl. No.	Categories	Frequency	Percentage
1.	Refrigerator	15	5.00
2.	Electricity	176	58.66
3.	Electric fan	176	58.66
4.	Improved chullah	2	0.66
5.	Traditional chullah	300	100.00
6.	Gas stove	142	47.33
7.	Furniture (Sofaset, wardrobe, dining table)	109	36.33
8.	Pressure cooker	139	46.33
9.	Sewing machine	32	10.66
10.	Washing machine	5	1.66
11.	Mixture grinder	18	6.00
12.	Electric oven	13	4.33
13.	Iron (electric/non-electric)	152	50.66
14.	Sanitary latrine	179	59.66
15.	Kerosene stove	72	24.00
16.	Bio-gas	4	1.33

\*Multiple responses

#### 4.1.2.9 b Livestocks

It refers to the livestock possessed by rural women families for income generation by selling out products obtained from it like meat, milk, egg etc. or for agricultural production. The livestock possessed by rural women are presented in Table 4.4.

Table 4.4 reveals that majority of rural women (95.33%) possessed poultry followed by cows (92.00%), ducks (84.66%), goats (83.00%), piggery (40.66%) and buffalo (28.33%). Very less percentage of rural women (2.33 %) did not possess any livestock.

**Table 4.4. Distribution of rural women families according to their livestock possession**

N=300			
Sl. No.	Categories	Frequency	Percentage
1.	Cow	276	92.00
2.	Buffalo	85	28.33
3.	Goat	249	83.00
4.	Poultry	286	95.33
5.	Pig	122	40.66
6.	Duck	254	84.66
7.	No possession	7	2.33

\*Multiple responses

#### 4.1.2.9c Farm material

It refers to the materials possessed by rural families for utilization in farming operations. The farm material possessed by families of rural women is presented in Table 4.5. The table indicates that cent per cent of families of rural women possessed hoe and hand tools followed by bullock (87.00%), traditional plough (76.00 %), sprayer (13.66%), vermin- compost/ bio-compost unit (7.66 %), pump set (5.66 %), shallow tube well (5.66%), power tiller (5.33%) and duster (4.00%). The significant fact found in this study is that very negligible percentage of rural women families possessed improved plough (0.66 %), tractor and thresher (1.66 %). It is assumed that farming is

still tradition bound due to the less purchasing power of rural women families to buy improved agricultural machineries.

**Table 4.5. Distribution of rural women families according to their farm material possession** **N = 300**

Sl. No.	Categories	Frequency	Percentage
1.	Bullock	261	87.00
2.	Pump set	17	5.66
3.	Tractor	5	1.66
4.	Power tiller	16	5.33
5.	Traditional plough	228	76.00
6.	Hoe	300	100.00
7.	Improved plough	2	0.66
8.	Hand tools (sickle, khurpi, khanti, spade)	300	100.00
9.	Sprayer	41	13.66
10.	Duster	12	4.00
11.	Shallow tube well	17	5.66
12.	Vermi compost/ bio-compost unit	23	7.66
13.	Thresher	5	1.66

\*Multiple responses

#### **4.1.2.9d Transportation material**

It refers to the different types of vehicles possessed by the families of rural women meant for transporting goods or farm produce from home to farm or farm to home or another place or used by family members themselves to visit different places. The transportation facilities possessed by rural women families are presented in Table 4.6.













It was observed from Table 4.6 that 89.00 per cent of rural women families possessed cycle followed by 49.33 per cent two wheelers, 32.33 per cent hand cart, 3.00 per cent car and 1.33 per cent three wheeler. Very less percentage of rural women families (2.66%) possessed bullock cart and 5.66 per cent did not possess any transportation means.

#### **4.6. Distribution of rural women families according to their transportation**

<b>means possessed</b>		<b>N = 300</b>	
<b>Sl. No</b>	<b>Categories</b>	<b>Frequency</b>	<b>Percentage</b>
1.	Bullock cart	8	2.66
2.	Cycle	267	89.00
3.	Hand cart	97	32.33
4.	Two wheeler	148	49.33
5.	Three wheeler	4	1.33
6.	Four wheeler (car)	9	3.00
7.	No possessions	16	5.33

\*Multiple responses

#### **4.1.2.9e Communication media possession**

Communication media possession helps women in improving their communication skill, strengthening their capacity to mediate with external world and enhancing their knowledge about various aspects. Possession of media influences the socio-economic status of families also. The various communication media possessed by families of rural women are presented in Table 4.7.

Table 4.7 reveals that majority of rural women families (99.33%) possessed mobile phone followed by television and dish TV/ cable connection (54.66%), radio (23.64%), newspaper (14.33%), magazine (10.66%) and CD player (9.02%).

**Table 4.7. Distribution of rural women families according to their communication media possession** **N= 300**

<b>Sl. No.</b>	<b>Categories</b>	<b>Frequency</b>	<b>Percentage</b>
1	Radio	71	23.64
2	Television	164	54.66
3	Dish T.V./ cable connection	164	54.66
4	CD Player	27	9.02
5	Newspaper	43	14.33
6	Magazine	32	10.66
7	Mobile phone	298	99.33

\*Multiple responses

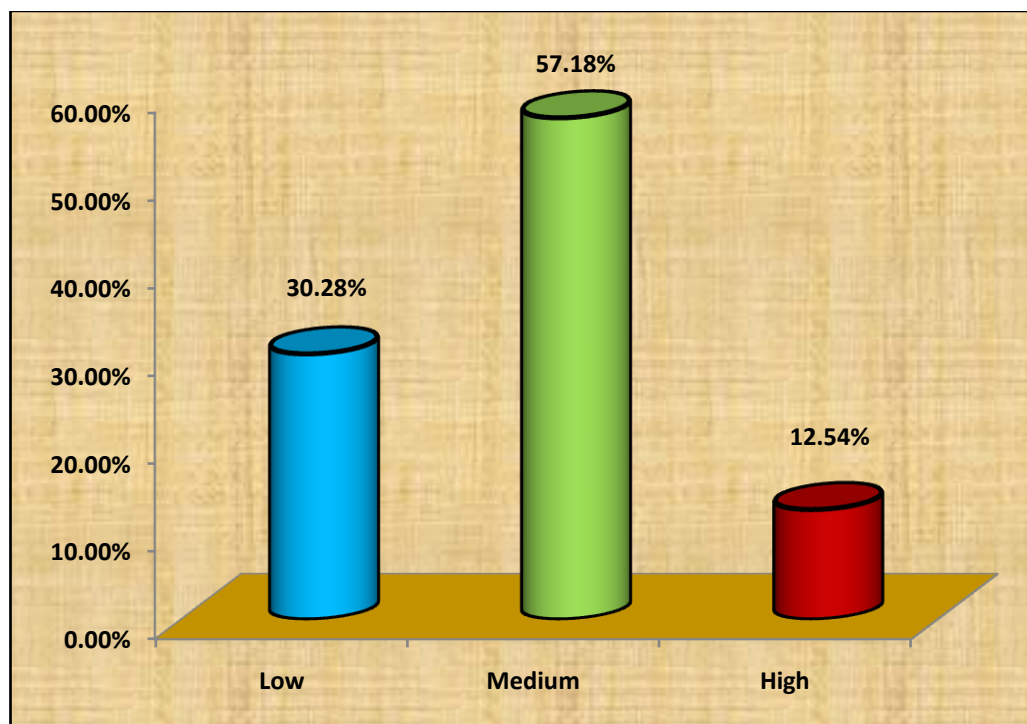
The significant finding is that mobile was the only media possessed by maximum number of rural women families which reflects their improved social status. So, mobile might be utilized by extension personnel to disseminate scientific information among rural women and provide up-to-date information about various intervention programmes on different agricultural aspects for rural women as the target group, scheduled to be organized by extension services.

#### **4.1.2.10 Socio-economic status of rural women**

All developmental programmes are planned on the basis of present socio-economic status of the rural families. So, this socio-economic status of families of rural women might be used by extension services and developmental agencies to plan programmes and policies targeting rural women for sustainable horticultural development.

The socio-economic status of rural women was classified as low, medium and high after quantifying the factors caste, education, occupation, family type and size, type of house, organizational membership, land holding and material possession and presented in Fig. 4.10. It was observed from Fig. 4.10 that majority of

rural women (57.18%) belonged to the medium socio-economic status, followed by 30.28 per cent belonged to the low socio-economic status and 12.54 per cent belonged to the high socio-economic status. These findings are in conformity with the findings of Devi (2000) and Bharali (2016).



**Fig. 4.10. Distribution of rural women according to their socio-economic status**

From the above Fig.4.10, it is assumed that majority of the rural women were not economically sound. Hence, due to economic hardship they might be compelled to engage in homestead gardening to generate additional income to fulfill the needs of their families as well as for household consumption by minimizing the expenditure level.

#### **4.1.2.11 Access to production resources**

Access to production resources such as land, water, variety of seeds, fund, fertilizer, pesticide and marketing facility enhances the participation and decision making ability of rural women related to production of horticultural crops and meet their some psychological needs like self esteem and confidence. Rural women's access to and control over various production resources such as land, irrigation, improved varieties of seeds etc. are presented from Table 4.8 to Table 4.14.

#### 4.1.2.11a Ownership of cultivated land

Table 4.8 shows the higher percentage of cultivated land (91%) was owned by husband followed by 7.00 per cent land was owned by family and a negligible 2.00 per cent of cultivated land was owned by farm women.

The prevailing pattern of land ownership could be due to socio-cultural or land tenure practices in the study areas. The patriarchal nature of the society denies women's right to ownership of land. Less land ownership has barred women to have access to other productive resources like fund, irrigation facility which affects their participation in agricultural production.

**Table 4.8. Distribution of rural women according to their ownership of cultivated land**  
N= 300

Ownership of land	Frequency	Percentage
Personally owned	6	2
Husband's land	273	91.00
Family land	21	7.00

#### 4.1.2.11b Sources of water for irrigating the crops

It refers to the various sources such as tube well, canal, river, pond and well, from where rural women get water for irrigating the crops in the homestead garden. The sources of water for irrigating crops are presented in Table 4.9. It is observed from Table 4.9 that majority of rural women (67.04%) had access of water for irrigation from tube well followed by 15.30 per cent from pond, 7.22 per cent from river, 5.30 percent from well and 5.14 per cent from canal, respectively.

**Table 4.9. Distribution of rural women according to their sources of irrigation**  
N= 300

Sources of irrigation	Frequency	Percentage
Tube well	201	67.04
Canal	14	5.14
River	23	7.22
Pond	46	15.30
Well	16	5.30

\*Multiple responses

#### 4.1.2.11c Sources of improved varieties of seeds

It refers to the various sources such as farm shop, neighbours, Govt. recognized seed farm, middleman etc. from where rural women get improved varieties of seeds of fruits and vegetable cultivation. Table 4.10 reveals the sources from which rural women had access to improved varieties of seeds of fruits and vegetable crops. It is observed from the table that majority 55 per cent of rural women had access to improved varieties of seed from farm shop followed by 42 per cent from middle men, 38 per cent from Govt. recognized seed farm, 36 per cent from ATMA office and 24.67 per cent from weekly market. The significant finding is that, a very negligible 2.33 per cent of rural women had availed seeds from Krishi Vigyan Kendra.

**Table 4.10. Distribution of rural women according to their sources of improved varieties of seeds** **N= 300**

Sources of improved varieties of seeds	Frequency	Percentage
Farm shop	165	55.00
Neighbours	22	7.34
Govt. recognized seed farm	114	38.00
Block office	9	3.00
Middle men	126	42.00
Weekly market	74	24.67
Krishi Vigyan Kendra	37	2.33
DAO and SDAO office	46	15.34
ATMA office	108	36.00

\*Multiple responses

#### 4.1.2.11d Sources of fund

One of the factors hindered rural women's participation in agricultural activities is their limited access to funds through government institutions. This problem

restricted their access to technology and demotivated them in adopting new ideas which could support their family income. But with the introduction of Self Help Groups and some microfinance institutions like Bandhan, rural women's access to fund had increased which can be seen from the Table 4.11.

It is observed from Table 4.11 that majority 83.72 per cent of rural women had access to fund from Self Help Groups followed by 74.66 per cent had from their own savings, 69.00 per cent from relatives, 67.00 per cent from neighbours, 48.34 per cent from the financial institution, Bandhan, 25.63 per cent from middlemen, 6.68 per cent from agricultural bank, NABARD, and a very negligible 2.00 per cent from cooperatives. Availing fund from SHG by majority of rural women might be due to their membership in SHGs and having less information about other sources of fund.

**Table 4.11. Distribution of rural women according to their sources of fund**

**N=300**

<b>Sources of fund</b>	<b>Frequency</b>	<b>Percentage</b>
Own savings	224	74.66
Financial institutions (Bandhan)	145	48.34
Self Help Group	251	83.72
Co-operatives	6	2.00
Agricultural banks	20	6.68
Relatives	207	69.00
Neighbours	201	67.00
Middle men	77	25.63

\*Multiple responses

#### **4.1.2.11e Sources of fertilizer**

The various sources from where rural women availed fertilizer are presented in Table 4.12. It is observed from the table that majority 93.02 per cent of rural women had bio-compost prepared at home and 28.65 per cent had cow dung and

animal litters obtained from their neighbour's house for application in the homestead garden. Further 89.33 per cent of rural women had access to inorganic fertilizer from farm shop and 55.31 per cent from open market. The interesting finding is that only 5.66 per cent of rural women did not use any fertilizer in their homestead gardens.

**Table 4.12. Distribution of rural women according to their sources of fertilizer**

**N= 300**

<b>Sources of fertilizer</b>	<b>Frequency</b>	<b>Percentage</b>
Open market	166	55.31
Govt. office	12	4.03
Farm shop	268	89.33
Bio-fertilizer from KVK	35	11.68
Middle men	42	14.00
Cowdung and animal litters from neighbours	86	28.65
Bio-compost of home	279	93.02
Do not use fertilizer	17	5.66

\*Multiple responses

#### **4.1.2.11f Sources of pesticides**

The different sources from where rural women had access to pesticides are presented in Table 4.13. It is evident from the table that 89.31 per cent of rural women had chemical pesticides obtained from farm shop followed by 74.34 per cent from open market and 36.35 per cent from State Agriculture Department. The significant finding is that 75.31 per cent of rural women had indigenous pesticides applied to the fruits and vegetable crops of their homestead garden and a very less 5.00 per cent of rural women had obtained bio-pesticides from Krishi Vigyan Kendras.

**Table 4.13. Distribution of rural women according to their sources of pesticides****N= 300**

<b>Sources of pesticides</b>	<b>Frequency</b>	<b>Percentage</b>
Farm shop	268	89.31
State Agriculture Dept.	109	36.35
Open market	223	74.34
Bio-pesticides from KVK	15	5.00
Indigenous pesticides	226	75.31
Do not use pesticides	36	12.02

\*Multiple responses

**4.1.2.11g Mode of marketing**

Marketing facility had influence on rural women's participation in horticultural activity. Good marketing facility motivates them to produce more and results in frequent monetary gain. The various modes of marketing adopted by rural women for selling their produce of homestead garden are presented in Table 4.14. It is observed from the table that majority of rural women (86.35%) had sold their produce through middlemen followed by 21.31 per cent through whole seller, 15.02 per cent through retailer and only 12.31 per cent of rural women did self marketing of their produce.

**Table 4.14. Distribution of rural women according to their mode of marketing****N= 300**

<b>Mode of marketing</b>	<b>Frequency</b>	<b>Percentage</b>
Wholesale	64	21.31
Retail	45	15.02
Product dispatched through middlemen at home	259	86.35
Self marketing	37	12.31

\*Multiple responses



#### 4.1.2.12 Contact with extension personnel

By contacting the extension personnel, rural women may gain knowledge and motivation for adoption of new ideas. An increased number of contacts with extension personnel enable rural women to bring clarity in her thinking and to take accurate decisions. The contacts of rural women with various extension personnel are presented in Table 4.15.

It is evident from the table that 24.00 per cent of rural women had frequent contact with Village Level Extension Worker followed by 11.66 per cent with Agricultural Extension Officer, 8.00 percent with Agricultural Development Officer, 7.33 per cent with ATMA officials, 3.67 per cent with Sub-divisional Agricultural Officer and a very negligible 1.67 per cent with NGO personnel. The significant finding is that majority of rural women had no contact with extension personnel excluding VLEW.

**Table 4.15. Distribution of rural women according to their contacts with extension personnel**  
N=300

Extension personnel	Frequently		Occasionally		Never	
	F	%	f	%	f	%
Village Level Extension Worker	72	24.00	184	61.40	44	14.60
Agricultural Extension Officer	35	11.66	56	18.66	209	69.66
Agricultural Development Officer	24	8.00	75	25.00	198	66.00
KVK personnel	--	--	42	14.00	258	86.00
Block officials	--	--	38	12.66	262	87.33
Sub-divisional Agricultural Officer	11	3.67	115	38.33	174	58.00
ATMA officials	22	7.33	109	36.31	169	56.33
NGO personnel	5	1.67	52	17.33	243	81.00

\*Multiple responses

This might be due to the fact that rural women are yet to be recognized as a prominent group in the work agenda of developmental agencies. So, they had less opportunity to have contacts with extension personnel. Besides this, too much household responsibilities hindered rural women's mobility to meet extension personnel to know about the package of practices available for better horticultural production.

#### 4.1.2.13 Sources of information

The sources from where rural women gathered information related to agricultural production are presented in Table 4.16. It is observed from the table that 24 percent of rural women had obtained information frequently from KVK personnel followed by 11.66 per cent from ATMA official and 7.33 per cent from relatives. The significant finding is that majority of rural women 95.00 per cent had not got any information from Internet, followed by 88.67 per cent from NGO personnel, 87.33 per cent from husband, 86.00 per cent from block officials, 81.00 percent from farm shop, 76.34 per cent from radio, 69.65 per cent from ATMA official and 66.00 per cent from SDAO and ADO.

**Table 4.16. Distribution of rural women according to their sources of information**

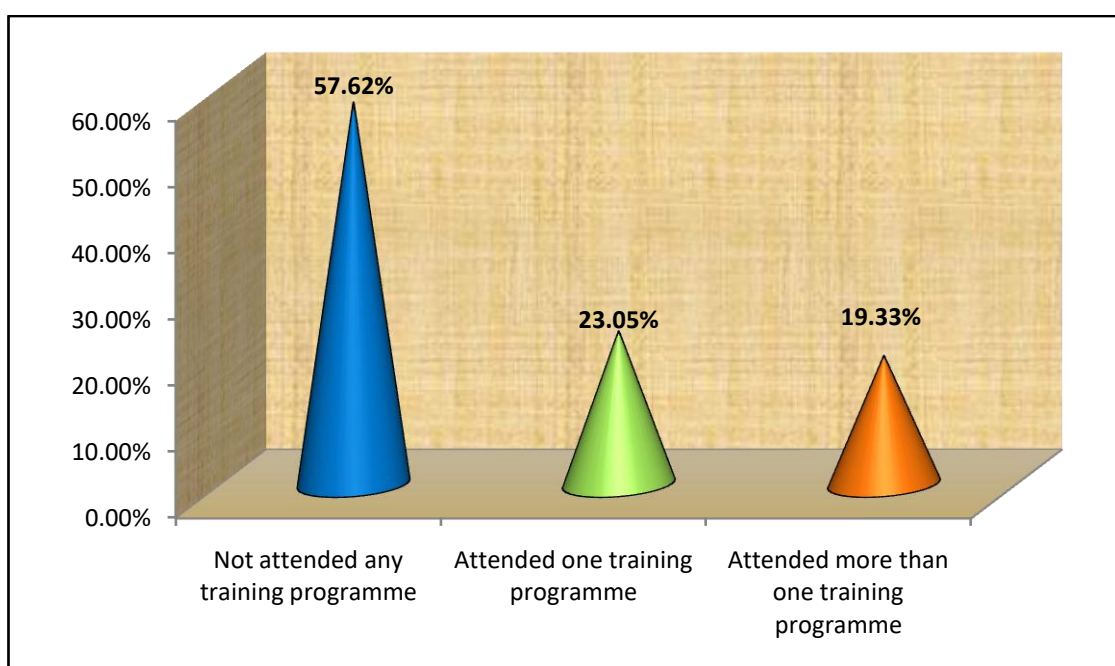
**N= 300**

Sources of information	Frequently		Occasionally		Never	
	f	%	f	%	f	%
KVK personnel	72	24.00	184	61.40	44	14.60
ATMA official	35	11.66	56	18.65	209	69.65
SDAO and ADO	24	8.00	75	25.00	198	66.00
Block official	--	--	42	14.00	258	86.00
Husband	--	--	38	12.67	262	87.33
Neighbours and friends	11	3.67	115	38.33	174	58.00
Relatives	22	7.33	109	36.31	169	56.33
Farm shop	5	1.67	52	17.33	243	81.00
NGO personnel	--	--	34	11.34	266	88.67
Television	136	45.33	28	9.34	136	45.33
Radio	25	8.31	46	15.32	229	76.34
Internet and mobile	3	1.02	12	4.01	285	95.00

\*Multiple responses

#### 4.1.2.14 Frequency of training programme attended by rural women

A training programme helps rural women in acquiring scientific knowledge and skills required for undertaking activities related to agricultural production. Besides this, trained and skilled rural women command higher socio-economic status in society than those who had not attended any training programme. The frequency of training programme on various areas attended by rural women is presented in Fig. 4.11. It reveals that majority of rural women 57.62 per cent had not attended any training programme followed by 23.05 per cent attended only one training programme and 19.33 per cent attended more than one training programme.



**Fig. 4.11. Distribution of rural women according to frequency of training programme attended by them**

It might be assumed from the data on frequency of training programme attended by rural women that there is urgent need of strengthening the social and institutional participation of rural women by organizing women oriented training programmes to increase their access to appropriate production technologies.

#### 4.1.2.15 Areas of training programme attended by rural women

The training programmes based on various areas of agricultural production attended by rural women are presented in Table 4.17. The table reveals that more than 60 per cent of rural women participated in training programme on piggery (85.03%) followed by poultry and duckery (81.89%), animal husbandry and dairying

(72.44%) and food processing and preservation (67.71%). It might be due to less risk of marketing of these products.

**Table 4.17. Distribution of rural women according to the areas of training programmes attended by them** **N= 127**

Sl. No.	Areas	f	%
1.	Homestead gardening	26	20.47
2.	Nursery raising	22	17.32
3.	Flouriculture	43	33.85
4.	Vermicomposting	38	29.92
5.	Mushroom cultivation	31	24.40
6.	Poultry farming	104	81.89
7.	Food processing and preservation	86	67.71
8.	Animal husbandry and dairying	92	72.44
9.	Piggery	108	85.03
10.	Duckery	104	81.89

\*Multiple responses

#### **4.1.2.16 Problems faced by rural women in attending training programmes**

The problems faced by rural women in attending training programmes organized by various Govt. and Non-Govt. organizations, are presented in Table 4.18. It is observed from the table that cent percent of rural women faced transport and communication problem followed by 93.00 per cent lack of time due to overburden of household works, 67.10 per cent lack of awareness about the programmes, 51.30 per cent lack of money, 37.03 per cent lack of interest on the aspect of the programmes and 21.23 per cent lack of time due to peak season of planting and harvesting of other crops, while attending training programmes.

This information might be useful for Govt. and Non-Govt. organizations in planning and organizing training programmes based on the availability of time of rural women and distance to the training venues from their houses.

**Table 4.18. Distribution of rural women according to problems faced by them while attending training programmes** **N= 300**

Sl. No.	Problems	f	%
1.	Transport and communication problem	300	100.00
2.	Lack of time due to overburden of household works	279	93.00
3.	Lack of money	153	51.30
4.	Lack of interest on the aspect of the programme	112	37.03
5.	Organising training programme during peak season of planting and harvesting of other crops	64	21.23
6.	Lack of awareness about the programme	201	67.10

\*Multiple responses

#### **4.1.2.17 Felt needs of rural women**

The objective of organizing any training programme is to develop the knowledge, skill of target group in specific areas where they can perform the functions effectively and efficiently. So for any training programme to be successful one, it must be based on the needs of the target group. The need is defined as the gap between what is and what ought to be. Considering the need areas, training should be organized systematically. The felt needs of rural women regarding training are presented in Table 4.19.

The table reveals that mode of marketing was ranked I with mean score 2.58. Rural women preferred this area because they might have faced this problem more due to lack of knowledge regarding it.

It is observed from the table that rural women ranked II to production practices with mean score 1.96 and rank III to seed selection and seed treatment with mean score 1.91. These might be due to the fact that they might have got less

opportunity to attend training program related to these aspects due to lack of time or unawareness which hindered their knowledge gain regarding these.

The table indicated that rural women ranked IV to nutrient management with mean score 1.89 and ranked V to plant protection measures with mean score 1.88. These might be due to their inability to solve their problems because of less contacts with extension personnel.

These findings might be very useful for Government and Non-Government organizations in future planning for organizing women oriented training programmes.

**Table 4.19. Felt needs of rural women**

**N= 300**

<b>Sl. No.</b>	<b>Areas</b>	<b>Mean score</b>	<b>Rank</b>
1.	Nursery raising practices	1.54	VIII
2.	Land preparation and planting	1.84	VI
3.	Seed selection and seed treatment	1.91	III
4.	Production practices	1.96	II
5.	Nutrient management	1.89	IV
6.	Plant protection measures	1.88	V
7.	Harvesting	1.47	IX
8.	Seed production	1.23	X
9.	Mode of marketing	1.98	I
10.	Testing of soil fertility	1.78	VII
11.	Fund advice	1.13	XI

#### **4.1.2.18 Mass media exposure**

Mass media exposure helps rural women in improving their communication skill to strengthen their capacity to contact and mediate with external world. Rural womens' exposure to mass media is presented in Table 4.20. It is observed from the table that rural women had poor exposure to various communication media. Majority of rural women (99.00%) had poor exposure of any study tour followed by 95.67 per cent were not watching educational films, 85.66 per cent were not reading newspaper, 85.00 per cent had never visited any exhibition, 82.00 percent were not

listening to agricultural programme on radio, 81.67 per cent were not reading farm publications and 79.33 per cent were not watching agricultural programmes on television. Further the Table 4.20 shows that a very less 18.33 per cent of rural women were reading farm publications such as leaflets, bulletins, folders etc. followed by 15.00 visited exhibition, 13.00 per cent were occasionally accessing mobile information, 10.33 per cent were listening to agriculture related programmes on radio, 9.34 per cent were reading newspaper, 9.34 per cent were watching agricultural programmes on television, 4.33 per cent were watching educational films and a very negligible 1.00 per cent of rural women had exposure to study tours occasionally. Further, the table reveals that less percentage of rural women (11.67%) were watching Television, 7.37 per cent listening to radio, 7.34 per cent accessing mobile and very less 5.00 per cent of rural women were reading newspaper frequently.

From the findings it can be concluded that due to over burden of household works, unawareness about agriculture related programmes, a large percentage of rural women had no access to various communication media.

**Table 4.20. Distribution of rural women according to their mass media exposure**

Mass media exposure	N=300					
	Frequently		Occasionally		Never	
	f	%	f	%	f	%
Radio						
(Listening agricultural programme)	23	7.67	31	10.33	246	82.00
Television	35	11.67	27	9.00	238	79.33
(Watching agricultural programme)						
Newspaper	15	5.00	28	9.34	257	85.66
Educational films	--	--	13	4.33	287	95.67
Farm publications	--	--	55	18.33	245	81.67
(Leaflets, booklets, folder etc.)						
Exhibitions	--	--	45	15.00	255	85.00
Study tours	--	--	3	1.00	297	99.00
Mobile	22	7.34	39	13.00	239	79.66

\*Multiple responses

#### 4.2.1.19 Types and varieties of horticultural crops grown in homestead garden

The types and varieties of horticultural crops grown in the homestead gardens are shown in Table 4.21. The table indicates that for cultivation of fruit crops majority of rural women (79.33%) preferred local varieties of seeds or plants followed by 7.00 per cent who preferred hybrid varieties. Further the table reveals that for cultivation of vegetable crops majority of rural women (90.33 %) preferred local varieties and 39.33 per cent preferred hybrid varieties.

**Table 4.21. Distribution of rural women according to types and varieties of horticultural crops grown in homestead garden N= 300**

Types of crops	Variety	F	%
Fruit crops	Local	238	79.33
	Hybrid	21	7.00
Vegetable crops	Local	271	90.33
	Hybrid	118	39.33

\*Multiple responses

## 4.2 Assessment of work profile of rural women of Assam engaged in homestead gardening for sustainable horticultural development

### 4.2.1 Participation of rural women in different activities related to cultivation of horticultural crops

The participation of rural women in different activities related to cultivation of horticultural crops is presented in Table 4.22.

It is evident from the Table 4.22 that majority of rural women (79.02%) participated independently in transplanting and planting followed by 66.00 per cent in weeding, 43.65 per cent in application of manure and fertilizer, 39.33 per cent in storing of harvested crops, 38.33 per cent in mulching and 37.66 per cent in preparation of organic manure. Further, the table indicates that 76.00 per cent of rural women participated jointly in seed cleaning followed by 73.00 per cent in seed storage, 72.00 per cent in seed collection from harvested crops, 68.33 per cent in cleaning of harvested crops, 64.00 per cent in grading of crops and 62.33 per cent in packaging. About 74.31 percent of rural women had no participation in fencing.

These findings are in conformity with the findings of Deka and Saikia (2002) and Lal and Khurana (2011). These studies show that women were mostly



involved in manually performed activities like weeding, transplanting and post harvest activities which needed more labour and care while performing.

**Table 4.22. Distribution of rural women according to their participation in different activities related to cultivation of horticultural crops**

**N=300**

Sl. No.	Activities	Types of participation					
		Independent participation		Joint participation		No participation	
		f	%	f	%	f	%
1.	Fencing	6	2.02	71	23.67	223	74.31
2.	Land preparation	22	7.34	131	43.66	147	49.00
3.	Layout of plots	19	6.34	143	47.67	138	46.00
4.	Buying of seeds	32	10.66	105	35.00	163	54.33
5.	Seed treatment	45	15.00	142	47.33	113	37.66
6.	Sowing of seed and nursery raising	38	12.64	150	50.00	112	37.34
7.	Transplanting and planting	237	79.02	63	21.00	---	---
8.	Inter-culture operations						
	(i) Irrigation	73	24.33	159	53.00	68	22.67
	(ii) Weeding	198	66.00	102	34.00	---	---
	(iii) Earthing up	107	35.67	135	45.00	58	19.33
	(iv) Mulching	115	38.33	124	41.33	61	20.33
	(v) Drainage	76	25.34	116	38.67	108	36.00
	(vi) Pruning	111	37.00	136	45.32	53	17.67
	(vii) Stacking	92	30.65	129	43.00	79	26.36
9.	Preparation of organic manure	113	37.66	175	58.00	12	4.00
10.	Application of manure and fertilizer	131	43.65	154	51.33	15	5.02
11.	Plant protection measures	102	34.00	137	45.66	61	20.33
12.	Harvesting	104	34.67	172	57.33	24	8.00











Sl. No.	Activities	Types of participation					
		Independent participation		Joint participation		No participation	
		f	%	f	%	f	%
13.	Cleaning of harvested crops	95	31.66	205	68.33	--	--
14.	Grading of crops for marketing	108	36.00	192	64.00	--	--
15.	Storing of graded crops	118	39.33	182	60.66	--	--
16.	Packaging	93	31.00	184	61.33	23	7.66
17.	Marketing	68	22.67	39	13.00	193	64.33
18.	Seed collection from harvested crops	66	22.00	216	72.00	18	6.00
19.	Seed cleaning	61	20.33	228	76.00	11	3.67
20.	Seed storage	81	27.00	219	73.00	--	--

#### 4.2.2 Participation of rural women in household activities

The participation of rural women in household activities is presented in Table 4.23. It is evident from the table that majority of rural women participated independently in weaving (69.67%), cooking (65.66%), farm related activities (58.74%), taking care of children /elders (57.02%) and knitting (51.66%). Further the Table 4.23 reveals that 50.63 per cent of rural women jointly participated in cooking for festivals and special occasions, 47.63 per cent in carrying food to farm, 43.06 per cent in cleaning of house, 39.80 per cent in collection of fuel wood and 38.03 per cent in washing of clothes. In case of livestock management activities, 73.66 per cent of rural women participated independently in selling of milk or eggs and 61.33 per cent in preparing feed and feeding of animals.

It indicates that majority of rural women participated in household activities either independently or jointly which were very laborious and time consuming. So, extension planners and policy makers should pay attention to all activities performed by women including household activities while planning programmes and policies for them. Development of women friendly low cost homestead

technology is a present need which can save time and energy of rural women in day to day life so that, they can concentrate on other productive activities including attending training programmes.

**Table 4.23. Distribution of rural women according to their participation in household activities** **N=300**

Sl. No.	Activities	Types and extent of participation					
		Independent participation		Joint participation		No participation	
		f	%	f	%	f	%
<b>(a)</b>	<b>Main household activities</b>						
1.	Cooking	197	65.66	82	27.33	21	7.00
2.	Collection of fuel wood	99	32.90	119	39.80	82	27.30
3.	Carrying food to farm	63	21.04	143	47.63	94	31.33
4.	Fetching of water	82	27.01	113	37.34	107	35.65
5.	Cleaning the house (brooming and mopping)	107	36.70	131	43.06	62	20.24
6.	Washing of clothes	154	51.30	114	38.03	32	10.67
7.	Taking care of children and elders	171	57.02	95	31.65	34	11.33
8.	Processing of food	81	26.00	104	35.00	117	39.00
9.	Preservation of fruits and vegetables	123	41.00	66	22.00	111	37.00
10.	Cooking for festivals and special occasions	62	20.67	152	50.63	86	28.70
11.	Mending and renovations of clothes	107	35.54	128	42.46	65	22.00
12.	Tailoring	54	17.98	96	32.02	150	50.00
13.	Weaving	209	69.67	42	14.00	49	16.33
14.	Knitting	155	51.66	61	20.32	84	28.02
15.	Farm related activities	176	58.74	101	33.60	23	7.66





















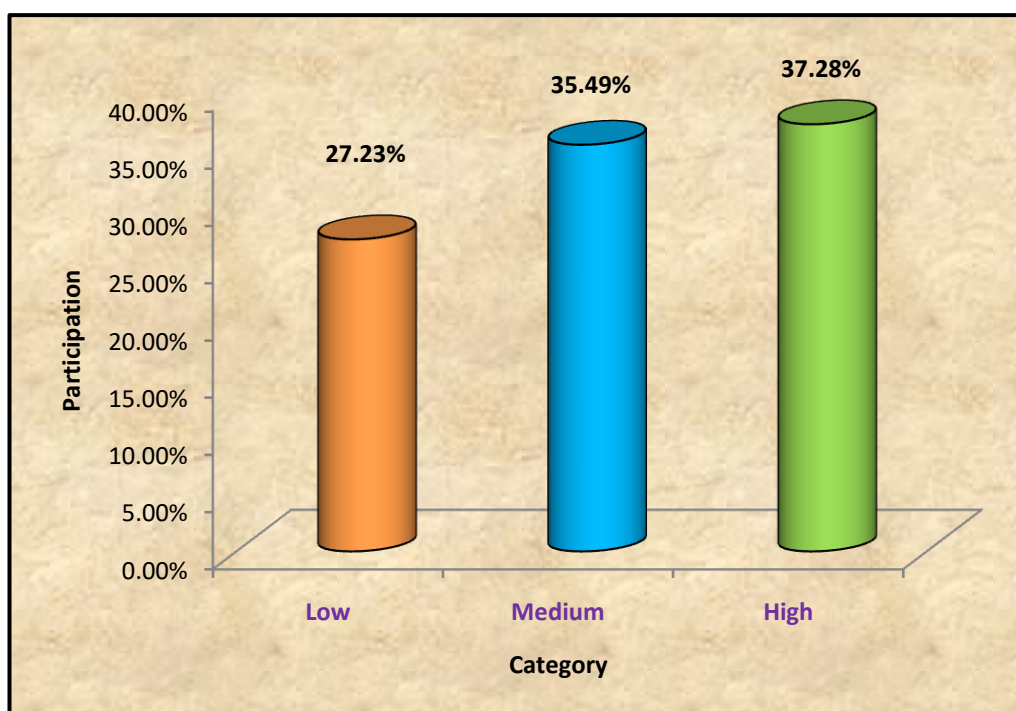




Sl. No.	Activities	Types and extent of participation					
		Independent participation		Joint participation		No participation	
		f	%	f	%	f	%
(b)	Livestock management activities						
1.	Collection of fodder	84	28.00	209	69.67	7	2.34
2.	Preparing feed and feeding of animals	184	61.33	109	36.34	7	2.34
3.	Care of animals	93	31.00	200	66.67	7	2.34
4.	Cleaning of animal shed	68	22.67	225	75.00	7	2.34
5.	Taking care of sick animals	108	36.00	185	61.66	7	2.34
6.	Grazing of animals	125	41.65	168	56.00	7	2.34
7.	Milking of animals	114	38.00	179	59.66	7	2.34
8.	Selling of milk/ eggs	221	73.66	72	24.00	7	2.34

#### 4.2.3 Overall participation of rural women in different horticultural and household activities

The overall participation of rural women in different horticultural and household activities is presented in Fig. 4.12. The Figure indicates that 37.28 per cent of rural women had high level of participation followed by 35.49 per cent had medium level of participation and 27.23 per cent had low level of participation in horticultural and household activities. These findings are in line with the findings of Ghosh and Ghosh (2014) and Tripathi *et al.* (2015) which reported that majority of labour intensive and unmechanized works were performed by women.



**Fig. 4.12. Overall participation of rural women in different horticultural and household activities**

#### **4.2.4 Relationship between participation of rural women in different horticultural and household activities and selected independent variables**

Table 4.24 reveals that marital status and family size were significantly and positively related with the participation of rural women in different horticultural activities at 0.01 level. The table indicates that age, caste, educational qualification, size of land holding, occupation of head of the family, organizational membership, contact with extension personnel and mass media exposure had no significant relationship with participation of rural women in different horticultural and household activities.

**Table 4.24. Relationship between participation of rural women in different horticultural and household activities and selected independent variables**

N=300			
Sl. No.	Variables	'r' value	't' value
1	Age	-0.090	0.118
2.	Marital status	0.266**	0.255
3.	Caste	-0.019	0.146
4.	Educational qualification	0.024	0.079
5.	Family size	0.445**	0.001
6.	Size of land holding	-0.001	0.091
7.	Occupation of head of the family	0.068	0.244
8.	Organizational membership	0.018	0.059
9.	Contact with extension personnel	-0.002	0.069
10.	Mass media exposure	0.079	0.172

\*\*Correlation is highly significant at the 0.01 level (2-tailed)

#### **4.2.5 Decision making pattern of rural women in different activities of cultivation of horticultural crops**

Table 4.25 reveals the decision making pattern of rural women in different activities of cultivation of horticultural crops. It is indicated from the table that majority of rural women (74.67%) took independent decision in amount of produce to be kept for consumption followed by 45.00 per cent in amount of produce to be kept for sale, 44.00 per cent in transplanting, 40.33 per cent in pruning and 39.67 per cent in training.

It is interesting to note that majority of rural women (72.66%) took joint decision in weeding followed by 69.00 per cent in marketing, 67.67 per cent in preparation of organic manure, 66.34 per cent in irrigation, 65.00 per cent in seed sowing, 62.00 percent in cleaning of seeds and 60.33 per cent in nursery raising.

Furthermore it appears from the Table 4.25 that 83.01 per cent of rural women had no decision in desuckering followed by 78.66 per cent in green manuring and 74.33 per cent in land preparation. These findings are in line with the findings of Mishra *et al.* (2009) and Kaur and Mavi (2015).

Majority of rural women took joint decisions in horticultural activities which signifies their prominent role in decision making process and extension organization can organize training and capacity building programmes to make these women the key decision makers in these areas of horticultural production.

**Table 4.25. Distribution of rural women according to their decision making pattern in different activities of cultivation of horticultural crops**

**N= 300**

Sl. No.	Activities	Decision making pattern					
		Independent decision		Joint decision		No decision	
		f	%	f	%	f	%
1.	Land preparation	6	2.00	71	23.67	223	74.33
2.	Plot selection	22	7.33	131	43.65	147	49.02
3.	Layout of plots (size and design)	19	6.32	143	47.34	138	46.34
4.	Employment of hired labour	32	10.67	105	35.00	163	54.33
5.	Cropping pattern	45	15.00	142	47.33	113	37.67
6.	Intercropping pattern	38	12.64	156	52.00	106	35.36
7.	Buying of seeds	57	19.00	142	47.33	101	33.67
8.	Seed treatment	54	18.01	154	51.33	92	30.66
9.	Seed sowing	81	27.00	195	65.00	24	8.00
10.	Nursery raising	96	32.00	181	60.33	23	7.67
11.	Transplanting	132	44.00	168	56.00	--	--
12.	Planting	77	25.67	174	58.00	48	16.00

Sl. No.	Activities	Decision making pattern					
		Independent decision		Joint decision		No decision	
		f	%	f	%	f	%
13.	Inter-culture operations						
	(i) Irrigation	83	29.33	204	66.34	13	4.33
	(ii) Weeding	61	20.33	218	72.66	21	7.01
	(iii) Earthing up	96	32.00	153	51.00	51	17.00
	(iv) Mulching	106	35.33	129	43.00	65	21.67
	(v) Drainage	75	25.00	113	37.66	112	37.34
	(vi) Pruning	121	40.33	136	45.33	43	14.33
	(vii) Training	119	39.67	147	49.00	34	11.33
	(viii) Desuckering	13	4.33	38	12.66	249	83.01
	(ix) Green manuring	23	7.67	41	13.67	236	78.66
	(x) Grafting	69	23.01	128	42.66	103	34.33
14.	Nutritional management (inorganic)	62	20.67	166	55.33	72	24.00
15.	Preparation of organic manure	76	25.33	203	67.67	21	7.00
16.	Harvesting	84	28.00	176	58.66	40	13.34
17.	Grading	124	41.33	169	56.33	7	2.34
18.	Amount of produce to be kept for sale	135	45.00	106	35.33	59	19.67
19.	Amount of produce to be kept for consumption	224	74.67	36	12.00	40	13.33
20.	Price fixation of the produce	91	30.34	165	55.00	44	14.66
21.	Cleaning of seeds	87	29.00	186	62.00	27	9.00
22.	Storage of seeds	97	32.31	174	58.04	29	9.65
23.	Marketing	68	22.67	207	69.00	25	8.33

#### 4.2.6 Decision making pattern of rural women in household activities

Table 4.26 reveals the decision making pattern of rural women in household activities. It is indicated from the table that 73.64 per cent of women took independent decision in production and sale of woven material followed by 37.00 per cent in buying food items for family members and 32.62 per cent in feeding of animals.

The table further reveals that majority of rural women (69.00%) took joint decision in maintenance of house followed by 63.67 per cent in social activities, 61.67 per cent in medical treatment of sick family members, 59.33 in saving of money, 55.00 per cent in buying clothes for family members, 54.35 percent in marriage for children and 54.00 per cent in purchase or sale of animals. These findings are in accordance with the findings of Antwal *et al.* (2005) and Roy and Kadian (2015).

**Table 4.26. Distribution of rural women according to their decision making pattern in household activities** **N= 300**

Sl. No.	Activities	Decision making pattern							
		Independent decision		Joint decision		No decision			
		f	%	f	%	f	%		
(a)	Main household activities								
1.	Buying food items for family members	111	37.00	129	43.00	60	20.00		
2.	Children’s education	81	27.00	102	34.00	117	39.00		
3.	Buying clothes for family members	93	31.00	165	55.00	42	14.00		
4.	Purchase of household items	52	17.34	150	50.00	98	32.66		
5.	Maintenance of house	39	13.00	207	69.00	54	18.00		
6.	Saving of money	57	19.00	178	59.33	65	21.67		
7.	Medical treatment of sick family member or relative	78	26.00	185	61.67	37	12.33		
8.	Marriage for children	35	11.65	163	54.35	102	34.00		
9.	Processing and preservation of food	73	24.33	116	38.66	111	37.01		
10.	Social activities	45	15.00	191	63.67	64	21.33		

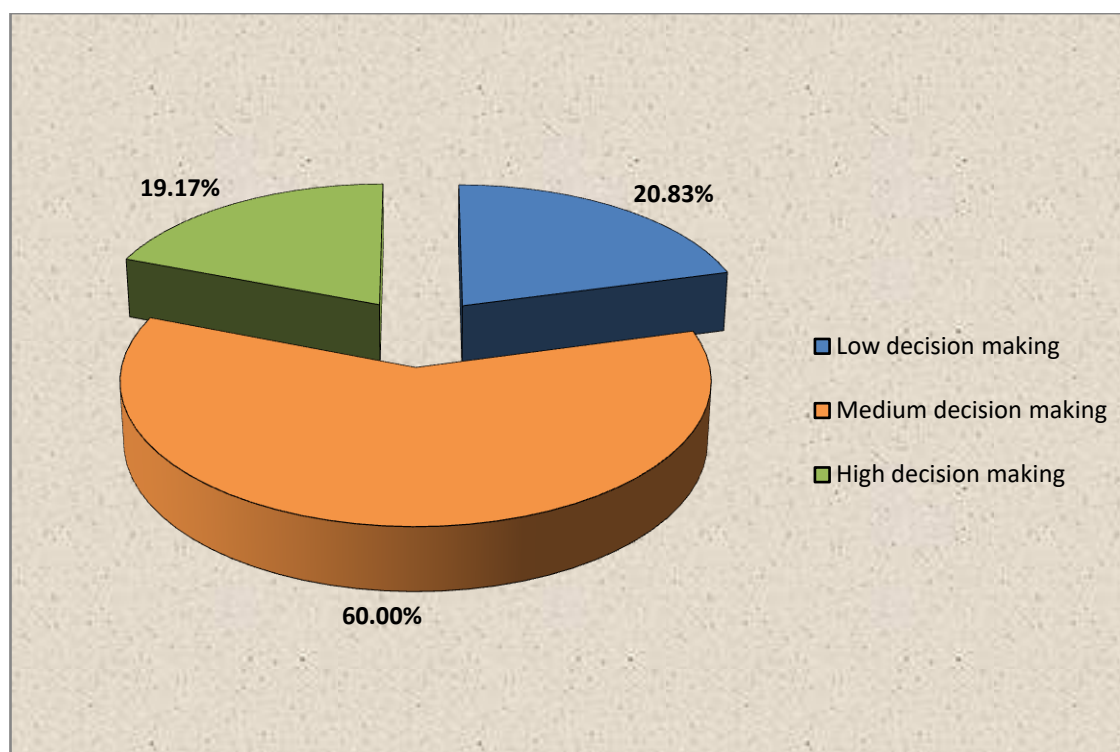


Sl. No.	Activities	Decision making pattern					
		Independent decision		Joint decision		No decision	
		f	%	f	%	f	%
11.	Production and sale of woven material or stitched garments	221	73.64	46	15.34	33	11.02
<b>(b) Livestock activities</b>							
1.	Purchase or sale of animals	97	32.33	162	54.00	41	13.67
2.	Sale of produce (meat, milk, egg etc.)	63	21.00	159	53.00	78	26.00
3.	Veterinary care of sick animals	58	19.33	148	49.33	94	31.34
4.	Purchase of fodder	98	32.66	157	52.34	45	15.00
5.	Feeding of animals	104	34.62	131	43.68	65	21.70

#### 4.2.7 Overall decision making pattern of rural women in both horticultural and household activities

The overall decision making pattern of rural women in horticultural and household activities is presented in Fig. 4.13. The figure reveals that 60.00 per cent of rural women had medium level of decision making followed by 20.83 per cent had low level of decision making and 19.17 per cent had high level of decision making.

It can be perceived that though men were the key decision makers in matters related to horticultural production, women were the key decision makers or joint decision makers in household and livestock related matters. So extension organizations may provide opportunity to rural women to be the key decision makers in horticultural activities by including them as one of their clientele groups of their training programmes.



**Fig. 4.13. Overall decision making pattern of rural women in horticultural and household activities**

#### **4.2.8 Relationship between decision making pattern of rural women in different horticultural and household activities and selected independent variables**

The relationship between decision making pattern of rural women in selected horticultural and household activities and selected independent variable is presented in Table 4.27. The table reveals that contacts with extension personnel was significantly and positively related to the decision making pattern of rural women in selected horticultural and household activities at 0.05 level and mass media exposure was significantly and positively related to the decision making pattern of rural women in selected horticultural and household activities at 0.01 level. The table indicated that there is no significant relationship of age, marital status, caste, educational qualification, family size, size of land holding, occupation of head of the family and organizational membership with the decision making pattern of rural women in selected horticultural and household activities.

**Table 4.27. Relationship between decision making pattern of rural women in different horticultural and household activities and selected independent variables** **N=300**

Sl. No.	Variables	'r' value	't' value
1	Age	0.039	1.36
2.	Marital status	0.055	1.56
3.	Caste	0.051	1.78
4.	Educational qualification	0.150	2.29
5.	Family size	0.127	1.42
6.	Size of land holding	0.119	1.15
7.	Occupation of head of the family	0.078	0.12
8.	Organizational membership	0.018	3.41
9.	Contact with extension personnel	0.624*	2.21
10.	Mass media exposure	0.394**	2.36

\* Correlation is significant at the 0.05 level (2-tailed)

\*\* Correlation is highly significant at the 0.01 level (2-tailed)

#### **4.2.9 Time utilization pattern of rural women**

Rural women contribute considerably to household income through engaging for greater number of hours in both agricultural and household activities. The average time utilization pattern of rural women is presented in Table 4.28. This indicates that rural women spent an average 4.20 hours daily on farm related activities followed by 3.22 hours on kitchen works, 1.62 hours on household works like cleaning, mopping, washing clothes etc. and 1.32 hours on entrepreneurial activities like weaving, knitting etc. These findings are in conformity with the findings of Kanwar *et al.* (2003), Kumar *et al.* (2011) and Bellurkar *et al.* (2016).

It is seen that majority of the rural women were burdened with double workloads of agricultural and household activities. These activities take the whole day period of rural women because they rarely had access to labour saving gender specific farm and homestead technologies. So, they could not devote their valuable time to

capacity building programmes organized for them by different Govt. and Non-govt. organizations.

**Table 4.28. Time utilization pattern of rural women**

**N=300**

<b>Sl. No.</b>	<b>Type of work</b>	<b>Mean</b>
1.	Kitchen work	3hr 22min
2.	Collection of fuel wood	1 hr 5 min
3.	Care of children and elderly	1 hr 25 min
4.	Personal care	1hr 15 min
5.	Household works like cleaning, mopping, washing cloths etc.	1hr 62min
6.	Fetching water	38 min
7.	Care of animals	55 min
8.	Religious activities	42 min
9.	Entrepreneurial activities like weaving, knitting, food processing and preservation etc.	1 hr 32 min
10.	Social visits	28 min
11.	Reading, watching TV and other leisure activities	1hr 10 min
12.	Farm related activities	4hr 20min
13.	Unaccounted time + sleeping	8hr 32 min

#### **4.2.10 Problems faced by rural women in different activities of cultivation of horticultural crops**

Rural women may have different problems such as infrastructural, physiological, economical, educational and technological, socio-psychological and environmental problems even within the same village, due to difference in their economic status. The ranking of problems faced by rural women in different activities of cultivation of horticultural crops are presented in Table 4.29.

It is observed from the Table 4.29 that regarding infrastructural problems faced by rural women, lack of irrigation facility, lack of market place and lack of

transportation facility to the market were ranked I, II and III with mean score 2.21, 1.82 and 1.79, respectively.

Further, it is observed from Table 4.29 that in case of physiological problems, growth retardation due to higher rate of weed growth, attack on crops by pests and diseases and poor production due to lack of availability of good variety seed are ranked I, II and III with mean score 2.55, 2.02 and 1.96, respectively.

High cost of labour, lack of provision of subsidy and high cost of other production resources are ranked I, II and III with mean score 2.03, 1.84 and 1.72, respectively among economical problem faced by rural women. These findings are in conformity with the findings of Rathod and Rathod (2016).

Regarding educational and technological problems, lack of proper training, lack of women friendly technology and lack of skill about improved scientific methods are ranked I, II and III with mean score 2.17, 1.95 and 1.80, respectively. These findings are in line with the findings of Mikalista (2010).

Among socio-psychological problems faced by rural women, household workload, lack of contact with extension personnel and lack of self-confidence are ranked I, II and III with mean score 2.56, 1.87 and 1.84 respectively and among other problems natural calamities, health hazards and high perishability of fruits and vegetables are ranked as I, II and III with mean score 2.06, 1.76 and 1.52 respectively. These findings are in accordance with the findings of Badodia *et al.* (2013)

**Table 4.29. Ranking of problems faced by rural women in different activities of cultivation of horticultural crops**  
N=300

Sl. No.	Problem area	Mean Score	Rank
<b>(a) Infrastructural problems:</b>			
1	Less amount of cultivated land	1.32	IV
2	Lack of irrigation facility	<b>2.21</b>	<b>I</b>
3	Problematic soil	1.20	V
4	Lack of transportation facility to the market	1.79	III
5	Lack of market place	1.82	II

Sl. No.	Problem area	Mean Score	Rank
<b>(b) Physiological problems:</b>			
1	Attack on crops by pests and diseases	2.02	II
2	Occurrence of nutritional deficiency diseases in plants	1.89	IV
3	Growth retardation due to higher rate of weed growth in field	<b>2.55</b>	<b>I</b>
4	Poor production due to lack of availability of good variety seed	1.96	III
5	Non-availability of HYV seeds	1.68	V
<b>(c) Economical problems:</b>			
1	Too much expensiveness of fertilizers/ chemicals	1.20	V
2	Lack of money for cultivation	1.42	IV
3	Lack of provision of subsidy	1.84	II
4	High cost of other production resources	1.72	III
5	High cost of labour	<b>2.03</b>	<b>I</b>
<b>(d) Educational and technological problems:</b>			
1	Lack of proper training	<b>2.17</b>	<b>I</b>
2	Lack of knowledge about post harvest technology	1.62	IV
3	Poor educational status of women farmer	1.54	V
4	Lack of farm women friendly technology	1.95	II
5	Lack of skill about improved scientific methods of cultivation	1.80	III
<b>(e) Socio-psychological problems:</b>			
1	Lack of involvement in decision making	1.68	V
2	Household work overload	<b>2.56</b>	<b>I</b>
3	Lack of contact with extension personnel	1.87	II
4	Not getting permission to attend training programme conducted by male person	1.23	VI
5	Lack of self-confidence	1.84	III
6	Lack of support, cooperation from family members	1.19	VIII
7	Male dominated society	1.80	IV



Sl. No.	Problem area	Mean Score	Rank
(f)	<b>Other problems:</b>		
1	Natural calamities (flood, drought, heavy rainfall etc.)	<b>2.06</b>	<b>I</b>
2	Loss due to animals like goat, pig and birds etc.	1.03	IV
3	High perishability of fruits and vegetables.	1.52	III
4.	Health hazards like skin and eye irritation, poisoning due to coming in contact with insecticides, pesticides, body ache and tiredness due to labourious works, biting of insects while doing various operations like weeding, transplanting etc.	1.76	II

So, extension organization may consider these problems in planning programmes and policies for knowledge and skill development of rural women through intervention programmes which may be more interesting to learn for them as these will be based on their needs.

#### **4.3 Identification of existing knowledge of rural women about recommended production technologies of horticultural crops**

Knowledge is one of the important components of behavior and plays an important part in covert or overt behavior of an individual. So, the extent of knowledge possessed by rural women might produce changes in their role behaviour and decision making pattern in different activities related to cultivation of horticultural crops.

##### **4.3.1 Existing knowledge of rural women in seven aspects of production technologies of horticultural crops**

In the present study the seven aspects of production technologies of horticultural crops which were scientifically validated and recommended by the concerned scientists were selected for identification of existing knowledge level of rural women is presented in Table 4.30



**Table 4.30. Distribution of rural women according to their existing knowledge on seven aspects of production technologies of horticultural crops**

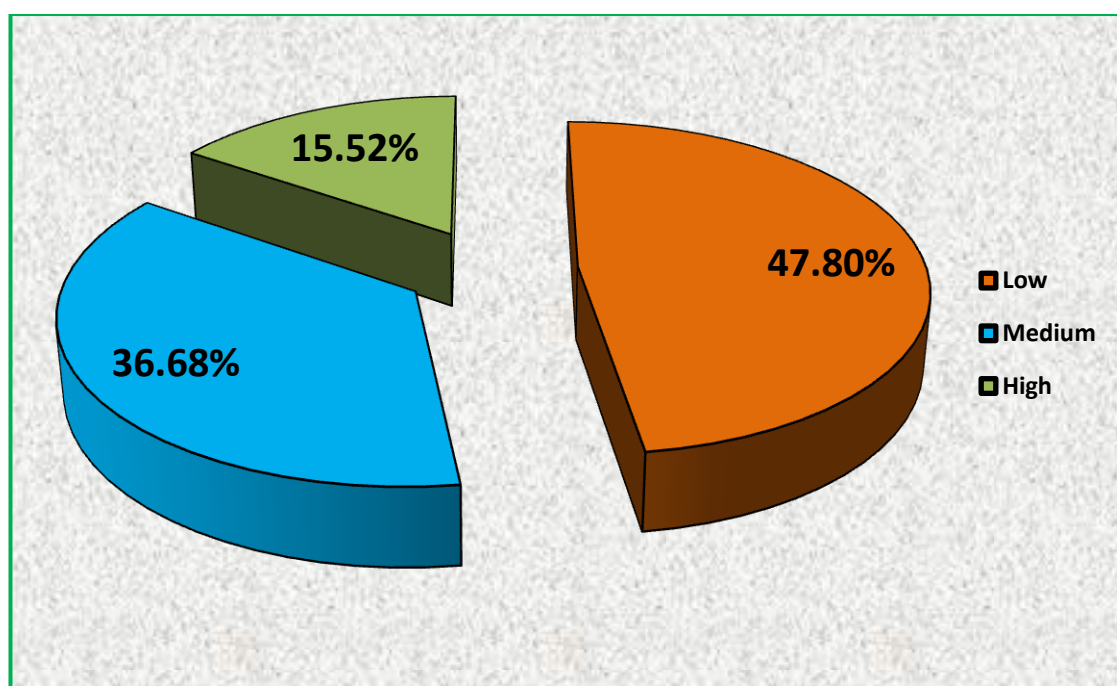
N= 300				
S. No.	Aspects	Category	Frequency	Percentage
1	Nursery raising practices	Low < 12.29	229	76.30
		Medium 12.29 to 18.22	42	14.00
		High > 18.22	29	9.70
2	Land preparation and planting	Low < 13.63	201	67.00
		Medium 13.63 to 17.65	56	18.70
		High > 17.65	43	14.30
3	Production practices	Low < 12.11	240	80.00
		Medium 12.11 to 16.04	46	15.30
		High > 16.04	14	4.70
4	Nutrient management	Low < 12.58	40	13.30
		Medium 12.58 to 17.51	185	61.70
		High > 17.51	75	25.00
5	Plant protection	Low < 13.24	158	52.70
		Medium 13.24 to 16.00	83	27.70
		High > 16.00	59	19.60
6	Harvesting	Low < 17.02	58	19.30
		Medium 17.02 to 23.35	208	69.40
		High > 23.35	34	11.30
7	Seed production	Low < 14.17	78	26.00
		Medium 14.17 to 17.91	150	50.00
		High > 17.91	72	24.00

From the above Table 4.30, it is revealed that majority of rural women had low level of knowledge on production practices (80.00%), nursery raising (76.30%), land production (67.00%), and plant protection (52.70%). It indicates that these are the important areas in which the rural women felt lack of confidence and inadequacy of knowledge to perform these operations effectively. This might be due to

negligence of involving rural women in agricultural trainings. The extension functionaries perceived that the above activities could not be performed by the rural women. On the other hand nearly 50.00 per cent rural women had medium level of knowledge on harvesting (69.40%), nutrient management (61.70%) and seed production (50.00%) where training is not immediately required.

#### **4.3.2. Overall existing knowledge level of rural women about recommended production technologies of horticultural crops**

The overall picture of the knowledge level of rural women reveals that less than fifty percent of the rural women had low level of knowledge about scientifically recommended production technologies of horticultural crops (47.80%) followed by 36.68 per cent had medium knowledge and only 15.52 percent had high level of knowledge (Fig. 4.14). This might be due to non recognition of women farmers as full fledged farmers for which they were deprived of receiving need based extension services.



**Fig. 4.14. Overall existing knowledge level of rural women about recommended production technologies of horticultural crops**

Thus it can be concluded that there is an immediate need for providing both formal and non formal educational opportunity to rural women. Simultaneously, a well planned extension service should be created specifically for rural women to raise their standard of knowledge and skill for effectively performing their role in production of horticultural crops. Extension services should be planned in such a way so that they can easily access it. KVK, farmers training centers etc. should give primary importance to rural women and consider them as full fledged farmers in production of horticultural crops.

#### **4.3.3 Relationship between knowledge of rural women and selected independent variables**

The relationship between knowledge of rural women and selected independent variables is presented in Table 4.31. The table reveals that age, educational qualification, occupation of head of the family, organizational membership and mass media exposure were significantly and positively significant at 0.01 level. There is no significant relationship between knowledge of rural women and marital status, caste, family size, size of land holding and contact with extension personnel.

It is a fact that aged rural women were much more experienced and had better exposure to new innovations of scientific information. Again from the table it is observed that the relationship between the education and knowledge was also positively significant. It is known that the formal education widens the horizon of knowledge of an individual as educated rural women can gather information by engaging themselves to various sources. Moreover, rural womens' membership in any organization and exposure to mass media help the extension personnel in changing the personal and technological behavior of rural women.

**Table 4.31. Relationship between knowledge of rural women and selected independent variables** **N=300**

<b>Sl. No.</b>	<b>Independent variable</b>	<b>‘r’ value</b>	<b>‘t’ value</b>
1.	Age	0.351**	0.001
2.	Marital status	-0.020	0.734
3.	Caste	0.015	0.792
4.	Educational qualification	0.542**	0.012
5.	Family size	-0.002	0.180
6.	Land holding	-0.045	0.436
7.	Occupation of the head of the family	0.319**	0.002
8.	Organizational membership	0.269**	0.024
9.	Contact with extension personnel	-0.074	0.203
10.	Mass media exposure	0.304**	0.045

\*\*Correlation is highly significant at the 0.01 level

#### **4.4. Building the capacity of rural women in homestead garden through intervention programme for sustainable horticultural development**

##### **4.4.1 Steps taken for intervention programme to see the changes of increasing the knowledge**

Based on the need of the training identified from the present research study, five days duration of trainings were organized for increasing the knowledge of rural women regarding various aspects of production technologies of horticultural crops by College of Home Science, Assam Agricultural University, Jorhat in collaboration with Office of the Sub-Divisional Agricultural Officer, Nazira sub-division, Sivasagar, in the month of November, 2016 so that they can apply these knowledge in near future















(Plate 54, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66 and 68). The identified trainings areas were nursery raising practices, land preparation and planting, production practices, nutrient management, plant protection, harvesting and seed production.

Initially a pre knowledge test was conducted to see the existing knowledge of rural women about production technologies of horticultural crops. Simultaneously, a post knowledge test was introduced after completion of each training to see the effectiveness of the training programme (Plate 55 and 67).

**Table 4.32. Differential knowledge score of rural women before and after training**

**N= 25**

Sl. No.	Aspects	Knowledge score (before training)	Knowledge score (after training)	Knowledge score (after one month of training)	Differential knowledge score		Rank on retention of knowledge
					Knowledge gained	Knowledge retained (after one month of training)	
1.	Nursery raising practices	380	678	600	298	220	V
2.	Land preparation and planting	379	657	609	278	<b>230</b>	<b>III</b>
3.	Production practices	419	688	640	269	221	IV
4.	Nutrient Management	373	689	631	316	<b>258</b>	<b>II</b>
5.	Plant protection	376	694	648	318	<b>272</b>	<b>I</b>
6.	Harvesting	530	696	667	166	137	VII
7.	Seed production	437	643	594	206	157	VI

Further to see the retention of the information given to the rural women, a post knowledge test covering all aspects was carried out to determine rural women's perceptions of the adoption of training knowledge, skills and attitudes after one month of completion of training programme. At the same time researcher visited the villages from where trainees were selected to see whether the training had been implemented or not. The total score obtained by the rural women were presented in Table 4.32.

It is observed from the Table 4.32 that existing knowledge of rural women were increased in all the aspects of production technologies of horticultural crops. In case of retention of knowledge by rural women on these seven aspects, plant protection, nutritional management and land preparation and planting were ranked as I, II and III respectively. These findings are inconsistent with the findings reported by Das and Saikia (2014). This might be due to the change of location area of cultivation of horticultural crops as well as felt needs of the respondents.

The steps taken for dissemination of scientific information in this study had enhanced the existing knowledge of the rural women.

#### **4.4.2 Impact of the training programme on rural women**

The effectiveness of training programmes on seven areas of cultivation of horticultural crops for rural women under present study showed a tremendous change in the overall behaviour of the rural women. The existing knowledge level of rural women in all the given areas of trainings had improved which was seen through feedback received from post training analysis after one month and participation in informal discussion with the trainees (Table 4.33). They were highly motivated to adopt the improved method of technologies which were observed in responses to queries raised by the researcher.

**Table 4.33. Impact of the intervention programme on rural women****N= 25**

Sl. No.	Package of practices	Decided to adopt the package of practices			Adopted the package of practices of Rabi crops		
		f	%	Rank	f	%	Rank
1.	Nursery raising practices	19	76.00	V	11	44.00	VII
2.	Land preparation and planting	<b>22</b>	<b>88.00</b>	<b>II</b>	<b>17</b>	<b>68.00</b>	<b>III</b>
3.	Production practices	20	80.00	IV	15	60.00	IV
4.	Nutrient Management	<b>21</b>	<b>84.00</b>	<b>III</b>	<b>18</b>	<b>72.00</b>	<b>II</b>
5.	Plant protection	<b>24</b>	<b>96.00</b>	<b>I</b>	<b>22</b>	<b>88.00</b>	<b>I</b>
6.	Harvesting	18	72.00	VI	14	56.00	V
7.	Seed production	17	68.00	VII	13	52.00	VI

It is observed from the Table 4.33 that more than 50.00 per cent rural women adopted their knowledge in cultivation of Rabi crops in their respective field. They frequently contacted the trainers if they found any problems during application of knowledge in their field through mobile. Further, it was found out that the other 50.00 per cent rural women had not been able to apply new techniques. When asked why, most of them said that newer techniques were too expensive. In terms of impact on yield of vegetable crops, majority of rural women said that their changed practices through training had improved this thing.

Rural women play an important role in the production of both Rabi and Kharif crops. Training and technology information had to be provided to rural women to improve their skills, level of decision making and effective participation, All pre test results on different aspects illustrated these rural women had little knowledge of improved package of practices. In contrast, the post knowledge test results revealed that they had broadened their knowledge of new and improved practices. The follow-up post knowledge test showed a considerable impact as these rural women were able to adopt

and implement these new skills and knowledge gained from the training. The horticultural training topics were entirely based on what these rural women identified as their training needs and priorities.

#### **4.4.3 Lessons learnt from the training**

Follow-up interviews have shown that most of the rural women appreciated the importance of these farming activities after learning the reasons behind them. Their practices are now reflective. Yet, the comprehension level of the rural women in the training was not the same for each and small group learning may be a better way to proceed in future, allowing for building individual capacities. Open group discussions also proved to be helpful. These trainings have enhanced these farmers' knowledge.

Moreover, horticultural cultivation is a very practical concept. Hence, in future, horticultural training where crop management or vegetable cultivation practices are involved, follow-up observations of applied horticultural practices in the field and reinforcing knowledge and skills learned during training must be arranged and faithfully conducted by the trainers and extension workers.

# **CHAPTER V**

## **SUMMARY AND CONCLUSION**

Agriculture, the single largest production endeavor in India, contributing 25 per cent of GDP, is increasingly becoming a female activity. Agriculture sector employs 4/5<sup>th</sup> of all economically active women in the country. About 48 per cent of India's self-employed farmers are women. More than simply supplying labour, women possess detailed knowledge of agriculture and use of plant and plant product for food, medicine and animal feed. Women today are central to the selection, breeding, cultivation, preparation & harvest of food crops. Apart from their pivotal role in cultivation of staple crops, they are primarily responsible for the production of secondary crops such as pulses, fruits and vegetables which are often the only source of nutrition available to their families.

Although food is available through markets at every place, food security at the household level becomes a challenge because of low purchasing power of rural families. At this point homestead gardening is one of the best possible solutions to meet the household food requirement of a family. But with the growing population and existence of nuclear family system, size of land holding is shrinking. So, judicious use of available land by rural families is essential to meet the family food requirement specifically fruits and vegetable which are the major protective food of our diet. This will naturally call for the increase in our production of fruits and vegetables, through improvement in agro-techniques and their subsequent delivery to the farmers. But there are some evidences that despite the contribution made by rural women in food security they are not being well served by the existing extension system in developing countries. They are in urgent need of understanding and acquiring new knowledge and skills on cultivation of horticultural crops specifically fruits and vegetable crops so that they could contribute more effectively to the production process. The above background therefore provides, the necessary basis and justification for the research study on "Capacity Building of Rural Women in Homestead Garden for Sustainable Horticultural Development" with the following objectives:

- To assess the work profile of rural women of Assam in homestead garden for sustainable horticultural development.
- To identify the existing knowledge of rural women about recommended production technologies of horticultural crops.
- To build capacity of rural women through intervention programme for sustainable horticultural development.

## **5.1 Methodology**

The present investigation was carried out in the State of Assam which is one of the eight North Eastern States of India. From the six agro climatic zones of Assam, two agro-climatic zones namely Upper Brahmaputra Valley Zone and Lower Brahmaputra Valley Zone were purposively selected. A multi stage purposive cum simple random sampling design was followed for selection of sample. One district from each zone namely Sivasagar district of Upper Brahmaputra Valley Zone and Kamrup (R) district of Lower Brahmaputra Valley Zone were selected randomly. From each selected district, two sub-divisions were selected randomly and from each sub-division, two blocks were selected by simple random sampling method. From each selected block, three (3) villages were selected by simple random sampling method. Thus, twelve (12) villages were selected. From each selected village twenty five (25) rural women who were mostly engaged in fruits and vegetable cultivation were selected as respondents by simple random sampling method for the present study. So, in total 300 rural women from 12 villages of the selected zones were included as respondent of the study. Data collection for the present study was done by using structured interview schedules.

## **5.2 Salient findings**

### **5.2.1 Personal characteristics of rural women**

Majority of the rural women (54.00%) of the study belonged to the middle age group i.e.34-47 years. Majority of them (87.67%) were married and 89.33 per cent belonged to Hindu religion.

### **5.2.2 Socio-economic characteristics of rural women**

Majority of the rural women (36.34%) belonged to OBC category, 71.00 percent nuclear families, 61.00 per cent small family. Majority of heads of the rural



women families (67.25%) had cultivation as the occupation, 54.32 per cent had educational qualification up to middle school level, 65.81 per cent were members of one organization, 70.33 per cent belonged to marginal farmer category, 47.00 per cent had pucca type of houses. All rural women families possessed traditional chullah followed by 59.66 per cent sanitary latrine, 58.66 per cent electricity and electric fan and iron (50.66%). Regarding livestock possession 95.33 per cent possessed poultry followed by 92.00 per cent cow, 84.66 per cent duck and 83.00 per cent goat. All the rural women families possessed hoe and hand tools followed by bullock (87.00%) and traditional wooden plough (76.00%). Majority of rural women families (89.00%) possessed cycle and two wheeler (49.33%). Large majority of rural women families (99.33%) possessed mobile phones. The study revealed that 57.18 per cent of rural women belonged to medium socio-economic status.

### **5.2.3 Other related findings**

Large majority of rural women (91.00%) had cultivated land owned by husband. About majority 67.04 per cent of rural women had tube well as source of irrigating crops, 55.00 per cent had availed improved variety of seeds from farm shop, 83.72 per cent had availed fund from Self Help Groups, 89.33 per cent had farm shop as source of fertilizer, 89.31 per cent had farm shop as source of pesticides and 86.35 per cent sold their farm produce through the middlemen. About 24 per cent of rural women had frequent contacts with village level extension worker and more than 50.00 per cent had no contact with other extension personnel except VLEW. Television is the source from which majority of rural women (45.33%) gathered information frequently. Majority of rural women (57.62%) had not attended any training programme among those who had attended training programme, piggery is the area on which majority of rural women (85.03%) attended training programme. Cent percent of rural women had faced transport and communication problem while attending training programmes and among the felt needs of rural women they ranked I, II and III to mode of marketing, production practices and seed selection and seed treatment with mean score 2.58, 1.96 and 1.91, respectively. Large majority of rural women (99.00%) had never gone for any study tour to access agricultural information and majority of rural women (79.33%) preferred local variety of fruit crops and 90.33 per cent of rural women preferred hybrid variety of vegetable seed for cultivation.

#### **5.2.4 Participation of rural women in different horticultural and household activities**

Majority of rural women (79.02%) participated independently in transplanting and planting and 66.00 per cent in weeding. About 76.00 per cent of rural women participated jointly in seed cleaning and 74.31 per cent of rural women had no participation in fencing. Majority of rural women participated independently in selling of milk/eggs (73.66%), weaving (69.67%) and 61.33 per cent in preparing feed and feeding of animals. About 37.28 per cent of rural women had high level of participation followed by 35.49 per cent medium level of participation and 27.23 per cent low level of participation in horticultural and household activities. The participation of rural women in different horticultural and household activities was significantly and positively related with marital status and family size. There was no significant relationship between participation of rural women in different horticultural and household activities with age, caste, educational qualification, size of land holding, occupation of head of the family, organizational membership, contact with extension personnel and mass media exposure.

#### **5.2.5 Decision making pattern of rural women in different horticultural and household activities**

Majority of rural women (74.67%) took independent decision in amount of produce to be kept for consumption, 72.66 percent took joint decision in weeding and 83.01 per cent took no decision in desuckering. Regarding household activities, majority of rural women (73.64%) took independent decision in production and sale of woven materials and 69.00 per cent took joint decision in maintenance of house. Majority of rural women (60.00%) had medium level of decision making whereas 20.83 per cent had low and 19.17 per cent had high level of decision making in horticultural and household activities. Decision making pattern of rural women in different horticultural and homestead activities was significantly and positively related with contacts with extension personnel and mass media exposure. There was no significant relationship between decision making pattern of rural women and age, marital status, caste, educational qualification, family size, size of land holding, occupation of head of the family and organizational membership.

### **5.2.6 Time utilization pattern of rural women**

The study revealed that rural women spent an average 4.20 hours on farm activities followed by 3.22 hours on kitchen works, 1.62 hours on household cleaning and 1.32 hours on entrepreneurial activities.

### **5.2.7 Problems faced by rural women in different activities of cultivation of horticultural crops**

The study revealed that regarding infrastructural problems faced by rural women, lack of irrigation facility, lack of market place and lack of transportation facility to the market were ranked I, II and III with mean score 2.21, 1.82 and 1.79, respectively. Further, it is revealed that in case of physiological problems, growth retardation due to higher rate of weed growth, attack on crops by pests and diseases and poor production due to lack of availability of good variety seed are ranked I, II and III with mean score 2.55, 2.02 and 1.96, respectively. High cost of labour, lack of provision of subsidy and high cost of other production resources are ranked I, II and III with mean score 2.03, 1.84 and 1.72 respectively among economical problems faced by rural women. Regarding educational and technological problems, lack of proper training, lack of women friendly technology and lack of skill about improved scientific methods are ranked I, II and III with mean score 2.17, 1.95 and 1.80, respectively. Among socio-psychological problems faced by rural women, household workload, lack of contact with extension personnel and lack of self-confidence are ranked I, II and III with mean score 2.56, 1.87 and 1.84 respectively and among other problems natural calamities, health hazards and high perishability of fruits and vegetables are ranked as I, II and III with mean score 2.06, 1.76 and 1.52, respectively.

### **5.2.8 Existing knowledge of rural women about recommended existing production technologies of horticultural crops**

Majority of rural women had low level of knowledge on production practices (80.00%), in nursery raising (76.30%), land production (67.00%), and plant protection (52.70%). It was also revealed that less than fifty percent of the rural women had low level of knowledge about scientifically recommended production technologies of horticultural crops (47.80%) followed by 36.68 per cent had medium knowledge and only 15.52 per cent had high level of knowledge. Age, educational qualification, occupation of head of the family, organizational membership and mass media exposure were significantly and positively significant at 0.01 level. There is no significant

relationship between knowledge of rural women and marital status, caste, family size, size of land holding and contact with extension personnel.

#### **5.2.9 Building the capacity of rural women through intervention programme for sustainable horticultural development**

The study reveals that the existing knowledge of rural women was increased in all the areas of different aspects of production technologies of horticultural crops. In case of retention of knowledge by rural women on these seven aspects, plant protection, nutritional management and land preparation and planting were ranked as I, II and III, respectively. It was found that more than 50.00 per cent rural women adopted their knowledge in cultivation of Rabi crops in their respective field and the other 50.00 per cent of rural women had not been able to apply new techniques. Follow-up interviews have shown that most of the rural women appreciated the importance of these farming activities after learning the reasons behind them. Their practices are now reflective. Yet, the comprehension level of the rural women in the training was not the same for each and small group learning may be a better way to proceed in future, allowing for individual capacities. These trainings have enhanced these women farmers' skills and knowledge.

### **CONCLUSION**

The findings of the study show that majority of rural women belonged to medium socio-economic group. Though their participation in horticultural activities specifically in homestead gardening was high, they had low level of knowledge regarding recommended existing production technologies of horticultural crops. Further, rural women faced several problems such as lack of proper training, transport and communication problems, natural calamities etc. which hindered their participation in horticultural activities. The analysis of their existing situation reveals that there is urgent need of women oriented intervention programmes for their knowledge and skill development, development of linkages for easy accessibility of production resources such as improved variety of seeds, irrigation facility, market facility etc. and women friendly technologies for drudgery reduction of them. There should be frequent contacts of extension personnel with rural women for providing up-to-date horticultural production related information frequently which enhances their decision making ability in farm related matters. Use of communication media by extension personnel to make rural women aware about various extension services including training and field

demonstration on horticultural production technologies could lead to greater participation of rural women in these programmes and may develop their capacity in terms of knowledge and adoption of package of practices for sustainable horticultural development.

## **RECOMMENDATIONS**

1. Mass awareness programme should be conducted at the block level for meeting the household food requirement through homestead gardening by adopting scientific package of practices.
2. Government and Non-Government organizations should make continuous efforts to involve rural women while planning agricultural development projects for generating their income.
3. There is an urgent need to increase the access to technological knowledge, credit and marketing facilities of rural women.
4. There should be concentrated efforts from all Government, Non-Government and private organizations for development of women friendly technologies for reducing drudgery related to agricultural operations like transplanting, weeding, harvesting and cleaning of produce.
5. Training organizers should include more numbers of field level demonstrations on scientific package of practices in their training agenda targeting rural women.
6. Extension functionaries should give importance on frequent dissemination of scientific agricultural production practice related information among rural women through mass media
7. More numbers of mobile training on agricultural production technologies should be organized at village level to suit the convenience of rural women.
8. Govt. and Non-Govt. organizations should take initiative for marketing of surplus produce by forming marketing groups of women.
9. A special training programme should be conducted to develop the scientific orientation, entrepreneurial abilities and working knowledge of rural women on agricultural activities.

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# APPENDIX I

## INTERVIEW SCHEDULE I

**Title of the Research: Capacity Building of Rural Women in Homestead Garden for Sustainable Horticultural Development.**

### GENERAL INFORMATION ABOUT THE RESPONDENT

1. Name of the respondent :
2. Village :
3. Block :
4. Sub-division :
5. District :

### PART - I

#### PERSONAL CHARACTERISTICS OF RESPONDENT

1. Approx. Age (in years) : Young(1)    Lower middle(2)    Upper middle(3)  

18-33yrs
34-47yrs
48-60yrs

2. Marital status

Unmarried (1)	Married (2)	Widow (3)	Divorced (4)	Separated (5)

3. Religion

Hindu (3)	Islam (2)	Others (1)

#### SOCIO-ECONOMIC CHARACTERISTICS OF THE RESPONDENT

4. Caste

ST (1)	SC (2)	MOBC (3)	OBC (4)	General (5)

5. **Family Structure:**

- a. Family type

Nuclear (1)	Joint (2)	Extended (3)

b. Family size (nos.) including respondent :      Small : Upto 4      (1) ☐

   Medium : 5-8      (2) ☐

   Large : 9 and above      (3) ☐

**6. Occupation of head of the family:**

a. Daily wage earner (1)      ☐

b. Independent profession (2)      ☐

c. Cultivation (3)      ☐

d. Business (4)      ☐

e. Service (5)      ☐

f. Other      ☐

**7. Educational level of rural women:**

Illiterate (0)	Can read only (1)	Can read and write (2)	Primary level (3)	Middle school level (4)	High school level (5)	Higher secondary level (6)	Graduate (7)	Above graduate (8)

**8. Organizational membership:**

Organization	No. membership	Member	Office bearer	Distinctive feature
1.Mahila Samiti 2.Self-Helf Group 3.Co-operative 4.Village panchayat 5.NGO 6.Religious Group 7.Bandhan 8.Others				

**9. Size of land holding :**

(i) Below 1.0 hectare	Marginal farmer (1)
(ii) 1.0 -2.0 hectare	Marginal farmer (2)
(iii) 2.1 – 4.0 hectare	Small farmer (3)
(iv) 4.1 – 10.0 hectare	Medium farmer (4)
(v) Above 10.0 hectare	Large farmer (5)

**10. Type of house :**

i. Katcha house (1)	
ii. Mixed house (2)	
iii. Pucca house (3)	

**11. Material possession:**

**(a) Household material possession :**

(i) Refrigerator (3.5)	<input type="text"/>
(ii) Electricity (2.0)	<input type="text"/>
(iii) Electric fan (2.0)	<input type="text"/>
(iv) Improved chullah (1.5)	<input type="text"/>
(v) Traditional chullah (0.5)	<input type="text"/>
(vi) Gas stove (3.0)	<input type="text"/>
(vii) Furniture (sofaset, almirah, dining table) (2.5)	<input type="text"/>
(viii) Pressure cooker (1.5)	<input type="text"/>
(ix) Sewing machine (2.5)	<input type="text"/>
(x) Washing machine (2.5)	<input type="text"/>
(xi) Mixture grinder (2.0)	<input type="text"/>
(xii) Electric oven (2.0)	<input type="text"/>

- |                              |                      |
|------------------------------|----------------------|
| (xiii) Iron (2.0)            | <input type="text"/> |
| (xiv) Sanitary latrine (2.0) | <input type="text"/> |
| (xv) Kerosene stove (1.5)    | <input type="text"/> |
| (xvi) Bio-gas (1.0)          | <input type="text"/> |
| (xvii) Any other             | <input type="text"/> |

**(b) Livestocks possession :**

(i)	Cow (2.5)	
(ii)	Buffalo (3.0)	
(iii)	Goat (2.0)	
(iv)	Poultry (1.5)	
(iv)	Pig (2.5)	
(v)	Duck (1.5)	
(vi)	Any other animal	
(vii)	No possession	

**(b) Farm materials possession :**

- |   |                      |
|---|----------------------|
| (i) Bullock (1.5)                               | <input type="text"/> |
| (ii) Pump set (2.0)                             | <input type="text"/> |
| (iii) Tractor(3.5)                              | <input type="text"/> |
| (iv) Power tiller (3.0)                         | <input type="text"/> |
| (v) Desi wooden plough (1.0)                    | <input type="text"/> |
| (vi) Hoe (0.5)                                  | <input type="text"/> |
| (vii) Improved plough (1.5)                     | <input type="text"/> |
| (viii) Hand tools (khurpi, khanti, Spade) (0.5) | <input type="text"/> |
| (ix) Sprayer (1.0)                              | <input type="text"/> |
| (x) duster (1.0)                                | <input type="text"/> |
| (xi) Shallow tube well (2.0)                    | <input type="text"/> |
| (xii) Vermicompost /Bio-compost unit (2.5)      | <input type="text"/> |

(xiii) Thresher (2.5)

(xiv) Any other

**(d) Transportation material**

(i) Bullock cart (1.5)

(ii) Cycle (1.0)

(iii) Hand cart (0.5)

(iv) Two wheeler (2.5)

(v) Three wheeler (3.0)

(vi) Four wheeler (Car) (4.0)

(vii) Any other

(viii) No possession

**(C) Communication media possession:**

(i) Radio (2.0)

(ii) Television (3.0)

(iii) Dish T.V./Cable connection (2.5)

(iv) CD Player (1.5)

(v) Newspaper (1.5)

(vi) Magazine (1.0)

(vii) Mobile phone (3.5)

(viii) Any other

**12. Access to production resources:**

**I. Ownership of cultivable land**

(i) Personally owned

(ii) Husband's owned

(iii) Family land

(iv) Any other

## II. Sources of water for irrigating the crop

i. Tube well

ii. Canal

iii. River

iv. Pond

v. Well

vi. Any other

## III. Sources of improved varieties of seeds

i. Farm shop

ii. Neighbours

iii. Govt. recognized seed farm

iv. Block office

v. Middle man

vi. Weekly market

vii. Krishi Vigyan Kendra

viii. DAO and SDAO officer

ix. ATMA office

x. Any other

## IV. Source of fund

(i) Own saving

(ii) Financial Institution

(iii) Self Help group

(iv) Co-operatives

(v) Agricultural bank



- |                  |                      |
|------------------|----------------------|
| (vi) Relatives   | <input type="text"/> |
| (vii) Neighbours | <input type="text"/> |
| (viii) Middleman | <input type="text"/> |
| (ix) Any other   | <input type="text"/> |

**V. Sources of fertilizer**

- |                              |                      |
|------------------------------|----------------------|
| (i) Open market              | <input type="text"/> |
| (ii) Govt. office            | <input type="text"/> |
| (iii) Farm shop              | <input type="text"/> |
| (iv) Bio-fertilizer from KVK | <input type="text"/> |
| (v) Middlemen                | <input type="text"/> |
| (vi) Neighbours              | <input type="text"/> |
| (vii) Bio-compost of home    | <input type="text"/> |
| (viii) Do not use fertilizer | <input type="text"/> |
| (ix) Any other               | <input type="text"/> |

**VI. Sources of pesticides**

- |                               |                      |
|-------------------------------|----------------------|
| (i) Farm shop                 | <input type="text"/> |
| (ii) State Agricultural Dept. | <input type="text"/> |
| (iii) Open market             | <input type="text"/> |
| (iv) Bio-pesticides of KVK    | <input type="text"/> |
| (v) Indigenous pesticides     | <input type="text"/> |
| (vi) Do not use pesticides    | <input type="text"/> |
| (vii) Any other               | <input type="text"/> |

**VII. Mode of marketing**

- |  |                      |
|--|----------------------|
| i) Wholesaler                                      | <input type="text"/> |
| ii) Retailer                                       | <input type="text"/> |
| iii) Products dispatches through middleman at home | <input type="text"/> |
| iv) Self marketing                                 | <input type="text"/> |

**13. Contact with extension personnel :**

<b>Extension Personal</b>	<b>Frequency of Contact</b>		
	<b>Frequently (2)</b>	<b>Occasionally (1)</b>	<b>Never (0)</b>
1.Village Level Extension Worker			
2.Agricultural Extension Officer			
3.Agricultural Development Officer			
4.KVK personnel			
5.Block official			
6.Sub-divisional Agricultural Officer			
7.ATMA official			
8.NGO personnel			
9.Any other			

**14. Sources of information:**

<b>Sources of information</b>	<b>Frequently (2)</b>	<b>Occasionally (1)</b>	<b>Never (0)</b>
1. KVK personnel			
2. ATMA official			
3. SDAO and ADO			
4. Block official			
5. Husband			
6. Neighbors and friends			
7. Relatives			
8. Farm shop			
9. NGO personal			
10. Television			
11. Radio			
12 Any other			

**15. Frequency of training programme attended by rural women:**

- a. None (0)
- b. Attended One (1)
- c. Attended more than one (2)

**16. Areas of training programme attended by rural women:**

- a. Homestead Gardening
- b. Nursery raising
- c. Flouriculture
- d. Vermicomposting
- e. Mushroom cultivation
- f. Poultry farming
- g. Food processing and preservation
- h. Animal husbandry and dairying
- i. Piggery
- j. Duckery
- k. Any other

**17. Problems faced by rural women in attending training programmes:**

- a. Transport and Communication problem
- b. Lack of time due to over burden of household work
- c. Lack of money
- d. Lack of interest on the aspect of the programme
- e. Organising training programme during peak season of   
Planting and harvesting of the other crops
- f. Lack of awareness of the other crops
- g. Any other

**18. Felt needs of rural women:**

Felt needs	Existing knowledge			Desired knowledge		
	KT	KS	NK	MN	SN	NN
1. Nursery raising practices						
2. Land preparation and planting						
3. Seed selection and seed treatment						
4. Production practices						
5. Nutritional management						
6. Plant protection measures						
7. Harvesting						
8. Seed production						
9. Mode of marketing						
10. Testing of soil fertility						
11. Fund advice						

KT = Knew thoroughly, KS= Knew somewhat, NK= Not known at all MN = Most needed, SN= Somewhat needed, NN= Not needed.

**19. Mass media exposure:**

Sources of information	Frequently (2)	Occasionally (1)	Never (0)
1. Radio (listening agricultural programme)			
2. Television (watching agricultural programme)			
3. Newspaper			
4. Educational films			
5. Farm publications (leaflets, booklet, folder etc.)			
6. Exhibitions			
7. Study tours			
8. Mobile			
9. Any other			

**20. Types and varieties of crops grown in homestead garden**

A. Fruit crops

B. Vegetable crops

(i) Local variety (i) Local variety (ii) Hybrid variety (ii) Hybrid variety

## PART- II

### Work profile of rural women

#### 21. Participation of rural women in different activities of cultivation of horticultural crops:

Sl. No.	List of activities	Types and extent of involvement				
		Independent participation (2)	Joint participation(1)			No participation (0)
			Husband	Children/ relatives	Hired labour	
1.	Fencing					
2.	Land preparation					
3.	Layout of plots					
4.	Buying of seeds					
5.	Seed treatment					
6.	Sowing of seed and nursery raising					
7.	Transplanting and planting					
8.	Interculture operations					
	(i) Irrigation					
	(ii) Weeding					
	(iii) Earthing up					
	(iv) Mulching					
	(v) Drainage					
	(vi) Pruning					
	(vii) Stacking					
9.	Preparation of organic manure					
10.	Application of manure and fertilizer					
11.	Plant protection measures					
12.	Harvesting					
13.	Cleaning of harvest crops					
14.	Grading of crops for marketing					
15.	Storing of graded crops					
16.	Packaging					
17.	Marketing					

18.	Seed collection from harvested crops					
19.	Seed cleaning					
20.	Seed storage					
21.	Any other					

**22. Participation of rural women in household activities:**

Sl. No	Activities	Types and extent of participation				
		Independent participation (2)	Joint participation (1)			No participation (0)
			Husband	Children /relatives	Hired labour	
(a)	<b>Main household activities</b>					
1.	Cooking					
2.	Collection of fuel wood					
3.	Carrying food to farm					
4.	Fetching of water					
5.	Cleaning the house (Brooming and mopping)					
6.	Washing of cloths					
7.	Care of children and elders					
8.	Processing of foods					
9.	Preservation of fruits and vegetables					
10.	Cooking for festivals and special occasions					
11.	Mending and renovation of clothes					
12.	Tailoring					
13.	Weaving					
14.	Knitting					

15.	Farm related activities					
16.	Any other					
<b>(b)</b>	<b>Livestock management activities</b>					
1.	Collection of fodder					
2.	Preparing feed and feeding of animals					
3.	Care of animals					
4.	Cleaning of the animal shed					
5.	Taking care of sick animals					
6.	Grazing of animals					
7.	Milking of animals					
8.	Selling of milk/eggs					
9.	Any other					

**23. Decision making pattern of rural women in different activities of cultivation of horticultural crops:**

Sl. No.	Decision making activities	Decision making pattern			
		Independent decision (2)	Joint decision (1)		No decision (0)
			Husband	Children/ relatives	
1.	Land preparation				
2.	Plot selection				
3.	Layout of plots (size and design)				
4.	Employment of hired labour				
5.	Cropping pattern				
6.	Intercropping pattern				
7.	Buying of seeds				
8.	Seed treatment				
9.	Seed sowing				
10.	Nursery raising for seedlings				
11.	Transplanting				
12.	Planting				
13.	Interculture operations				
	(i) Irrigation				
	(ii) Weeding				
	(iii) Earthing up				
	(iv) Mulching				
	(v) Drainage				
	(vi) Pruning				
	(vii) Training				
	(viii) Desuckering				
	(ix) Green manuring				
	(x) Grafting				
	(xi) Any other				
14.	Nutrient management (inorganic)				
15.	Preparation of organic manure				
16.	Harvesting				
17.	Grading				
18.	Amount to be kept for sale				
19.	Amount to be retained for consumption				
20.	Price fixation of the produce				
21.	Cleaning of seeds				
22.	Storage of seeds				
23.	Marketing				
24.	Any other				



**24. Decision making pattern of rural women in household activities :**

Sl. No.	Decision making activities	Decision making pattern			
		Independent decision (2)	Joint decision (1)		No decision (0)
			Husband	Children/ relatives	
(a) Main household activities					
1.	Buying food items for family consumption				
2.	Children’s education				
3.	Buying of clothing for family members				
4.	Purchase of household items				
5.	Maintenance of house				
6.	Saving of money				
7.	Medical treatment of sick family member or relative				
8.	Marriage for children				
9.	Processing and preservation of food				
10.	Social activities				
11.	Production and sale of women material or stitched garment				
12.	Any other				
(b) Livestock management activities					
1.	Purchase or sale of animals				
2.	Sale of produce (meat, milk, egg, etc.)				
3.	Veterinary care of sick animals				
4.	Purchase of fodder				
5.	Feeding of animals				
6.	Any other				

**25. Time utilization pattern of rural women:**

Type of work	Approx. time use (in hours)				Total
	Morning hours		Evening hours		
	Hours	Minutes	Hours	Minutes	
1. Kitchen work					
2. Collection of fuel wood					
3. Care of children and family Member					
4. Personal care					
5. Household works like cleaning, mopping, washing etc.					
6. Fetching water					
7. Care of animals					
8. Religious activities					
9. Entrepreneurial activities like weaving, knitting, food processing and preservation etc.					
10. Social visit					
11. Reading, watching TV and other leisure activities					
12. Farm related activities					
13. Unaccounted time + Sleep					
14. Any other					

**26. Problems faced by rural women in different activities of cultivation of horticultural crops:**

Did you face any problem in operating activities related to horticultural crops?

Yes ☐ No ☐

If yes, then types of problem:

Sl. No.	Problems faced	Always (2)	Sometimes (1)	Never (0)
<b>(a) Infrastructural problems:</b>				
1.	Less amount of cultivated land			
2.	Lack of irrigation facility			
3.	Problematic soil			
4.	Lack of transportation facility to the market			
5.	Lack of market place			
6.	Any other			
<b>(b) Physiological problems:</b>				
1.	Attack on crops by pests and diseases			
2.	Occurrence of nutritional deficiency diseases in plants			
3.	Growth retardation due to higher rate of weed growth in the field			
4.	Poor production due to lack of availability of good variety of seed			
5.	Non-availability of HYV seeds			
6.	Any other			
<b>(c) Economical problems:</b>				
1.	Too much expensiveness of fertilizers/ chemicals			
2.	Lack of money for cultivation			
3.	Lack of provision of subsidy			
4.	High cost of production resources			
5.	High cost of labour			
6.	Any other			
<b>(d) Educational/technological problems:</b>				
1.	Lack of proper training			
2.	Lack of knowledge about post harvest technology			
3.	Poor educational status of women farmers			
4.	Lack of farm women friendly technology			
5.	Lack of skill about improved scientific methods of cultivation			
6.	Any other			
<b>(e) Socio-psychological problems:</b>				
1.	Lack of involvement in decision making			
2.	Household work overload			
3.	Lack of contact with extension personnel			
4.	Not getting permission to attend training programme conducted by male person			
5.	Lack of self confidence			
6.	Lack of support, co-operation from			

	family members			
7.	Male dominated society			
8.	Any other			
<b>(f) Other problems:</b>				
1.	Natural calamities (flood, drought, heavy rainfall etc.)			
2.	Loss due to animals like goat, pig and birds etc.			
3.	High perishability of fruits and vegetables			
4.	Health hazards			
5.	Any other			

### PART-III

#### The existing knowledge of rural women about recommended production technologies of horticultural crops

Sl. No	Statements	Know thoroughly (3)	Know somewhat (2)	Not known (1)
<b>A.</b>	<b>Nursery raising practices</b>			
1.	1% Chemical (Captan solution ) is used for disinfections of nursery beds.			
2.	Fine tilth is needed for sowing most of the vegetable seeds.			
3.	Better performance in mango, citrus can be obtain if the plants are propagated through grafting.			
4.	Treatment of vegetable seeds is done with chemicals (Captan or Brassicol) @ 3g/kg of seed prior to sowing			
5.	Pineapple should be propagated mainly through slips and suckers for commercial production			
6.	Best results could be obtained if sword suckers of banana are planted during March to May			
7.	Air layering is mostly done in guava, litchi, lemon etc.			
8.	Most suitable time for raising papaya seedlings is Feb – March			
9.	Vegetable seeds should be sown at a depth 3-4 times the diameter and transplanted when these are 30-40 days old			
10.	It is necessary to water the nursery beds copiously a day before lifting the seedlings to keep them turgid and also to prevent root damage			
<b>B.</b>	<b>Land preparation and planting</b>			
1.	Pairing and pralimage are the important cultural practices during planting to avoid nematode infestation			
2.	Size of pit for banana planting should be 45cm x 45cm x 45cm.			

Sl. No.	Statements	Know thoroughly (3)	Know somewhat (2)	Not known (1)
3.	Ginger planting in Assam is done during March-April			
4.	Floating seeds of okra should be discarded for sowing			
5.	Pre-sowing soaking is important for okra while in beans it is harmful			
6.	Initial land preparation should be done at least one month ahead of growing any vegetable crop			
7.	French bean can be sown from October to March, while in cauliflower different varieties respond differently under Assam climate			
8.	In kitchen gardens, shade giving plants should not be planted on Southern side.			
9.	A well-planned kitchen garden can aid in providing nutritional security to the family.			
10.	To avoid mortality in the main field the transplants should be hardened in the nursery itself			
<b>C.</b>	<b>Production practices</b>			
1.	Growth regulators may be used to induce flowering in pineapple, prevent flower and fruit drop in many crops			
2.	In case of banana and pineapple, maximum of two rations may be allowed in a commercial plantation			
3.	Desuckering is an important operation in banana production			
4.	Papaya cannot withstand waterlogging for even 24 hrs.			
5.	Partial shading of ginger with dhanicha or arahar is necessary for promoting crop growth			
6.	Water requirement of cabbage and knolkhol is comparatively high, so irregular watering may lead to splitting of cabbage and knolkhol			
7.	Mulching is an important operation for controlling weeds, regulation of temperature and moisture in soil			

Sl. No.	Statements	Know thoroughly (3)	Know somewhat (2)	Not known (1)
8.	Langra, Dashehari, Amrapalli are the varieties of mango.			
9.	Pusa Katki, Pusa Deepali varieties of cauliflower are grown early in the season			
10.	Proper crop rotation can improve the soil condition and help minimize land preparation cost			
<b>D.</b>	<b>Nutrient management</b>			
1.	Organic wastes, cowdung and top soil are the basic ingredients for compost making			
2.	Soil fertility can be maintained by application of FYM, lime and inorganic fertilizer			
3.	Well decomposed compost is a better source of organic manure than raw cowdung			
4.	Cultivation of green manuring crop like dhaincha is necessary for restoring the soil fertility			
5.	In cauliflower browning occurs due to deficiency of boron			
6.	As compared to other vegetable crops, leafy vegetables require more amounts of nitrogenous fertilizers			
7.	Continuous application of inorganic fertilizers without manures may lead to soil deterioration			
8.	Seed sowing, fertilizer application and irrigation should not be done on the same day			
9.	Higher application of Nitrogenous fertilizer often leads to maleness in papaya			
10.	Vermi compost can be prepared through earthworm culture			
<b>E.</b>	<b>Plant protection</b>			
1.	Smudging (smoking) helps in reducing infestation of insect-pests in fruit trees			
2.	Cultivation of sesamum can control thatch grass			
3.	Trunk borer is one of the most serious pests in citrus fruits			
4.	Best remedy against bacterial wilt in tomato is the adoption of resistant varieties			

Sl. No.	Statements	Know thoroughly (3)	Know somewhat (2)	Not known (1)
5.	Covering of maturing pineapple with rice straw provides protection from sun burn and bird damage			
6.	Application of Malathion 5% dust @ 20kg/ha can control cut worm attack in vegetables			
7.	Spraying of pesticides should not be done during noon hours and windy part of the day			
8.	Fruit fly causes serious damage to cucurbit fruits			
9.	Bordeaux mixture made of Copper Sulphate and lime is an effective fungicide that can be prepared at home			
10.	Damping-off is the most serious disease in vegetable seedling			
<b>F.</b>	<b>Harvesting</b>			
1.	Vegetables should not be harvested just after spraying the insecticides and should be harvested generally after 5 to 7 days of spraying the insecticide			
2.	Early morning hours are the ideal time for harvesting vegetables			
3.	In case of brinjal the fruit is harvested at tender immature stage			
4.	For distant market, the fruit of pineapple should be harvested when color changes from green to yellow			
5.	Banana is harvested when the fruit ridges changes from angular to round instead of drying of leaves			
6.	Frequent harvesting of okra increases total production			
7.	According to purpose tomato is harvested at different maturity stages			
8.	Absence of latex on scratching of fruits is an indication of maturity of mango and papaya			
9.	Instead of uprooting the whole plant, individual leaves of palak, lai etc. should be harvested			
10.	Irrigation should be stopped at least one week before harvesting of onion and garlic, but in case of potato light irrigation before harvesting facilitates the operation			
<b>G.</b>	<b>Seed production</b>			
1.	Hybrid varieties of crop yield much more than other varieties			



<b>Sl. No.</b>	<b>Statements</b>	<b>Know thoroughly (3)</b>	<b>Know somewhat (2)</b>	<b>Not known (1)</b>
2.	It is of no use retaining and sowing seeds of a hybrid crop in the next year			
3.	Harvested seeds should be properly dried for a longer storage life			
4.	Dark, cool, dry and airy space is ideal for storage of potato and onion			
5.	It is meaningful to retain seeds of a crop if the plot is sufficiently away from plots of other varieties of the crop			
6.	Pointed gourd, spine gourd seeds do not give rise to healthy and useful plants			
7.	Overripe and disease affected fruits should not be taken for extraction of seeds			
8.	Majority of fruit plant seeds are stored at 4-5 degree centigrade temperature			
9.	Palak crop takes about 180 to 200 days for its seed production			
10.	Seed production from early and mid season varieties of cauliflower in the plains of our country is beneficial			

# APPENDIX II

## INTERVIEW SCHEDULE II

### GENERAL INFORMATION ABOUT THE RESPONDENT

1. Name of the respondent :
2. Village :
3. Block :
4. Sub-division :
5. District :

### Assessment of impact of the intervention programme on recommended production technologies of horticultural crops

Sl. No.	Aspects of the Intervention programme	Decided to adopt the package of practice	Adopted the package of practice
1.	Nursery raising practices	Yes/No	Yes/No
2.	Land preparation and planting	Yes/No	Yes/No
3.	Production practices	Yes/No	Yes/No
4.	Nutrient management	Yes/No	Yes/No
5.	Plant protection measures	Yes/No	Yes/No
6.	Harvesting	Yes/No	Yes/No
7.	Seed production	Yes/No	Yes/No

## APPENDIX III

### SCHEDULE III

#### VILLAGES OF THE RESEARCH STUDY

Zone	District	Sub-division	Block	Village
1.Upper Brahmaputra Valley Zone	Sivasagar	Sivasagar	Sivasagar development block	V1- Changmai Gaon  V2- Bhadhara  V3- Bailung Chetia Gaon
		Nazira	Nazira development block	V4-Bihubar Majgaon  V5- Hundarpukhari Hulal Gaon  V6- Mothiachiga Konwar Gaon

Zone	District	Sub-division	Block	Village
2. Lower Brahmaputra Valley Zone	Kamrup (Rural)	Kamrup Sadar	Boko development block	V7- Bhogdabari Gaon  V8- Sukhba Gaon  V9- Hahim
		Rangia	Rangia development block	V10- Bangoan  V11- Garka  V12- Chepti Nakul

**APPENDIX IV**  
**CERTIFICATE OF PARTICIPATION**

	<p style="font-size: 1.5em; color: green; margin: 0;"><b>ASSAM AGRICULTURAL UNIVERSITY, JORHAT</b></p> <p style="margin: 5px 0;"><i>Training Programme on</i> <b>Recomemended Existing Production Technologies of Honticultural Crops</b></p> <p style="margin: 10px 0;"><b><u>CERTIFICATE OF PARTICIPATION</u></b></p> <p style="margin: 10px 0;">This is to certify that .....</p> <p style="margin: 10px 0;">of.....participated in the Training Programme on <i>Recommended</i> <i>Existing Production Technologies of Horticulture</i></p>

## APPENDIX V

### SCHEDULE OF THE INTERVENTION PROGRAMME

Sl. No.	Date of the intervention programme	Topic	Materials and methods/activity	Resource person
1.	07/11/16	Inuguration session on overall view of recommended production technology of horticultural crops(fruits and vegetables)	Lecture	(a)District Agriculture Officer, Sivasagar district, Assam  (b)Sub-Divisional Agicultural Officer, Nazira, Sivasagar  (c) Sr. Agicultural Development Officer, Nazira Sivasagar  (d) Sr. Agicultural Development Officer, Sivasagar
2.	07/11/16	Importance of horticultural crops in human nutrition	Lecture	Subject Matter Specialist (Home Science), Krishi Vigyan Kendra, Sivasagar
3.	07/11/16	Nursery raising practices and land preparation and planting	Lecture cum Demonstration	(a) Subject Matter Specialist (Horticulture), Krishi Vigyan Kendra, Sivasagar  (b) Block Technology Manager, ATMA, Nazira

4.	08/11/16	Production practices of fruits and vegetable crops	Lecture and demonstration	(a)Sub-Divisional Agicultural Officer, Nazira, Sivasagar  (b)Sr. Agicultural Development Officer, Nazira Sivasagar
5.	09/11/16	Nutrient management	Lecture and demonstration	(a) Sub-Divisional Agicultural Officer, Nazira, Sivasagar  (b) Sr. Agicultural Development Officer, Nazira, Sivasagar
6.	10/11/16	Plant protection	Lecture and demonstration	(a)Programme Co-ordinator, Krishi Vigyan Kendra, Sivasagar, Assam  (b)Sr. Agicultural Development Officer, Nazira, Sivasagar
7.	11/11/16	Harvesting	Lecture and electronic media	Sr. Agicultural Development Officer, Sivasagar
8.	11/11/16	Seed production	Lecture	Sr. Agicultural Development Officer, Nazira
9.	11/11/16	Validictory session	Sharing of experience by the participants and distribution of certificate among the participants	(a) Sub-Divisional Agicultural Officer, Nazira, Sivasagar  (b) Sr. Agicultural Development Officer, Sivasagar