INTRODUCTION

CHAPTER – I

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The world over agricultural production system is undergoing rapid transformation to cope up with the changing priorities in rapidly modernizing world and increasingly aware people One of the change is emergence of organic food production system, which is now being talked about more vigorously at different levels by different people representing various institutions **(Chander, 2002)**

Green revolution in India was mainly realised with the introduction of high yielding varieties of various crops and by following intensive cultivation practices with the use of fertilizers, pesticides and other inputs. The fertilizer consumption in country accordingly has increased from 6600 tonnes in 1951-52 to about 12.16 million tonnes in 1992-93. In other terms, fertilizer consumption which was only 0.5 kg/ha in 1951-52, increased upto 67 kg during 1992 - 93. Same was the situation with pesticides

Indiscriminate use of synthetic pesticides over the years has resulted different types of hazards and toxicity. Pesticides residue may constitute a significant source of contamination of air, water, soil and food which could become a threat to the plant and animal communities. A large amount of pesticide is released into atmosphere during use thereby inviting adverse climatic changes. A variety of undesirable environmental effects including excessive mortality and reduced reproductive potential in organisms. Changes in the abundance of species and the diversity of ecosystem, reduction in the productive potential of natural resources and the development of pesticides resistance in target and the non target species has been reported from many countries. **(Koeman, 1978)** Majority of synthetic pesticides are not easily degradable and tend to enter in food chains They spread their toxic effects through ecological cycling and bio-magnification causing serious health problems in human and animal subjects The pesticide residue in plant produce, soil. water, wild life and animal tissues

is responsible for various carcinogenic, teratogenic and catratogenic defects in human society. Liver and kidney damages are observed in response to a long exposure to organochlorine pesticides whereas organophosphorus toxicity results decline of memory (**Korsak, 1977**). Sometime they may even result in mutation of genes and these changes become predominant only after a few generation. Residues of DDT and other toxic insecticides have been found not only in the fat and blood of the people in various parts of India but also in the breast milk of lactating mother.

In the view of the environmental and health hazards, use of these pesticides has either been banned or discouraged in developed countries. Supreme court of India have issued some directives on the import of hazardous wastes and to restrict the use of pesticides in Indian environment (**Tripathi and Tripathi, 2000**). With the increase in the country's own population, compulsion would be not only to stabilize agricultural production but to increase it further in sustainable manner. The scientists have realized that the green revolution with high input use has reached a plateau and is now sustained with diminishing return and falling dividend. It is because of these the health conscious countries like Germany, Japan, USA, Australia, Netherland etc. are ready to pay a premium for food raised without the use of chemicals. The obvious choice for that would be adaptation of organic farming practices without compromising agricultural production. Organic farming, which aims at cultivating the land and raising crops in such a way as to keep the soil alive and in good health may be an alternative to the present system of farming solely depending upon chemicals

The country at present is not in a position to completely eliminate the use of chemicals especially fertilizers It would be difficult and unrealistic to phase out the use of these chemicals systematically For this, on one hand, the dose rate of fertilizers need to be gradually reduced and balanced by increasing the use of optimum quantity of organic manure and bio-fertilizers

1.1 Organic Farming

Organic agriculture is a system of agriculture that refrains the use of synthetic fertilizers, pesticides and pharmaceuticals at every stage of cultivation, harvesting and packing. It is based on the aspect of the natural capacity of plants and animals of nature to optimize production. Inputs into this type of agriculture are wholly natural. High quality production is ensured by crop rotation, inter-crossing of proper varieties, biological pest control, nutrient recycling and other measures. This results in healthy produce and protection of environment. **(Agropharma, 1996)**

Organic food

Health is the primary reason why organic food is important Remember, pesticides and other such agents are essentially poisons, designed to kill living organisms. Organically grown food, being free from these pesticides, contributes to healthy wholesome and sound diet. Organically grown food is full of natural taste and flavour.

Organic manure

Organic manure includes farm yard manure, compost of farm wastes. crop residue, cattle dung, night soil and urine, sweeping from cattle shed, forest liter, water hyacinth, poultry, sheep and goat dropping, tankage blood and meat meal, fish meal, oil cake, sewage and sludge.

1.2 Women and Agriculture

Women continue to make significant contribution to farming Women not only participate in the traditional roles of homemaker, care giver and wife, but also work side by side with their spouse in keeping the farm viable Women in agriculture were virtually ignored by both government and research scholars **(Wilson, 1984)**

Women as human resource in India constitute about 50% of the total population and about 77% of them belong to rural areas. Majority of them come from small and marginal farmers or landless families Their main

occupation is agriculture and allied activities, involving them either as cultivators or as agricultural labourers. Except probably ploughing, no other field operation is beyond them. (**Srivastava et al 1995**) Agriculture employs $4/5^{th}$ of all economically active women, they constitute $1/3^{rd}$ of the agriculture labour force and 48 per cent of self-employed farmers. There are 75 million women against men in dairy and those engaged in animal husbandry, accounts for 20 million as against 15 million men (**ICAR Report, 2002**). Agricultural policies are still dominated by the false view that farmers are men and women are only housewives. Though women contribute significantly, yet they have remained "inactive and dependent". Thus workrole profile of Indian women is that they put 14 to 18 hours of manual work daily on farming operations, livestock raising activities, fetching of fuel and water from distant places. They use conventional tools, which have little efficiency and face drudgery, while working in the field or in the home. Being generally illiterate and ignorant, they have no access to new technologies in agriculture. Gender discrimination rooted in law and custom is pervasive and impedes socio-economic developments.

Women in Uttranchal : A heaven for organic farming in India

Uttranchal, one of the youngest state of India is today geared up to extend its traditionally strong agricultural base into organic farming. The organic umbrella encompasses commodities; value added food, woolens, cotton, health products and alternative life styles. Uttranchal is home to rich natural resources and bio diversity both flora and fauna, especially as most of the state is set amidst the Himalayan ranges. This makes organic farming an ecological necessity rather than an economic one. In this fragile bio-network organic farming is the only viable option, both ecologically and economically. Traditionally mountain farmers have been using forest waste for manure and livestock bedding. These materials locally called "*Persa*" in Kumaon and '*sotter*' in Gharwal are soiled with the cow dung and then used as traditional compost in almost all farmlands. It goes without saying that Uttranchal farmers who consist mostly of women are extremely hard working and honest.

The hills are a very harsh environment. The main agricultural land ratio in the hills is 6% higher than that in the crowded plain (**Mathur et al, 1976**). The women can be seen toiling hard in the farm, on the hills and in the house, from dawn to late night. In Uttranchal women are involved in unending responsibilities of family, whereas men folk can afford to spare time for joyful activities like playing cards, gambling, loafing etc. The hill agriculture entirely revolves around female efforts but the tragedy is that she cannot make final decision. Her status is like a worker in honey comb, where male plays the role of queen bee (**Dubey, 1992**). In other words hill agriculture can be termed as a "women agricultural".

The rural society in hilly areas are typically tradition bound and fatalistic. Due to limited resources and lack of exposure to the outside developing world. By tradition the male members in high caste generally don't engage in manual field work. They are generally engaged in gossiping, local politics and drinking pleasures on which substantial part of their family income is spent. Due to above reasons the main part of manual work involved in the daily chores is done by female members of the family.

As far as efficiency of work is concerned it is reported that women are more efficient than men labor, in respect of rice transplanting (16% more), weeding in rice and wheat fields (7.8% more), picking of pearl millet (25% more) and 37% more in picking cotton (**Prashad et al, 1988**). Their efficiency in harvesting and processing of tea, coffee and horticultural crops is well established.

1.3 Agriculture and Ergonomics

According to **Clark and Corlett (1984)** ergonomics is the study of human abilities and characteristics which affect the design of equipment, systems and jobs and its aims are to improve efficiency, safety and well being of workers. Ergonomics in agriculture plays two roles one is tangible i.e. pertaining to cost benefit ratio and considered as the measure of major importance. The other

method is intangible which is dependent on choices of importance such as human health, comfort and safety. Hence to achieve better efficiency in performance and more human comfort, it is necessary to design the equipment keeping in consideration the operator's capabilities (**Kathirvel et al 2001**) and limitations. Therefore in agriculture also, the application of ergonomics can help in increasing the efficiency and thereby productivity of the worker without jeopardizing his/her health. A lot of research work has been done in developed countries in this field. However, results available from those studies cannot be applied as such to Indian situation. Because agriculture as well as ergonomics are region specific entities.

1.4 Rationale for the Study

Organic production system unlike traditional systems of production, are governed by a set of standards to be followed strictly by the producers of organic foods. The awareness, however on organic production as per these standards is still very low especially in developing countries including India. Some advances have already been made in India in the area of organic tea, coffee, spices, cotton etc. As these agricultural commodities are being exported as organic produce from India. The non-government organizations (NGOs), private sectors and certain public sectors, agencies like Agriculture and Processed Products Export Development Authority (APEDA) under Ministry of Commerce and Industry have taken up several steps to augment supply of organic food products mainly to meet export demands from developed nations which has risen sharply in recent years. One of the major steps taken by government of India is launching of **National Programme for Organic Production (NPOP)** in May, 2001 and development of Indian standards for organic production, which together have been published by Ministry of Commerce and Industry to guide organic producers in India.

Today, Uttranchal has 24 villages dedicated as organic villages. Therefore, investigator was interested in this field.

Most of the women in rural areas of Uttranchal are associated directly or indirectly with agricultural production, processing and distributions. Majority of female labor are engaged in operations like collection of cow dung, transportation of cow dung to manure shed, preparation of organic manure, transportation of manure to the field, application of manure in the field, weeding, hoeing, harvesting, threshing and winnowing and they carry heavy load on head.

Critical Activities

Critical activities are those activities in which heart rate exceeds beyond 106 to 110 beats/min. **Sharma and Thakur (1999)** indicated that women in hill area performed several agricultural activities like fetching of water. weeding, harvesting etc. They reported that during these activities heart rate of the women farmers goes beyond 106 beats/min.

Most of these activities performed by women were repetitive and monotonous. Many of them are carried out in bending posture creating backache. They are full of drudgery and the traditional tools used by women for these critical activities are least productive, more time and energy consuming. Role of women in agriculture is so significant that without them nothing can be done on the farms.

The seasonal workload pattern deserves attention because it creates a greater pressure on women. Total workload also falls disproportionately on women from various landholding groups. Women in rural areas, irrespective of their age, size of family, size of land holding, caste and community perform major agricultural tasks. Women performed activities continuously for long hours without any breaks in between. These women undertake one heavy activity after another. Therefore, most of the women suffer from heavy workload and related health hazards.

To improve the efficiency of women, attention needs to be given to introduce work rest in between or after the activities to reduce the health hazards of women farmers. After performing these activities women farmers report pain

and discomfort frequently in shoulder, elbows, lower back pain, lumber pain, knee pain and also severe pain in wrist and hands. Long lasting static posture with heavy load without any rest impairs the blood supply.

The knowledge of workload in different activities is of great practical value. Particularly when giving more attention to the economic use of human in order to provide comfort and consequently to promote health and well being of homemakers. In order to have good working conditions and better health, avoidance of static work one after other with the increased heart rate, energy expenditure is must. The avoidance of static work for any part of the body is an important factor for work improvement.

Christensen (1963) reported that progressive increase in working heart rate with time or significantly higher pulse count towards the end of day's work gives an indication of 'physiological fatigue'. The problem of fatigue and rest pauses is of great practical importance demanding a high degree of physical effort. Heavy manual work if continued for long period, results in fatigue due to production of lactic acid and its accumulation in the active tissues which are main causative factors for physiological fatigue. In order to recuperate from it, rest pause is needs, otherwise efficiency of work and consequently the individual's output will be greatly affected.

Broucha and **Ball (1953)** have demonstrated that adequately organized rest period provide a considerable reduction of physiological strain, by adjusting rest period alone, a satisfactory level of physiological reaction could be achieved.

Organic manure have been the traditional means of maintaining the soil fertility. Most organic manure contains many, if not all, essential nutrients and therefore provides a balance source of nutrients for crops. Rural women are silent participants in the economic life of developing countries.

Rural women in developing countries continue to be responsible for the time and labour intensive responsive tasks of crop production, household management and for animals husbandry The ultimate goal of crop cultivator is

to produce high quality agricultural products and maximized crop yield. To achieve these goals we need a good variety, well practiced cultural techniques and an eco-friendly environment suitable for crop growth. These major interlinked factors should be well coordinated.

Presently the agricultural industry is thought to be a source of environmental pollution if not properly managed. Therefore organic matter should be used only for the purpose of suitable agriculture. So it is necessary to apply more organic fertilizers to the soil to produce high quality agricultural products and maintain the high soil fertility.

The findings of the study will have great practical utility for the rural women farmers who spend long hours in fields without any rest, perform all household chores at home and look after the livestock. The study will provide useful information regarding improved technologies, improved working postures Beside this information on various methods of preparing organic manure so that the more farmers will be attracted towards organic farming and healthy and eco-friendly environment. Moreover, study will provide useful information regarding work rest allowance women should take in between and after performing activities to keep their work efficiency similar throughout the day. This would help to increase the output ratio of work and at the same time reduce the workload.

The policy makers are largely unaware of the workload experienced by women farmers in various critical activities. The result of that ignorance or disregard of the problems causes omission of the kind of policies which would be relevant for them.

Considerable work has been done to develop agriculture with major expanses on technical and economic achievement, but very little attention has been focused in working methods, working postures adopted by women farmers work rest allowance required them in between and after performing various activities. Beside this gender sensitive issues are often taken for granted or totally ignored As a result, the technologies developed by designers are based

on the assumption that the technologies designed should be gender neutral or that the men are main users.

In hilly area of Uttranchal most of the agricultural activities are being performed by women farmers and they have quite different technological needs, due to the differences in their level of education, experiences, skills, physique, stamina etc. The modern technology thus, if not given due consideration to improve the skill of women, may harm them rather then benefit them. Some studies have been carried out in the country in this field but the work done is of piecemeal in nature. Therefore, there is need to conduct research in this area and gather enough data to sensitize planners and policy makers to massive contribution of women who play a pivotal role in agriculture.

On one side there is need to create awareness among farmers regarding organic farming i.e. eco-friendly farming and its enormous benefits in order to make environment clean, healthy and safe and on another side there is also an urgent need to understand the workload experienced by women farmers in various critical activities and suggest to them various methods, tools and technologies so they can work efficiently without any occupational health hazards and can enhance their life style. The significance attached to workload of women farmers involved in organic farming have motivated the investigator to design the present study. Also this study might be of great practical utility to the home scientist home management specialist, environmentalist, ergonomist and administrators who are involved directly or indirectly in attempting to recognize women's role in agriculture while planning and executing the educational and developmental programmes.

1.5 Objectives of the Study

1. To study the attitude of women farmers regarding organic farming.
2. To identify critical activities performed by women farmers and to study
   a) Sequence of critical activities

b) Time spent and distance travelled in critical activities

c) Technologies used in critical activities

3. To identify the body discomfort/health problems experienced by women farmers in various critical activities.
4. To assess the physical fitness of women farmers in terms of

   a) Standing height
   b) Body weight
   c) Blood pressure
   d) Body temperature
   e) Physical fitness index (PFI)
   f) Pondural Index (PI)
   g) Aerobic capacity (Vo_2 max)

5. To measure the workload of women farmers in terms of

   a) Cardio-vascular stress
   b) Energy expenditure
   c) Total cardic cost of work (TCCW)
   d) Physiological cost of work (PCW)
   d) Muscular stress (grip - strength)

6. To suggest remedial measures in order to reduce the workload of women farmers (on the basis of workload experienced by them)

1.6 Hypotheses of the Study

H_1 There is a relationship between attitude of women farmers regarding organic farming and their personal, family and situational variable

H_2 There is a relationship between body discomfort experienced by women farmers and their personal, family and situational variables.

H_3 There is a relationship between age, standing height, body weight of women farmers and following selected variables namely,

   a) Physical fitness index
   b) Aerobic capacity
   c) Pondural index
   d)) Heart-rate (HR)
   e) Energy expenditure (EE)

H_4 There is a relationship between heart rate and energy expenditure of women farmers on various activities.

H_5 There is a relationship between total cardic cost of work (TCCW) and physiological cost of work (PCW) of women farmers while performing various activities.

H_6 There is a difference between heart rate and energy expenditure of women farmers before and while performing various critical activities.

H_7 There exists a variation in the heart rate, energy expenditure, total cardic cost of work, physiological cost of work, grip strength and work rest allowance of women farmers while performing various activities.

1.7 De-limitations of the Study

1. Study was limited to Nainital district of Uttranchal state.
2. Study was limited to those women farmers who are involved in organic farming.
3. Study was limited to 120 women farmers for descriptive data
4. For experimental work six physically fit women farmers were selected.