Introduction

CHAPTER I

INTRODUCTION

Organic farming is the answer to our national problems of environmental degradation, unsafe food, polluted water. degraded land and a wide range of illness due to unsustainable agriculture Agricultural policies in the past few decades in India have resulted in short term gains in production at the cost of long-term harmful effects on the environment. Definite moves are underway to promote organic farming through farmers' movements, government and non-government organizations. In this context, it is very vital for the organic farming movement in India to have clarity on the nature and processes of organic farming, so that transformation towards organic farming becomes faster and wide spread. One of the changes 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).

Organic farming 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 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, intercrossing of proper varieties, biological pest control, nutrient recycling and other measures. This results in healthy produce and protection of environment.

In 1980, U.S.D.A. released a landmark report on organic farming. The report defined organic farming as:

Organic farming is a production system, which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, and livestock feed additives, to the maximum extent feasible. Organic farming systems rely upon crop rotations, crop residues, animal manures, legumes, green manures, off-farm organic wastes, mechanical cultivation, mineral – bearing rocks, and aspects of biological pest control to maintain soil production and tilth, to supply plant nutrients, and to control insects, weeds, and other pests. (Cited in Sharma, 2001)

Organic farming is defined as a system that attempts to provide a balanced environment, in which the maintenance of soil fertility and the control of pests and diseases are achieved by the enhancement of natural processes and cycles, which only moderate inputs of energy and resources while maintaining on optimum productivity (Hodges 1981).

A sustainable agriculture i.e., a system that maintains and improves soil fertility in order to guarantee adequate food production in unforeseeable future. An agriculture, which takes as it's, guide, the working of biological processes in natural ecosystem. It must always be remembered that agriculture is primarily applied biology and is most likely to be successful when it accepts and follows biological principles.

A self-sustaining system of agriculture like organic farming may offer solution to many sustainability problems affecting Indian agriculture today. By following chemical based energy intensive agriculture, India could achieve self-sufficiency in food production but it has lead to decline in crop productivity. In Punjab, the shift to commercialized inputs (fertilizers, exotic seeds, water, pesticides and other chemicals etc.) as a mode of augmenting agricultural productivity has resulted in ecological degradation and increasing

centralization (Shiva, 1990) Emergence of new nutrient disorders, soil and environmental degradation, pollution, loss of bio-diversity, susceptibility to new pests and pathogens, human health hazards etc., altogether have created a spectre of unsustainability.

Long term use of chemical fertilizers has resulted in declining crop productivity and depletion of soil fertility. In intensive cropping use of organic manures like farm yard manure (FYM), sesbania green manuring and recycling of farm manure, on the other hand, show promise in sustaining high crop productivity and soil fertility Numerous long-term studies show that imbalance caused by chemical fertilizers is not noticed with organic manure additions. The yield decline in crops due to nutrients imbalance under intensive cropping have been found to be averted by FYM additions over nitrogen, phosphorus, potassium (NPK) (Nambiar and Ghosh, 1984; Moris and Meelu, 1985).

Ergonomic, Agriculture and Technology Assessment

One way to examine how an area embraces its domain is to see how it is being represented in various definitions. Definitions reflect how people specify some topic or concept· Terms most frequently used to describe an area's scope can be a significant source of insight. In the present work, we extracted concise phrase describing human factor / ergonomics from a previous work (Wogalter et al 1998) that involved analysis of numerous definitions.

According to Clark and Corlett (1984) ergonomics is the study of human abilities and characteristics, which affect the design of equipment, system and jobs and its aims, are to improve efficiency, safety and well being of workers.

"Ergonomics is the relations between man and his occupation, equipment and the environment in the widest sense, including work, play leisure, home and travel situations. [Brown, and Hendrik, (1986)]

"Ergonomics is to apply knowledge in designing system that work, accommodation, the limits of human performance and exploiting the advantage of the human operation in the process". [Winkens, (1992)]

"Ergonomics is a body of knowledge about human abilities, human limitation and other human characteristics that are relevant to design". [Chapanis, (1995)]

Ergonomic or Human Engineering is the scientific study of relationship between man and his working environment. The term environment includes his tools and materials, his method of work, ambient conditions and physical environment of work, and also the organization of work [Gite, (2002)].

From the above definition ergonomics include relationship between man and his environment, (environment includes temperature, humidity, noise, etc.,) safety for workers, use of relevant characteristic and improve efficiency.

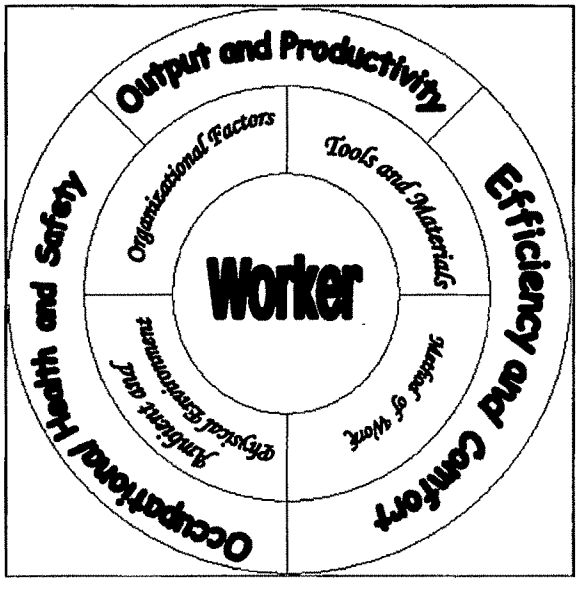

Fig. 1.1 The Ergonomic Concept

Thus ergonomics is study of relevant human characteristics and their relationship with his environment with aim to improve efficiency, increase 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.

In Indian agriculture, hand tools / implements are extensively used for various operations. These are either operated or controlled by human workers. Now a days Indian agriculture is modernizing very rapidly. More and more hand tools, implements and machines are being developed, manufactured and used for various agricultural operations. All of these equipments are operated to achieve better efficiency of performance or more human comfort. Use of anthropometric data in design of agricultural equipment is one step in this direction.

For the present study ergonomics means designing agricultural tools for use. The focus would be on assessment and some modification in designing of tools / implements used by women farmers for various agricultural operations carried out by them.

A century ago, human engineering was a virtually unknown concept. In schools and homes, in industries and in farms, the items were paramount and its user secondary. If the operators could not be rammed into the workspace, then the operator was dispensable. Little consideration was given to efficiency, comfort and safety of the operator while designing tools.

Ergonomics or human factors, as an applied science concerning the design of interfaces between men, machine and the working environment have shown its great capacities and potential for improving working conditions and efficiency during its application.

The main economic characteristic of agriculture in developing countries is the low level of productivity compared with what is technically possible. It has been shown in many and varied circumstances that although women farmers may be rational and intelligent, technological stagnation or slow improvements can still be the norm. This contradiction can be explained by understanding several unusual, troublesome features of agriculture. First, because agriculture is basically a biological process, it is subject to the various unique risks of weather, pests and disease, which can affect the product, supply in an unpredictable fashion. Despite exceptional biological risks, most farmers nowadays rely to various extents upon cost derived from sales of produce. But agricultural products have consumer demand patterns, which can turn even good production years – when biological constraints are conquered – into glut years and therefore financial disasters.

Innovation and technology change has been and will be the main engine of agricultural development. Technology change can be described as the growth of 'know-how'. But technology is not just a system of knowledge, which can be applied to various element of agricultural or other production, to improve levels or efficiency of output. Technology applications require and use new inputs.

It is possible to exaggerate the lack of prospect for improvement and the consequent use for new investment in farm resource use. Changes both on and off-farm are influencing the economics of traditional system. A change in the resource base or interdependent agricultural system may alter various other constraints and opportunities with in the overall farm system.

Knowledge of the existence of appropriate technology will not be sufficient to ensure adoption, attitudes towards it may need to change, the hardware has to be physically available and those convinced of its value need financial resources to acquire it. New technology normally require access to resources.

In selecting new technology, either for testing or promotion, numerous criteria can be devised to aid judgment. These will include the degree of technical effectiveness, financial profitability, the economics and social returns, health and safety factors.

Justification of the study

Rural women are silent participants in the economic life of developing countries. The successful development cannot be pursued with out the participation of rural women. Women's contribution to crop production alone was 50 percent more than that of the work in animal husbandry and farm support activities at home, but her work is not given due credit. There is hardly any activity in agricultural production except ploughing in which women are not actively involved. Transportation and storage of grains were found to be exclusive domain of women. Women farmers performed the other farm operation like weeding, harvesting, carrying head load, threshing and winnowing jointly.

Women play a significant and crucial role in agricultural development and allied fields including crop production, livestock production, horticulture, post harvest operation etc. Women in rural areas have primary responsibility of running household, procuring fuel, fodder and most of their time goes in performing the household chores. At present, the women work force in agriculture and allied sectors is estimated at about 61 million, which amounts to about 30% of the total rural workers in the country. Most of the work related

to management studies have shown that the Indian women works for about 14-16 hours a day to carry out the most arduous activities on farm and at home. (Gite, 2002)

The multiple role of women in agriculture allied operations and household activities are generally under estimated and undervalued. By and large, they have remained as invisible hands. Women's involvement in agricultural tasks is a source of heavy burden of drudgery on them.

An analysis of the life pattern of the rural women indicates that irrespective of the land status of the family, they provide 14-18 hours of productive physical labour in different chores. (Sharma and Thakur, 1998)

Poor women in developing countries continue to be responsible for the time and lobour intensive tasks of crop producing, gathering storage and preparation of food. While they are an integral and crucial part of organic agriculture system, they do not have access to new technologies. In spite of women's significant contribution in production. It is discouraging to note that in men dominated operations related to organic agriculture, machines have greatly improved the efficiency of men and reduced their drudgery, but no mechanization has been introduced for women dominated operations like transplanting, weeding, harvesting, winnowing, pounding and grinding especially in the hill and Tarai regions of Uttranchal. This is because of dominating attitude of men. It is thus evident that there is an urgent need to take an in-depth look into aspirations, felt needs and drudgery of women their working conditions and the negative impacts of these on them.

The hill and Tarai region of Uttranchal provides an excellent example of the importance and magnitude of the role of women through their active participation in organic farming development and allied fields including main crop production, livestock production, horticulture and many income-

generating activities. Their role in agriculture is so significant that without them almost nothing can be done on the farms. Traditionally majority of the male workers of the region do not participate in working on the farm except ploughing the fields. Level of women's participation has been found statistically higher than that of men in all the six major activities studied namely paddy, wheat, fruits and vegetables cultivation, livestock rearing, fuel and fodder cultivation, women were more efficient than men by 16 percent in selected agricultural task. (Sharma and Thakur, 1998)

The major step in improving the role of women farmers, in organic farming and allied fields lies in introducing improved implements and technologies for performance of task. An important point to be considered therefore is how to improve and develop local technologies in a way that is appropriate and may serve the women folk. There is an immediate need to rectify the bias in designing of farm and other implements for women to reduce drudgery and to improve the efficiency of work. More attention needs to be given to introduction of improved implements to reduce the physically strenuous work of the rural women.

The technology development and transfer programmes have generally been carried out on the assumption that the technologies are either gender-neutral or that the men are the main users and decision makers. This is often incorrect because women have quite different technological needs than man due to their different level of education, experiences, skills, physique, stamina etc. therefore, unless these differences are recognized and acted upon technology designs will not be relevant to the user's needs, and transfer programmes will be ineffective.

The rural women are usually employed in arduous field operations like sowing, transplanting, weeding, interculture, harvesting and threshing. Women workers are also preferred in commercial agriculture like tea, coffee, tobacco

and plantation crops. For some of these operations, hand tools and equipment are available. Women workers using their hands/feet to carry out other operations. The tool/ equipment available have been primarily developed for male workers, and women workers have to use them whenever required. As a result, the output is lower and many occupational health problems also crop up. It also happens that once the equipments are developed and made; male workers, would take over take over the task resulting in unemployment for women workers, do available jobs, which are done predominantly by women with hands. The modern technology thus, if not given due consideration to improve the skill of women, may harm the women rather than benefit them.

There are many case studies carried out in the country regarding women's contribution in agriculture and allied activities. Most of the studies reported so far on agricultural women have been related to effect of modern technology. The present research study proposed to be located in the villages of Nainital district of Uttranchal hills. It would provide opportunities to rural women farmers to accept improved implements for various organic agricultural and allied tasks and improve the work performance. This would also help them to save the time and also energy. If women farmers had to participate in activities in farm, which improves the family's economic conditions, The present study had great practical utility for the women farmers who spend the whole day in their fields, perform all-household chores at home, look after the livestock and carryout income generating activities. The study would provide useful information to them about modification of equipments and use of improved technologies. The application of improved/-modified technology can help in increasing efficiency and thereby productivity of the workers without jeopardizing their health and safety.

Objectives of study

1) To find out the demographic profile and health problems of women involved in organic farming.
2) To find out types of technologies used by women for selected operations in organic farming.
3) To measure the physiological cost of selected operation in terms of muscular stress, postural stress, heart rate, energy expenditure TCCW, physical discomfort, time spent and distance travelled.
4) To assess the existing technologies and implements on the basis of ergonomic parameters.
5) To identify modified technologies, which can be used for selected organic farming operations.
6) To assess the impact of modified technologies in reducing the physiological cost of work and body discomfort.
7) To find out the attitude of women farmers towards acceptance of modified technologies.

Hypotheses of the study

1. It is predicted that there is a significant relationship between attitude of women farmers towards acceptance of modified technologies in organic farming and following selected variables
    a) Age of women farmer
    b) Education of women farmer
    c) Type of family
    d) Size of land holding
    e) No. of animals and livestock
    f) Size of family

g) Income of the family

h) Time spent and distance travelled in various activities.

2. There is relationship between body discomfort experienced by women farmers and following selected variables:

a) Age of women farmer

b) Education of women farmer

c) Type of family

d) Size of land holding

e) No. of animals and livestock

f) Size of family

g) Income of the family

h) Time spent and distance travelled in various activities.

3. There is relationship between age and following selected variables:

a) Physical fitness index.

b) Ponderal index.

c) Physiological cost of work.

4. There exists a significant association between the time spent, distance traveled and physiological cost of work (heart rate) in various activities.

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

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

7. There is a significant difference in physiological cost of work and body discomfort before and after the activities.

8. There is a significant difference in physiological cost and body discomfort before and after acceptance of modified technologies.

De-limitation of the study

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