
Summary and
Conclusion

CHAPTER V

SUMMARY AND CONCLUSION

The concept of Organic agriculture has been perceived differently by the farmers of the developing and of the least developed countries. To most of the farmers in countries like India, it implies the use of organic manures and natural methods of plant protection instead of synthetic fertilizers and plant protection chemicals.

According to the produced codex definition (FAO), Organic farming is production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs; taking into account the regional conditions require locally adopted systems. This is accomplished by using, wherever possible, agronomic, biological and mechanical methods, as apposed to using synthetic materials to fulfill any specific function within the system. (Cited in Sharma, 2001)

Organic agriculture does not imply the simple replacement of synthetic fertilizers and other chemical inputs with organic inputs and biologically active for mutations. Instead, it envisages a comprehensive management approach to improve the health and the underlying productivity of the soil. In a healthy soil, biotic and abiotic components covering organic matter including soil life, mineral particles, soil air and soil water exist in a state of dynamic equilibrium and regulate the ecosystem processes in mutual harmony by complementing and supplementing each other. When the soil fauna and flora multiplies processes of dissolution and synthetic at a high pitch. This state of soil life and the associated organic transformations will enhance the regenerative capacity

of the soil and make it resilient to absorb the effects of climatic vicissitudes and occasional failures in agronomic management.

Women continue to make significant contributions to farming. Not only do women participate in the traditional roles of homemaker, caregiver and wife, they also work side-by-side with their spouses in keeping the farm viable. The rural women are usually employed in most arduous field operations like sowing behind the plough, transplanting, weeding, interculture, harvesting, threshing and agro-processing.

Ergonomic, here plays a major role as it is concerned with the design of systems in which people carry out work. All work systems involve a human component and a machine component embedded in a local environment. Improving working condition, work as well as tools and equipment requires a systematic approach. Thus we need to know about the characteristics of people involved and also the conditions under which the work is being performed.

There are many studies carried out in the country regarding women's contribution to agriculture and allied activities. Most of the studies reported so far on agricultural women have been related to employment pattern, wages, social issues and effect of modern technology on these aspects. Technology as such did not get much attention till date in these studies. The findings of the study will have great practical utility for women farmers who spend long hours in field without any rest and appropriate technologies. There is a need to measure physiological cost of work for assessment and modification of technologies used by women in organic farming.

Objectives of the Study

(1) To find out the demographic profile and health problems of women involved 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 use 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.

Hypothesis 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 farmers.
   b. Education of women farmers.
   c. Type of family.
   d. Size of family.
   e. No. of animals and livestock
   f. Size of family
   g. Income by 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 farmers
   b. Education of women farmers.
   c. Type of family
   d. Size of land holding.
   e. No. of animal 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 is a significant association between the time spent, distance travelled, and physiological cost of work with traditional technologies.

(5) There is a significant relationship between heart rate and energy expenditure of women farmers before and while performing various activities.

(6) There is a significant difference between heart rate and energy expenditure of women farmers before and after 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-Limitations of the Study:

(1) Study was limited to Nainital district of Uttranchal State.

(2) Study was limited to those women farmers who were involved in organic farming.

(3) Study was limited to selected operations in organic farming.

(4) Study was limited to 120 women farmers for descriptive data.

(5) For experimental works six physically fit women farmers were selected.

Methodology

A sequential method of research is as following

Research Design

Descriptive cum experimental research design was used for present investigation.

Locale of the Study

The present study was carried out in Uttranchal state. The present study has been carried out in Nainital district. Two blocks Haldwani and Bhimtal were selected for the present study purposively.

Sampling designs

The purposive cum convenience sampling design was used to select the study area and women farmers.

Sample size

The total sample size consisted of 120 women farmers. All the respondents were involved in organic farming for the collection of experimental data 5 percent (of selected sample of 120 women farmers) i.e., 6 women were purposively selected on the basis of a physical fitness test. Reason for selecting only six women farmers was because each women farmer had to

perform to selected ten agricultural activities. For each activity three trials were conducted and each trial was of 15 minutes duration.

Development of the Instrument

For descriptive data interview schedule was developed keeping in view the objectives of the study. It comprised of following section.

Section – I Contained the question to elicit information about the background characteristics of women farmers the household like age, education, type of family etc.

Section – II Dealt with the detail information regarding the extent of women's involvement in various types of activities. Type of technologies used for various activities, type of technologies used for various activities, health problems and body discomfort experienced by women farmers, time spent, distance travelled and posture involved in various activities.

Section – III Contained the scale of attitude of women farmers acceptance of modified technologies.

Section – IV Dealt with anthropometrics dimensions, checklist to assess modified and traditional technologies. It also included various type of observation and record sheet for recording to physiological cost of activities in terms of heart rate, energy expenditure T.C.C.W., postural stress and muscular stress. Body map and 10 point scale was also included for measuring body discomfort by women farmers during activities.

Analysis of Date

Descriptive and relational statistics were used for the present study.

Major Findings of the Study

Highlights of the findings of this investigation are reported below.

Demographic Profile of Women Farmers

The mean age of women farmers was 36.06 ±1.94 years. Out of the total sample 34.16 percent of women farmers were illiterate and very few of them i.e. 5.83 percent were graduate. Rest of them varied in their educational level. On the whole majority of farmers i.e. 95.0 percent were full time farmers and very few of them i.e. 5.00 percent were part time farmers. Majority of women farmers i.e. 98.33 percent were male headed household. More than half i.e. 59.16 percent of women farmers belonged to nuclear family. The mean family size of the women farmers was approximately 7 members. On the whole 18.0 percent of women farmers had large size of land holding (greater than 10 hectare). Mean monthly income of family was Rs. 4051.06 ± 331.52 monthly income of family ranged from Rs. 1700 to Rs. 11500. On the whole less that half of the respondents 45.0 percent of women farmers had medium income ranging from Rs. 1701 to Rs. 4200 while 29.16 percent of them had low income i.e. up to Rs. 1700. Remaining 25.83 percent of them had high income range of Rs. 4201 to 11500. From the total sample 73.33 percent of women farmers had less than 5 animals and only 2.5 percent of women farmers had more than 10 animals.

Type of Technologies Used by Women Farmers

For digging of land 85.0 percent used 'Kudal' and remaining used small handle 'hoe'. It was observed that majority of women farmers i.e. 73.33 percent women did leveling of land manually. For application of sowing majority of them used hand and 25.0 percent did sowing behind plough. All women farmer were used kudal for interculture, hoeing and weeding. For harvesting all the women farmers used only traditional sickle. For threshing and winnowing majority of them performed this activity by hand.

Time Spent and Distance Travelled by Women Farmers for Performing Various type of Activities

It was found that maximum time spent by women farmers was on weeding (475 minutes/day) and minimum on digging of land (198 minutes/day). It was further analyzed that highest distance travelled by women farmers was 49.5 meters for weeding and lowest distance travelled by them was 3.15 meters for winnowing.

Posture Adopted by Women Farmers for Performing the Various type of Activity

Posture mainly adopted by women farmers during various activities like digging of land, leveling of land, sowing, interculture, hoeing, weeding, harvesting, threshing and winnowing was squatting and bending. For application of manure they adopted standing and squatting body posture.

Anthropometrics Measurements

The average normal standing height of women farmers was found to be 154.2 ± 4.97 Cm. The percentile values were calculated as 5^{th} percentile i.e. 154.2 Cm and 95^{th} 162.0 Cm, knee-height (sitting) (45.3 Cm), forearm hand length (42.3 Cm). Elbow grip length (42.3 Cm). Elbow grip length (32.7 Cm). Bal tock knee length (50.7 Cm) of the respondents.

Body Discomfort Experienced by Women Farmers

On the basis of score range, very few of them i.e. 8.33 percent had mild discomfort, about 47.5 percent had moderate and 43.33 percent had severe body discomfort. On the basis of percentage of respondents experiencing discomfort in different body parts, it was found that knee pain (94.16 percent), back pain (97.50 percent), lumber pain (99.16 percent) hip and thigh (91.66 percent) were more common among them while headache (50.0 percent) neck pain (60.0 percent) and chest pain were least common among them.

A positive correlation was observed between size of land holding, numbers of animals and livestock, time spent and distance travelled in various activities and body discomfort experienced by women farmers. Negative correlation co-relation was found between age, income of the family and body discomfort experienced by women farmers.

Physical Fitness Test of Selected Women Farmers:

It was found that mean physical fitness index score of women farmer was 117.53 ± 6.73 which indicated that their physical fitness was of good / average category. Mean body type score of women farmers was 24.21 ± 0.89 which showed that they were mesomorphic category.

A positive correlation ($P \leq 0.01$) was observed between age and physical fitness index. Thus, it could be inferred that as age increased physical fitness index decreased. Heart rate (beats/min) of women farmers during activities with traditional and modified technologies.

Heart rate highest during digging of land with traditional technologies. (138.66 beats/min). It was lowest during threshing with modified technologies (110.17 beats/min). These activities were classified as heavy to severe activities with traditional technologies and except threshing and winnowing with modified technologies. A positive correlation was observed between heart rate while digging of land, leveling of land, application of manure, interculture, hoeing weeding, winnowing and age of the respondent.

Energy Expenditure of Women Farmers During Activities with Traditional and Modified Technologies.

Energy expenditure during digging of land with traditional technologies was highest i.e. 13.248 kJ/min and percentage increase in energy expenditure was 263.380 percent. While it was lowest during threshing with modified technology i.e. 8.787 kJ/min. and percentage increase in energy expenditure

during threshing with modified technology was 134.203 percent. A positive correlation was observed between energy expenditure and heart rate of women farmers before and while performing various activities.

Heart Rate (beats/min^2) of Women Farmers During Activities with Traditional and Modified Technology Relation to Outputs of Works:

It was observed during sowing with modified technologies heart rate was more i.e. 125.05 beats/min and output also more i.e. 6.84 m^2 and heart rate was less (117 beats/min) with traditional technologies and output was also less (4.20 m^2). It was observed that significant difference in physiological cost (heart-rate) before and after acceptance of modified technologies, while performing farm activities.

Total Cardiac Cost of Work (TCCW) of Women Farmers During Activities with Traditional and Modified Technology.

Total cardiac cost of work (TCCW) of women farmers was significant high ($P \leq 0.01$) during digging of land with traditional technologies i.e. 988.33 beats while it was lowest during winnowing with modified technology (593.99 beats).

Muscular Stress (Grip strength) of Women Farmers During Activities with Traditional and Modified Technologies:

It was found that muscular stress (grip strength) was highest i.e. 5.30 kg of right hand and 4.22 kg of left hand with traditional technologies and mean difference in muscular stress was lowest during threshing with modified technologies i.e. 3.87 kg of right hand and 3.19 kg of left hand.

A positive correlation was observed between, muscular stress while digging of land, leveling of land, application of manure, interculture, hoeing, weeding, harvesting, threshing and age of women farmers.

Postural Stress of Women Farmers among Various Activities with Traditional and Modified Technology:

It was found that postural stress was more while performing various activities such as digging of land, leveling of land, application of manure, sowing, weeding, hoeing, interculture, with traditional technologies as compared to modified technologies, it was observed that during sowing, with traditional activities postural stress (angle of deviation) was more i.e. 7.55 degree in upper portion and 3.12 degree in lower portion as compared to modified technologies i.e. (1.40 degree in upper back and 1.32 degree in lower back).

Attitude of Women Farmers Towards Acceptance of Modified Technologies

Findings showed that near about half i.e. 66.66 percent of women farmers possessed favorable attitude towards acceptance of modified technologies. Remaining 16.66 percent had neutral attitude towards acceptance of modified technologies.

Positive correlation was found between size of land holding, numbers of animals and livestock, income of the family, time spent and distance travelled in various activities and attitude of women farmers towards acceptance of modified technologies. Negative correlation was found between age and attitude of women farmers towards acceptance of modified technologies.

Ergonomic Assessment of Modified and Traditional Technologies: -

Physiological cost in terms of heart rate, energy expenditure, TCCW, postural stress and postural stress were less with modified technologies in all activities as compared to traditional technologies and out put was also more.

An ergonomic assessment was also made of various tools. It was found that there was need of minor modification in some of the modified

technologies, for example, modification in handle of hoe, Kutla, land leveller and hand scraper. But there was need for major changes in maize seeder on the basis of ergonomic parameters and some changes need to be made in handles for better gripping in maize sheller and modified sickle.

Conclusion:

On the basis of the findings of this investigation the following conclusions are drawn.

(1) Majority of women farmers were suffering from back pain whereas few of them had respiratory problems.

(2) The entire women farmer used traditional technologies for performing various types of agricultural activities.

(3) Maximum time spent by women farmers was on weeding and minimum on digging of land. Maximum distance travelled by women farmers was during weeding and minimum was during winnowing.

(4) Body discomfort experienced by women farmers in descending order was lumber, knee, back, calf muscle, hip thigh, elbow/forearm, shoulder, neck head and chest. Body discomfort was affected by age, size of land holding, no. of animals and livestock, income of the family, time spent and distance travelled by women farmers.

(5) On the basis of physical fitness tests, it was concluded that mean score of women farmer on physical fitness index was good and all of them were of mesomorphic body type.

(6) Heart rate of women farmers was highest during digging of land with traditional technologies and it was lowest during threshing with modified technology.

(7) Working heart rate in relation to output of women farmers was highest during sowing with modified technologies and output was also more as compared to traditional technologies.

(8) Energy expenditure of women farmer was highest during digging of land with traditional technologies and it was lowest during threshing with modified technologies.

(9) Total cardiac cost of work (TCCW) was highest during digging of land with traditional technology while it was lowest during winnowing with modified technologies.

(10) Muscular stress (grip strength) of women farmers for night and left hand were maximum during threshing with traditional technology as compared to modified technologies.

(11) Postural stress (angle of deviation) of women farmers during sowing with traditional technology was more as compared to modified technology.

(12) Body discomfort experienced by women farmers was more while activities were done with the help of traditional technologies as compared to modified technologies.

(13) On overall basis of parameters physiological cost of work in terms of heart rate, energy expenditure, TCCW, posture stress and muscular stress were more with traditional technologies as compared to modified technologies.

(14) More than half of the women farmers had favorable attitude towards acceptance of modified technologies.

Implications of the Study

The findings of the investigation brought out a number of implications for the government, NGO's equipments/tool designers and educational institutions.

Therefore there is need that the results of the study indicated that women farmers lacked awareness regarding proper methods, postures and tools for work hence experienced body pain.

(1) From the findings, it was revealed that women farmers spend long hours while performing these activities distance travelled by them were high, posture adopted, technologies used by them were faulty, they were neither ergonomically designed not gender based therefore, there is need design, gender based tools and technologies for women farmers.

(2) Presently, women are mostly involved in organic agricultural operations in hills, but very few studies have focused on design of tools and implements on the basis of anthropometric data of women workers. The tools and equipments should be designed ergonomically as per the need of hour for reduction in physiological cost of work and body discomfort. Moreover, the available tools and equipments evaluated with the help of farm women of hills in the study had been mainly designed, considering anthropometric data male of farmers. These equipments and tools, can be modified especially to suit the dimensions of the hill women for significant reduction in physiological cost of work and body discomfort.

(3) Hill farmers have very less and scattered land holding and are using old traditional tools and implements, also, the women farmers should be encouraged for maximum utilization of improved tools and implements even on hired basis for increasing net returns on the farm.

(4) The study also revealed lack of availability of modified tools for farm women. The demand for tools and implements is mostly met by the rural artisans / blacksmiths spread throughout the state. However, there is no organizations and industry in the state which can take up the issue of

manufacturing of improved farm tools implements for mechanization of farming in hills. Hence, in order to rationalize the production of improved farm tools and implements, the small scale manufacturers of farm equipments should be encouraged in the state.

(5) Lack of mechanization of farming was also observed by the investigator therefore to choose proper agricultural power machinery for hill agriculture, a macro mechanization planning will be required. Available power tiller manufactured in the country will help in mechanization but for limited valley areas where economic conditions of farmers is good. It will help in reducing physiological cost of work and body discomfort of farm women.

(6) Presently, farmers of hill region have no animal drawn equipment except plough for agricultural operation and animal are idle most of the time. There is a need of design and develop new light weight animal drawn equipment for hills to reduce physiological cost of work of women farmers and more utilization of bullocks.

(7) Suitable and appropriate improved power drawn tools and equipments for various categories of farmers should be introduced to improve dignity of farmers and to encourage, educated youths through custom hiring to go for farming rather than searching jobs.

(8) Women farmers are to be made aware and educated regarding better work methods, ergonomically sound technologies, ergonomically fit posture will automatically results in reducing the physiological cost of work and body discomfort experienced by women farmers during various agricultural activities.

(9) There is a need to formulate policies, strategies and programmes in relation to demand for farm power and implements in agriculture for mechanization. Mechanization is slow but steady process to improve the economic conditions. The government should make the policies considering mechanization needs for different classes of farmers and for

different agro climate conditions so that hill agriculture production can be sustained for increasing population.

(10) It was also observed by the investigator that there was lack of repair and service facilities for the equipment in hilly region. So repair and service facility through private entrepreneurs or government organization at proper time is a basic need of hill farmers. It should be provided overall in the state so that the work may not suffer in peak season.

(11) Government should also create strong awareness among the consumers regarding health hazards caused by consumption of chemically grown food and encourage consumption of organic food.

(12) Organic food fair could be organized by NGO's at village level so that the buyers and sellers of organic food could meet each other and can make market contact with each other.

Recommendations of the Study

(1) Comparative study on organic farming and conventional farming in different aspects can be carried out.

(2) Ergonomic assessment of various technologies used by women farmer in preparation and application of organic manure.

(3) To study impact of training on farm women for achieving proficiency to a great extent while using suitable technologies.

(4) Ergonomic tool designing on the basis of anthropometric measurement of selected women involved in various agricultural technologies.

(5) Awareness level and knowledge among consumers regarding organic food products and their impact on health.

(6) Ergonomic assessment of workload in various activities of women farmers involved in making and using of composite from biodegradable waste.