SUMMARY & CONCLUSION

Chapter V

Summary and conclusions

Agriculture has a pivotal role to play in the growth and development of each and every country. More people earn their livelihoods through agriculture (including horticulture) than any other industry. In India, an industrially developing country, agriculture contributes a share of nearly 27 per cent to gross domestic product (Alam and Singh, 2003), thus is a concrete pillar of support to economy of the country. Around 70 per cent of the population earn their livelihood from agriculture (EIU, 1997). This brings out tremendous importance which agriculture holds for India and therefore, underlines the need for development of agriculture in India. The workforce estimated at more than 200 million is engaged in agricultural and allied activities to make this sector of economy a huge success. Both men and women carry out numerous field operations to feed the population. Agriculture is one of the most labor intensive and energy demanding occupations. Agricultural operations are difficult, demand a lot of hard work, and much of the power required for accomplishing these operations is derived from human energy. They are accompanied by difficult postures, and long working hours. Farmers work throughout the year irrespective of the harsh and adverse environmental conditions under hot sun and in cold weather.

Agriculture is considered as the biggest unorganized sector where large number of rural women take part actively. Agriculture and allied industrial sectors employ as much as 89.5 per cent of the total female labour (CSO, 1995). From various research studies conducted in the country to assess the role played by rural women in farming, it has emerged, that except probably ploughing, there is hardly any field operation which is not performed by women. In comparison to men, women do the extremely tedious, time and labour intensive work like sowing, transplanting, weeding and interculture, harvesting, threshing, transport

and post harvest operations like shelling, cleaning, grading and processing, etc. All these jobs being not mechanized have to be performed manually and, therefore, involve considerable amount of drudgery. Men, on the other hand are employed in those agricultural operations which are heavier, mechanized, thus involving less labour, and considered as prestigious and more paying. In overall farm production, women's average contribution is estimated at 55 to 66 per cent of the total labour with percentages much higher in certain regions (Venkateswaran, 1992). In addition to farming activities women have exclusive involvement in the traditional roles of homemaker, caregiver, and wife. Besides, they also take care of the livestock. This clearly shows the extent of workload with which rural women are burdened.

Justification of the study

Though women in general participate in almost all agricultural operations, weeding is traditionally women's responsibility. Various authors emphasize this, for instance Vedavalli and Sharma, 1997; Vedavalli, 1997; Saradamoni, 1991; Sharma, Tripathy and Gurung, 1997; Srivastava et al.1997. Weeding is an important agricultural operation performed to prevent growth of undesirable plants called weeds in the crop fields that hinder the growth of cultivated plants. Weeding is generally carried out by women in squatting posture. Many times weeding is carried by women by bending at the waist level. Generally short handled tools such as khurpi, khunti, hand hoe, spade etc are used to carry out weeding. Postures assumed while performing this activity are strenuous and result in body discomfort and may cause serious health problems to the women workers. The testimony by Murphy (1973), an orthopedic surgeon, summarized in the memorandum presented before the Industrial Safety board on the health effects of using short handled tools for hand weeding says: "maintaining the body in a bent position as is necessary when using the short hoe places great stress on the intervertebral discs of the spine which accelerates the development of degenerative diseases of the disc structures and promotes the development of degenerative arthritis of the spine. Performance of even simple activities while in

this bent position adds further stresses that are magnified many times over what they would be if performed in the erect position. The result is a worker whose spine ages much more rapidly than the rest of his body until a point is reached at which he is no longer able to work because of low back pain, even though the rest of his body may be young". This suggests the severe consequences of working with the short handled tool. Furthermore, the output with traditional hand hoe (Khurpi) is very low. It takes 300-700 man hours to cover one hectare depending upon crop, soil condition and weed infestation (Alam and Singh, 2003). The important factor associated with weeding is the time factor. There is limited time within which weeding needs to be finished. The workers are under constant pressure to complete weeding operation before weeds increase in height and become difficult to uproot. Therefore, women keep on weeding for long hours continuously to finish weeding as soon as possible. Eventually, at the onset of the day they end up fatiguing themselves.

Ergonomics is the science which attempts to fit the work and tools to the needs of the worker rather than worker to the work and tools Looking at the difficulty associated with the weeding operation researchers have come up with the different weeding technologies which have been proved to cut short the weeding time and reduce the harmful effect on the human body as well. For instance, wheeled type manual weeders (wheel hoe) have been developed at various institutions and at present more than 15 designs of wheel hoe are available in the country. These types of weeder can be operated by a person in standing posture and only 50 to 100 man hours are required to cover one hectare area (Gite, 1999). Different types of long handled tools have also been developed by different institutions to alleviate the drudgery involved with the weeding operation.

By providing women with the better technology to work with on the fields, it could be possible to reduce the occupational hazards faced by these women. Better tools would reduce stress on the spine and lessen the back pain experienced by these women. The present investigation has attempted to assess the available

technologies for weeding on the ergonomic parameters. In the field of Home Management we are concerned with the problems of worker especially women workers. Women work not only in field but also in homes and their fitness and health are not only important for the individual but also for the family. One cannot neglect the health and fitness of the vital human resource both at family and national level.

The study was carried out in the Kangra district of Himachal Pradesh. Himachal Pradesh is a hilly state and therefore most of the agricultural operations are carried out manually except ploughing which is done with the help of bullocks. This shows that lot of human energy is consumed in hill agriculture. The implements which have been in use are age- old and are labour intensive. The Kangra district represents all the agroclimatic zones of Himachal Pradesh. The study centered in the selected villages of Kangra district where women were actively involved in farming especially weeding. The study was carried out with the following specific objectives –

Objectives of the study

1. To study socio-economic, demographic, and anthropometric characteristics of the women involved in weeding operation.
2. To ascertain frequency of weeding, total number of days spent yearly on weeding operation, and posture assumed while carrying out weeding.
3. To find out the number of hours for which weeding is performed continuously, frequency of taking rest, and duration of rest period.
4. To assess the body discomfort experienced and identify body parts where pain is felt while working with traditional weeding tools.
5. To ergonomically assess the available weeding technologies on the basis of following parameters:

   (a) physiological cost of work (in terms of heart rate and energy expenditure)

   (b) muscular stress (in terms of reduction in grip strength)

(c) discomfort experienced

(d) postural stress

(e) tool dimensions in relation to the anthropometric characteristics of the women

6. To find out weeding efficiency and output (area weeded) on operation with available technologies.
7. To suggest modification, if any, in the technologies tested for better performance.

Research design

In conformity with the objectives of the study, descriptive survey and experimental design were formulated to proceed with the study. Split plot experimental design was set up for carrying out the experiment.

Locale of the study

The present study was carried out in district Kangra of Himachal Pradesh.

Sampling design

Purposive cum random sampling design was used for the selection of the sample for descriptive study. A total of 96 women farmers were surveyed. Two villages namely Balla and Kotkwala were purposively selected from Kangra block for carrying out experimental study. Eight healthy females, non pregnant, devoid of any serious illness, and who were willing to participate in the experiment were selected for the study.

Method of data collection

The data were collected through personal interviews visiting each household separately. Structured interview schedule was constructed. It consisted of various sections which sought responses to various desired questions.

Section I: This section consisted of questions to seek information related to the background characteristics. The section dealt with the personal characteristics of respondents such as age, education, and family characteristics such as socio-economic, agricultural and livestock details.

Section II: This section had questions framed to gather information on weeding operation. The questions elicited responses on such information as the crops for which weeding operation is carried; number of times for which weeding operation is carried out in different crops; tools used for carrying out weeding operation; postures used for carrying out weeding operation; time for which weeding operation is carried continuously; frequency of rest periods; duration of rest periods etc.

Section III: This section dealt with measurement of anthropometric dimensions, and subjective assessment of the body discomfort felt by women workers while working with traditional weeding tools. Both overall body discomfort and body part discomfort were assessed.

Major findings

Background characteristics

►The average age of the women farmers performing weeding operation was found to be 37.44±8.88years. Nearly 49 per cent of the women farmers belonged to the age category of 31 through 40 years. Small percentage (7.29 per cent) in the age category of 51 through 60 years was found to perform weeding operation.
►With regard to educational status it was found that more than half (57.29 per cent) of the women farmers were literate and the remaining 42.71 per cent were illiterate. Just 3.12 per cent women farmers had completed senior secondary. Others had education till primary, middle and matric. Comparison of the older and the younger age groups showed that larger number of women in the older age group (70.37 per cent) were illiterate.
►A majority (58.33 per cent) of the women farmers had nuclear families while the remaining 41.67 per cent hailed from joint families. The mean family size was found to be 5.79±2.67 members. Most of the younger women (53.62 per cent) as well as older women (51.12 per cent) had families with 5-8 members. Small percentage, 8.69 per cent younger women and 14.81 per cent older women

belonged to families having more than eight members. Women farmers mainly (63.54 per cent) belonged to Choudhary caste. A very few respondents belonged to the other castes such as Rajput, Brahmin, Bhatt, and Gaddi.

►The husbands of the women farmers were engaged in various occupations ranging from unskilled manual labour to skilled worker. A little above one fourth of the women (27.08 per cent) reported their husbands to be labourers. About 12.5 per cent reported their husbands to be full time occupied in agriculture, 11.46 per cent reported their husbands to be skilled workers as driver, carpenter, tailor etc.

► The mean landholding size was 12.54±1.07 kanals. Almost 60 per cent of the women farmers owned the landholding size in the range of 2-10 kanals. In least number of cases, women farmers owned landholding above 20 kanals. There was difference in landholding ownership pattern due to the age of the women farmers.

► On an average the women farmers had 2.56±1.59 animals. More than half of the women farmers (56.25 per cent) had 1-2 animals. In least number of cases (8.33 per cent), women farmers had more than four animals. A study of data pertaining to younger and older women showed similar pattern of livestock ownership. The mean milk yield was found to be 3.63±2.82 litres/day. Out of total, 40.62 per cent of women farmers reported milk yield to be 2.1-5 litres per day. Nearly 45 per cent of the younger women reported milk yield in the range of 2.1-5 litres as against 29.63 per cent older women.

►The total annual income of the families was spread over three income ranges viz., (Rs 21,900-71,900), (Rs 71, 900.1-121,900) (Rs 121,900.1-171,900) with more number of families falling in the category of Rs. 21,900-71,900, that is, 42.71 per cent. Small percentage that is 7.29 per cent had total annual income in the range of Rs171, 900.1-221,900. The mean total annual family income was found to be Rs. 89978.54 ± 49927.55.

Anthropometric characteristics

►The various anthropometric characteristics of the women farmers were measured. The average standing height of the women farmers was found to be 151.77± 4.78 cm. The mean weight was 47.83±7.72kg. The mean shoulder height of the women farmers was found to be 125.88 ± 3.92cm. The mean waist height of the women farmers was found to be 96.41±3.95cm. On an average the elbow height of the women farmers came out to be 95.38±3.89 cm. The mean knee height of the women farmers was 41.55 ± 3.02cm.The mean waist back length of women farmers was observed to be 34.07±1.98 cm. The mean hand length was found to be 16.91±0.94cm. The forearm hand length of the women farmers was 41.38±1.88 cm. The mean palm length of the women farmers was found to be 9.54±0.72cm. The mean hand breadth across thumb came out to be 9.18±0.64cm. The mean hand breadth across metacarpal III was 7.64±0.79cm. The mean wrist breadth of the women farmers was found to be 5.89±0.71cm.

Information regarding weeding information

►A number of vegetables are cultivated such as cabbage/cauliflower, ladyfinger, potato, brinjal, gourds, carrot, radish etc which require weeding operation. Study found out that majority (73.20 per cent) of the women farmers carry out weeding operation thrice for **cabbage and cauliflower**. A little below two fifth of the women farmers (37.5 per cent) perform first weeding 16-20 days after planting cabbage/ cauliflower. A little above half of the women farmers(55.36 per cent) perform second weeding 16-20 days after first weeding operation. Out of 41 women farmers who said that they perform third weeding operation, 51.22 per cent reported to perform third weeding 16-20 days after second weeding operation.

►A majority (66.07 per cent) of the women farmers perform weeding for **ladyfinger** twice. Half of the women farmers said that they carry out first weeding operation for ladyfinger 16-20 days after sowing. A little less than half of the women farmers (46.4 per cent) perform second weeding 16-20 days after first

weeding operation. Out of 19 women farmers, nearly 58 per cent reported to perform third weeding operation16-20 days after second weeding operation.

►A little above half of the women farmers (58.93 per cent) perform weeding operation twice for **potato** crop. About three - fifth of the women farmers (60.71 per cent) perform first weeding operation 20-35 days after sowing. Out of 33 women farmers who reported to perform second weeding operation in potato, a majority (72.73 per cent) reported to do so 10-20 days after first weeding operation.

►Out of 56 women farmers, 98.21 per cent reported to perform weeding operation in brinjal twice except one farmer who reported to perform once. Out of 56 women farmers, 60.71 per cent reported to perform first weeding operation 15-20 days after planting brinjal. Out of 55 women farmers who reported to perform second weeding operation, a majority (69.09 per cent) said that they do so 15-20 days after first weeding operation.

►Out of 55 women farmers who cultivated, gourds/pumpkin/cucumber majority (89.09 per cent) reported to perform weeding operation in these crops twice. Sixty per cent said that they carry weeding operation in gourds/pupkin/cucumber 15-25 days after sowing. Fifty four women reported to perform second weeding operation in these crops. Out of them, 66.67 per cent reported to do so 16-30 days after first weeding operation. All of the 5 farmers who reported to perform third weeding operation said to do so after 15 days of second weeding operation.

►Nearly 59 per cent of the women farmers said that they carry out first weeding operation in gourds/pumpkin/cucumber 15-25 days after sowing. Furthermore, out of 54 women farmers, 66.67 per cent reported that they perform second weeding after 16-30 days of first weeding operation.

►Out of sixteen women farmers women who reported to cultivate onion/garlic, 68.75 per cent reported to perform weeding operation twice. A majority (81.25 per cent) said to perform first weeding operation 30 days after planting onion and sowing garlic. Out of 11 women farmers who reported to perform second weeding operation 72.73 per cent said that they carry out second weeding operation 15 days after first weeding operation.

►Out of 50 women farmers who reported to cultivate radish/ turnip/carrot, 94 per cent said they perform weeding operation in these crops twice. Out of 50 women farmers, majority (70 per cent) reported to perform first weeding operation 10-15 days after sowing. Out of 47 women farmers who reported to perform second weeding operation, 74.47 per cent said that they carry second weeding operation10-15 days after first operation.

►Most of the women farmers (40.62 per cent) had been performing weeding operation since11-20 years. Fifty per cent women farmers reported to perform weeding operation using squatting posture. The average number of hours for which women farmers continuously perform weeding operation was found to be 1.87±0.83 per cent. Most of the women (53.12 per cent) reported to perform weeding operation continuously for 1.1 to 2 hours without taking rest. In least number of cases (9.37 per cent), women reported to continuously perform weeding operation for one hour and less. Most of the women farmers (54.17 per cent) revealed that they take just one or two rest periods in between weeding operation. Small percentage (12.5 per cent) reported to take five or six rest periods in between the operation. Most of the women farmers (41.67 per cent) take rest for 10 minutes. 9.37 per cent women farmers who take rest for 20 minutes. A majority (63.54 per cent) of women farmers were found to perform weeding for 3.1 to 6 hours in a day. Just one woman was found to perform weeding for 1-3 hours

►Analysis of data showed that 38.54 per cent of women farmers have one family member to help them in carrying out weeding operation. In just 5.21 per cent cases, three family members were helping respondents, while in 36.46 per cent cases, respondents were working alone.

►Nearly 35 per cent women farmers reported that 20 days are spent in a year doing weeding operation while 33.33 per cent women farmers reported 21-40 days. In least number (10.42 per cent) of cases, more than 60 days were spent in doing weeding.

►Analysis revealed that on an average women farmers cover 0.34±0.13 of a kanal in a day with traditional tools. Majority (71.87 per cent) of women farmers

reported that they are able to weed an area in the range of 0.25 – 0.49 kanals in a day. Small number of women farmers (10.42 per cent) reported to cover an area less than 0.25 kanals in a day. Just two women farmers (2.08 per cent) said that they are able to cover an area falling in the range of 0.75 – 1 kanals in a day.

► It was found that a little above one third of the women farmers (37.5 per cent) fell ill 'once in a year' followed by one third of the women farmers who reported that they fell ill 'once in six months'. In least number of cases (12.5 per cent), respondents reported they fell ill 'once a month'.

► Results indicated that on the whole, majority (78.1 per cent) of women farmers were using khutti for weeding. In 12.5 per cent cases the women farmers were using both khutti as well as phuara.

Body discomfort experienced by women farmers

► Body parts as identified by women farmers where they experienced discomfort with traditional weeding tools included left elbow, left forearm, left palm, left foot, left arm, left wrist, right elbow, right forearm, right palm, right arm, right wrist, right leg, right thigh, left thigh, left clavicle, right clavicle, left knee, right knee, left shoulder, right shoulder neck, mid back, upper back, lower back. Furthermore, extent of discomfort was found to be the highest in lower back with the mean discomfort score 6.95. Other body parts where women farmers reported to feel severe discomfort after day long weeding work were neck, upper back, and mid back. The respective mean body discomfort score were 6.67, 6.76, and 6.75. In the rest of the body parts mentioned above, women farmers reported to feel moderate discomfort.

Testing of hypothesis

Karl Pearson correlation coefficients were computed between the bodily discomfort score of the women farmers and the selected personal, family, and situational variables to see whether extent of bodily discomfort is significantly affected by the selected variables or not.

►The value of correlation coefficient between stature of the women farmers and the body discomfort score ('r' value = - 0.141; not significant) indicated that the relationship is not significant.

►Significant positive correlation ('r' value = 0.492; significant at 1 per cent level of probability) was observed between the age of the women farmers and the extent of the bodily discomfort experienced by them.

►Furthermore, significant negative correlation ('r' value = - 0.463; significant at 1 per cent level of probability) was found between the health status in terms of frequency of falling ill and bodily discomfort experienced by the women farmers.

►A significant positive correlation ('r' value = 0.205; significant at 5 per cent level of probability) was found between bodily discomfort experienced by the women farmers and ponderal index.

►Significant positive correlation ('r' value = 0.207; significant at 5 per cent level of probability) was found between the size of the landholding owned by the women farmers and the body discomfort experienced by the women farmers.

►The value of the correlation coefficient ('r' value = 0.201; not significant) between the number of helping hands and the body discomfort showed that the relationship between these two variables was not significant.

►It was further found that there is no significant relationship between the total number of days spent weeding in a year and the body discomfort ('r' value = 0.003; not significant) experienced by the women farmers.

►Furthermore, it was found that there is significant relationship ('r' value = 0.337; significant at 1 per cent level of probability) between the bodily discomfort experienced by the women farmers and the numbers of hours in a day spent doing weeding by the women farmers.

►Results indicated that the mean working heart rate for all the women subjects while working with wheel hoe was 136.14 beats/min; that was the highest. Followed by this was draw weeder with the mean working heart rate of 128.57 beats/min; v-blade hoe with 127.81 beats/min; falcon hoe with 124.12 beats/min. The lowest mean working heart rate i.e 113.85 beats/min was recorded while working with traditional weeder (khutti).

►Results further shows that the mean value of Δ HR for all subjects for wheel hoe was 54.52 beats/min., this was the highest. It was followed by draw weeder with 45.99 beats/min; 45.01 beats/min for v-blade; 42.99 beats/min for falcon hoe, and 31.45 beats/min for khutti. This shows that while working with wheel hoe and other weeders/weeding technologies which were tested heart works faster or harder as the increase in heart rate is larger as against khutti.

►The results indicated that the mean area covered for all the subjects by wheel hoe was 123.99 m^2/h followed by falcon hoe with 51.80 m^2/h; v-blade hoe with 51.16 m^2/h; draw weeder with 50.89 m^2/h and 23.37 m^2/h for khutti. Therefore, weeding with khutti resulted in the lowest output. On the other hand weeding with the wheel hoe recorded highest output.

►The mean increase in beats/m^2 calculated for all the subjects showed that while working with wheel hoe, there was an increase of 28.8 beats/m^2. The ascending order of the increase in beats/m^2 was falcon hoe with 50.17 beats/m^2, v-blade hoe with 54.3 beats/m^2, draw weeder with 56.54 beats/m^2 and khutti with 80.97 beats/m^2.

►The mean energy expenditure for all the women subjects was highest while performing weeding with wheel hoe (12.9 kJ/min.); followed by draw weeder (11.7 kJ/min.); v-blade (11.6 kJ/min.); falcon hoe (11 kJ/min.). The lowest mean energy expenditure was recorded for traditional weeder, khutti (9.4 kJ/min).

►The perusal of data related to the mean increase in energy expenditure for all the eight subjects showed that mean value was the highest for wheel hoe (215.834 %). Draw weeder followed wheel hoe with the mean increase in energy expenditure equivalent to 174.82 %, then falcon hoe (172.6 %), v-blade hoe (165.42 %), and khutti in the last with the mean increase in energy expenditure amounting to 116.95 %.

►On averaging the total cardiac cost for all the eight subjects, it was found that for wheel hoe; mean value of total cardiac cost was 1903.73 beats/min, for draw weeder 1568.69 beats/min, for v-blade 1504.95 beats/min, for falcon hoe 1480.05 beats/min, and for khutti the mean value of total cardiac was 1059.2 beats/min.

►Analysis revealed that the mean weeding efficiency was highest for khutti with 90.03 % and the lowest for the wheel hoe with 74.38%.

►The mean reduction in grip strength of left hand was recorded to be lowest for draw weeder (11.95%). The mean reduction in grip strength of left hand on weeding with Khutti was 11.85%.

►The examination of the findings related to the reduction in grip strength of the right hand after operation of different weeders indicates highest reduction in case of falcon hoe; the reduction was recorded to the tune of 25.8%.

► The last in the order was traditional weeder, khutti for which mean reduction in grip strength was recorded to the tune of 20.29%.

►Results further indicated that mean reduction in grip strength of both hands after operation with v-blade hoe was highest (20.69%). This was followed by falcon hoe (19.65%); wheel hoe (18.36%); draw weeder (17.64%) and the last in the order was khutti (16.24%).

►The % deviation in the lower back was higher while working with the traditional weeder and it ranged between 3.67% and 9.76%. The analysis further revealed that the mean % deviation in the lower back while working the wheel hoe was 0.73%; that was the lowest. The respective mean % deviation while working with draw weeder, v-blade and falcon hoe were 2.84%, 2.57% and 1.76%. The mean % deviation while working with khutti was 6.14%. On an average, the % deviation in the upper back while working with wheel hoe was 0.60%, with draw weeder 1.69%, with v-blade hoe 2.02%; with falcon hoe 1.80%; and with khutti 3.14%. This suggests that working with traditional weeder resulted larger % deviation in the upper back compared to the technologies under assessment.

►The mean overall bodily discomfort score for wheel hoe was found to be 5.96. The respective mean overall bodily discomfort scores for draw weeder, v-blade hoe, and falcon hoe were found to be 5.54, 5.62, and 5.12 respectively. On operation with the traditional weeder the mean overall bodily discomfort score was found to be 4.46.

►It was found that while weeding with wheel hoe women subjects felt moderate discomfort in left and right shoulders, left and right arms, left and right forearms. Women experienced mild discomfort in both the palms and both the elbows and upper back.

►On operation with draw weeder women subjects experienced mild discomfort in left shoulder, left palm, right palm, left elbow, right elbow, upper back, mid back and low back. Women subjects felt moderate discomfort in right shoulder, left arm, right arm, left forearm, and right forearm.

►It was found that on operation with v-blade hoe women subjects felt mild discomfort in left shoulder, left palm, right palm, left elbow, right elbow, and low back. It was further found that women subjects felt moderate discomfort in right shoulder, left arm, right arm, left forearm, and right forearm. It was found that women subjects felt mild discomfort in left shoulder and low back on operation with falcon hoe. Women subjects felt moderate discomfort in right shoulder, left arm, right arm, left forearm, right forearm.

►On operation with khutti, women subjects reported mild discomfort in left shoulder, right arm, right palm, right wrist, left knee, right knee. Moderate discomfort was reported by women in right shoulder, right forearm, upper back, mid back, and low back.

Ergonomic assessment of the weeders using checklist

►Ergonomic assessment of the weeders was done using checklist provided in the test code and procedure for ergonomical evaluation of manually operated weeders formulated by CIAE, Bhopal. On the whole women subjects liked the weeding tools which were assessed. Operation with wheel hoe required heavy effort but area covered with the wheel hoe was high. Some women farmers found the length of the handle a little longer so as to enable them to work comfortably. They had no problem gripping the handle of wheel hoe. The diameter of the handle in case of draw weeder and v-blade hoe was found to be comfortable enough to grip the handle. As the women subjects were not used to working with long handles they found it little difficult to work with the long handled tools.

Conclusions

The study concludes that the extent of the discomfort experienced by the women farmers is a function of the age of the women farmers, their health status, the area under cultivation, and the number of hours spent in a day during peak weeding season. It is further concluded that the number of persons who assists women in performing the activity does not affect the extent of discomfort experienced by the women farmers. Body discomfort experienced by the women farmer is not affected by the posture adopted.

►The physiological cost with the weeders which were tested was higher compared to khutti. But the area weeded with the weeders was also higher compared to khutti. The study concluded that the work with the weeders results in saving time as more area is weeded in lesser duration. Therefore long working hours of working with khutti in a squatting posture are avoided. Hence drudgery is reduced.

Implications of the study

►Through informal discussions it came to the forefront that women farmers believe that whenever work is done then it is quite natural to feel pain, discomfort and pain are part of the work and they have to suffer the pain. Therefore, nothing can be done about difficult farm tasks and the associated sprains and strains. It is a shame that pain should be taken as a mode of acceptance and dealt with in such a stoic fashion. Therefore, there is an urgent need to change this kind of mindset. Through the use of simple, practical and inexpensive ergonomic solutions farm work could be made much safer, reducing unnecessary damage to the body and spirit of the worker. Government, NGOs, agricultural scientists, home scientists, extension workers and the development workers should work in coordination for spreading awareness about the ergonomic principles to the farmers especially women because they are the ones who carry out the tedious farm tasks using age old tools.

►The women are still using age old traditional implements for weeding activity and face a lot of drudgery in terms of long working hours and stressful posture and there is a great need that new technologies be introduced in the district to improve the working condition of the women farmers. Farm mechanization has yet to take place. Farmers still work with age-old implements which are comparatively ineffective and time consuming. Governmental efforts are required to formulate policies for farm mechanization catering to the needs of different classes of farmers belonging to different agro-climatic zones with focused strategies for their implementation.

►Women farmers expressed interest and openness to using new technologies. It is very essential that technological fairs should be organized exhibiting women friendly tools and equipments so that they get aware of the new technologies. Governmental efforts are needed in promoting the new technology. One way of popularizing new technology is by providing subsidy on the purchase of new technology.

►Training in relation to the use of the new technologies is needed so that the women can learn the correct way of using the technologies.

►As landholding of the farmers is generally small and their economic condition low the need arises for the introduction of low cost technology which is within their reach.

►Geographically, the district of Kangra valley is very different from the plains. Therefore, weeding tools need to be developed keeping in view the farming system prevalent and the type of soil. This would ensure that whatever technology is fabricated is useful to the farmer.

►The best way to reach women is by involving male heads. It was observed by the investigator that the women farmers were hesitant to use the weeding tools which required them to stand while weeding. What I think is that males of the village should be approached first and made aware regarding the importance of working in the posture which puts least strain on the body. If they are convinced about the benefits of using the technology they could be of help in motivating the women farmers to use the new technology. It is very important to break cultural barriers which restrict the women from using new technology.

►Anthropometric data is lacking in the state. Most of the tools in use are not fabricated according to their anthropometric dimensions. Therefore, it is very important to carry out authentic anthropometric surveys which gather data on the important anthropometric dimensions of the women farmers.

Recommendations of the study

•Ergonomic assessment of the other drudgery prone activities such as transplanting, harvesting etc with the traditional tools can be carried out.

•Similar study could be carried on women farmers belonging to different geographical locations and agro climatic zones.

•Study could also be carried out on women who have adopted the new technology.

•Research could also be conducted on tools for other agricultural operations.

•A detailed study of musculoskeletal problems faced by farmers could also be made.