# *ERGONOMIC EVALUATION AND ECONOMICS OF IMPROVED HARVESTING TECHNOLOGY FOR FARM WOMEN IN ODISHA CONDITION*

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**Abstract:** Many agricultural tasks demand high level of strenuous activity. Investment to improve agricultural worker's (Farmer and farm women) health would be justified on both humanitarian and economic ground. It is also quite true that maximum farm activities were carried out by farm women and these activities not only demands maximum physi-ological workload as well as energy expenditure also due to the highly drudgery involved in certain farm activities which ultimately leads to health problems and also ill effect on efficiency which reduce output of the activities. It causes considerable physical and mental fatigue and other health problem. The root cause of their suffering is ignorance about improved technologies, age –old method of doing the work. Hence, a study was conducted to assess ergonomically the efficiency of improved technology – Naveen Sickle for harvesting of wheat crop. Forty farm women were selected from adopted cluster area of Odisha(particularly North Odisha) to assess and compare the impact of improved technology over conventional one. Drudgery Index, RPE, Degree of Difficulty, Muscular skeletal problems, Efficiency and Output etc. were the main parameter of conducted study. Studies have pointed out that farm activities are time and labour intensive, monotonous, repetitive and more drudgery prone are generally performed by women. The result shows that improved method not only reduces drudgery by 28 per cent involved in the activity but also saves energy and time as well as minimizes muscular skeletal problems also. The work output was also found higher 138 m2 area with improved technology as compare to conventional method. In this way results indicates that this method is useful to the farmers as well as to the particular labour also. Additional 286.7 m2 area covered per day and saves Rs. 506 / ha. by the farmer. Farm women completed the work faster and saved nearly 3 hr. /day which can be utilized for another work. In terms of money calculated she could earn additional income Rs. 1450/month due to additional area covered per day.

**Keywords:** Drudgery, Efficiency, Ergonomic, Farm women, Muscular problem, Technology.

**Introduction:** Women in India are the major work force in agriculture and perform almost all the agricultural activities. In India, out of 30 million women work force, 20 million live in rural areas. The rural women play a significant role in agriculture and other agro based activities. The daily work schedule of rural women is very demanding and arduous as per Suma Hasalkar et al (2005). It is estimated that during peak period, women work every day for about 8-9 hours in agriculture and 4 hours in household activities and there are certain agricultural operations in which female agricultural workers are considered better than male workers as studied by Bhopal and Pattai (1998). Women carry-out many jobs as weeding, transplanting, harvesting, threshing and storing grains, tending animals and providing fuel and water etc. These tasks often have serious consequences for women due to the uncomfortable technologies of performance. A study conducted on farm women by Bibhu et al. (2005) stated that during wheat harvesting activity from morning till evening women usually adapts squatting posture and they continue to work in this posture for long duration without adapting any other posture due to which they reported severe pain in lower back and knees. Work-related musculoskeletal disorders develop slowly over months and years of repeated stresses. The risk factors themselves are ubiquitous, found in most jobs. Left unaddressed, musculoskeletal disorders can result in lifelong pain and permanent disability. It occurs due to the highly drudgery involved in the activities. Hence, Drudgery involved in the activity and ergonomic study of farm women is necessary. Drudgery is a term used to represent the dissatisfactory experiences that constrain work performance in any activity (Technical module/AI-CRP- FRM/ DRWA/ 2001) and Ergonomics is the new discipline in developing countries applied to the assessment of workload in various activities performed by women in home and farm (Suma Hasalkar et al (2005).Hence, keeping this fact in mind the present study was con-ducted by setting the objectives viz. to personal and social background of the farm women, to assess the Drudgery Index of the farm activity-harvesting and to calculate the body muscular skeletal problems of the farm women while completing the harvesting activity.

**Methodology:** The study was conducted in three village viz.Turumunga,Hatibari and Neuliposi which comes under the adopted cluster area of KVK-Keonjhar (Odisha). In Rabi season (Yr.2009, 2010,2011 and 2012) randomly 40 women were selected who were exclusively performed the farm activities. In the said villages. On farm Trials (OFT) and Frontline

Demonstrations (FLD) were conducted for reducing drudgery of farm women at the time of harvesting of wheat. Comparative study was carried out with improved technology (Naveen Sickle) and existing tool (local sickle) for assessing the drudgery involved in harvesting of crop. Well prepared pro-forma was used for assessing the data. While collecting the data especial attention was given on the selected sample size as regards to their physical fitness and prevalence of any serious health hazard.

**Theoretical Framework:**

**Pressure:**

Blood pressure was measured with the help of sphygmomanometer (Digital) in mm. Hg.Systolic-120 + 10 (range 110-130)and Diastolic 80 + 10 (range 70-90)

**Physical Fitness:** Oral body temperature was measured with the help of thermometer in F.

**Age Group:** Criteria of age group were selected below 40 years purposively.

**Degree Of difficulty:** Degree of Difficulty was measured on five point scale ranging from very easy to very difficulty.

**Time:** Time were made in One hr. (60 minutes) observations the practices for assessing and for comparing the efficiency.

**RPE:** Perceived exertion was measured on five point scale ranging
from very easy to very difficulty.

**Drudgery Index:**

It was measured by using fallowing formula

X + Y + Z * 100 /3

**Improved Technology:**

Especially designed farm tool for harvesting of wheat – Naveen Sickle (source CIAE 1998) was used for the study. It was compared with ion the of existing the Naveen practice Sickle(local- sickle).

**Specific Features**

- Light in weight,
- Serrated blade,
- Economic,
- Easy to handle, Covers more area,
- More suitable to wheat crop, vegetables and green fodder etc.,
- Specially designed handle cuts the crop from bottom level, Saves time
- Women friendly farm tool

| **Table No.1: General profile and social background of the farm women.** | | |
|---|---|---|
| | respondents | centage |
| 26 0 | 24 | 60 |
| 1-35 | 12 | 30 |
| 35< | - | |
| 145 | 26 | 65 |
| 46-50 | 04 | 10 |
| 50 < | - | |
| Joint | 12 | 30 |
| No. of members 4-6 | 8 | 45 |
| 7< | 12 | 30 |
| **Comparison between** | **improved and** | **existing** |

| Table no.2 types of houses | | |
|---|---|---|
| Type of Houses | 8 | 45 |
| Semipa kka | 10 | 25 |
| Pakka | | |

| Table no.3 feedback of the farm women regarding exiting and improved technology. | |
|---|---|
| -Heavy to handle | - Light weighted |
| -Frequently sharpness of | - Easy to handle |
| blade is required | - It cuts the crop from |
| -Maximum stress on hand | bottom level |
| muscles | - Practice is required |
| | |
| -Squatting posture for long | - Frequent sharpness of |
| period leads to leg muscles | blade is not required |
| problem | - Economic |
| -Poor output at the end of day | - Serrated blade cuts the |
| Constraints- | crop easily |
| - Covers minimum area | - Covers more area |
| - Squatting posture for long | - Saves time and money |
| time creates health hazard/ | - Squatting posture for |
| skeletal problems | shorter period |
| | Constraints- |
| | - Unusable to left handed |
| | person |
| | - Easily not available in market |

| **practice.** | covered / day m2 | required per hectare | day @Rs1680/ha | month (ha) | day @Rs1680/ha | month | |
|---|---|---|---|---|---|---|---|
| Respondent | Daycovered (m2)per | hectarerequired per | / ha)incurred (Rs | daycovered (m2)per | Days/ha | / ha)incurred (Rs | Area Additionalcovered | Net expenditure / ha to farmer |

**Economics of Improved Technology:** Data in Table 4A and 4B pertaining to the assessment of total work being accomplished and the effect of earning per labour and saving to the farmer who employs the labours for harvesting, clearly indicates the effectiveness of improved sickle over the existing traditional sickle. On one hand it is evident that a labour covers an additional area of 91.9 m per day and thus requires less number of days to cover one hectare area but on the contrary the same labour covers an additional area of 0.86 ha per month which ultimately results in an additional income of Rs 1450. Similarly, for the farmer who employs the labour for harvesting is also at a benefit because his work gets done faster and thus he too saves Rs 507 per hectare. Thus the technology is farmer as well as labour friendly in all aspects of work and economics.

**Illustrations, Diagrams And Photographs:**

Some Good Figures Regarding Research

**Equations**

**Drudgery Index:**

It was measured by using fallowing formula

X + Y + Z * 100 /3

**Result And Discussion:** In Keonjhar reason wheat and gram is the main rabi crop. Harvesting of the crop is done manually and this is exclusively carried out by farm women. In the OFF and ON campus training programmes it emerged during the discussion that harvesting of the crop was more exerting, time consuming and due to the squatting posture maximum muscular pain in the body was improved practice (Naveen Sickle). It means near about 28 percent drudgery could be reduced in improved practice. Reducing of drudgery it indicate that improved practice saves time, gives more output and it reduces body muscular skeletal problems also. It also indicate that women friendly farm tools minimizes maximum problems of the farm women but these equipments are not popular in rural area because the new techniques or technologies' are still not reached at bottom level particularly at rural area.After completing the study in general discussion was conducted with the farm women for receiving the feedback regarding the improved method (Naveen sickle) and existing practice (local sickle) is depicted in Table No. 3. Based on the experience and feedback of the farm women it was crystal clear that Naveen sickle is quite better than local sickle. Local sickle is very heavy to handle due to the heavy weighted handle and it covers less area and require more time and labour for harvesting of the crop. Squatting posture was adopted for long time creates more skeletal problem and it leads to body hazards to the particular ladies. On the contrary there were several positive points were elaborated by the farm women regarding improved method- Naveen sickle. The first and most important point was pointed out by the farm women that Naveen sickle was very easy to handle because of the light weight. The another important point was noted by them that it cuts the crop from bottom level and it helps to avoid the burning problem of residues at field level only. It cuts the crop very sharpen due to the serrated blade and covers more area and saves time and money. It minimizes the body muscular problems also.Only one strong point negatively pointed out regarding the Naveen Sickle that it was useless to the left handed person. Further they stressed out that it should be easily available to the faced by the farm women.farm women and it should be economic to all groups.Data on 40 farm women randomly selected for the study were Economics of Improved T chnology: incorporated in the following tabulation format. The general Data in Table 4A and 4B pertaining to the assessment of total profile and social background of the farm women was depicted work being accomplished and the effect of earning per labour in the Table No.1. It was observed that 60 per cent farm women and saving to the farmer who employs the labours for harvest- were belongs to 26-30 years age group and 30 per cent were ing, clearly indicates the effectiveness of improved sickle over in the 31-35 years age group where as only 10 per cent were the existing traditional sickle. On one hand it is evident that ain the 20-25 years age group. In case of weight also maximum labour covers an additional area of 91.9 m per day and thus the farm women's were dwelt in the 41-45 kg weight (65 %), 25 quires less number of days to cover one hectare area but on the per cent were under the malnourished category and only 10 per contrary the same labour covers an additional area of 0.86 ha cent were in the normal weight i.e. 10 per cent. In the table it per month which ultimately results in an additional income of was observed that nuclear family system was more common in Rs 1450. Similarly, for the farmer who employs the labour for the rural areas also (70 %) as compare to joint family

system harvesting is also at a benefit because his work gets done faster (30%). In the rural area type of house was also a status symbol and thus he too saves Rs 507 per hectare. Thus the technology as result shows 25 per cent families were living in Pukka house is farmer as well as labour friendly in all aspects of work and whereas 45 per cent were living in semi pakka house and onlyeconomics.30 per cent were living in kachha house.

**Conclusion:** It is crystal clear from the above findings that improved method or women friendly farm equipments are really helpful in minimizing the drudgery of farm women while harvesting of crops.In this study, it was observed that Naveen Sickle is better than the local sickle because it covers more area, minimizes the drudgery (reduces by 28 per cent ), perceived exertion was also low, saves time and money expent on labour, minimizes body muscular problems and very easy to handle. The only drawback observed was that this Naveen Sickle was not helpful to the left handers. The most important point which emerged from the end-users was that these advanced technologies could be adopted by the farm women but it will take time because these new techniques or women friendly farm tools have still not reached at the rural level. For reaching to unreached person some efforts are required to diffusion of new technologies.

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