

Impact of Twin wheel here for Weeding Drudgery Reduction of Farm Women

Reeta Mishra¹, Y. D. Mishra², P. P. Singh³ and B.P.S. Raghubanshi⁴

ABSTRACT

The present investigation was carried out to evaluate the weeding efficiency of tools and performance evaluation of weeding activity performed by farm women using newly introduced and traditional tools. The study included a sample of 20 farm women of Morena district. SWOT analysis indicates that use of improved tools by farm women for weeding could be a useful implementation for reducing the drudgery of farm women with increased output. The interest of farm women was stimulated by explaining to them how it could contribute towards their drudgery reduction. A training programme for this group of women beneficiaries for their empowerment was organized to impart knowledge and skill of improved farm tools. The wheel hoe is found highly acceptable tool as compared to traditional khurpi. Twin wheel hoe was perceived more suitable for weeding by farm women.

Keywords: Drudgery, SWOT, twin wheel here, weeding

INTRODUCTION

Women play pivotal role in agriculture as female agricultural labour, as farmers, co-farmers, female family labours, as farm managers and farm entrepreneurs (Prakash *et al.*, 2014). Weeding is perceived as the drudgery prone task in agriculture domain. It accumulates load of work on farm women during peak seasonal period of work and reduces efficiency and effectiveness in performing the task in household chores and animal husbandry domain, if performed by traditional implements.

Weeding operation is a major problem for farm women. Majority of the farm women do weed control using hand tools like sickle, khurpi and so on. Therefore, timely weeding is very much essential for a good yield; this can only be achieved by using mechanical weeders which perform simultaneous job of weeding and hoeing and can reduce the time spent on weeding (man hours), cost of weeding and drudgery involved in manual weeding (Goel *et al.*, 2008).

Hence there is a need to carry out SWOT analysis of twin wheel hoe and their impact on reducing drudgery of farm women. Therefore, the present study was

undertaken with objectives to evaluate the weeding efficiency of tools and performance evaluation of weeding activity performed by farm women using newly introduced and traditional tools.

METHODOLOGY

Selection of respondents

Twenty farm women actively engaged in weeding activity were selected for the present study from KVK adopted village of Morena district, Madhya Pradesh, India. Care was taken to select farm women who were healthy, non-pregnant, non-lactating, and free from any other serious health hazards.

These farm women were randomly selected from 40 farm women of Morena district. Body height, weight and BMI of each subject were measured (Table 1). The grading of health status of women on the basis of BMI was done. The BMI scores were interpreted as per the classification given by Garrow (1987).

The heart rate during rest, work and recovery were recorded while working with traditional as well as twin wheel hoe.

¹ RVSKVV- Krishi Vigyan Kendra, Morena (M.P.) and ² Directorate of Extension Services, RVSKVV-Gwalior (M.P.)

Table 1: Physical characteristics of the selected sample of farm women (n=20) for evaluation of weeding technology

Parameters	Mean	S.D.
Age (years)	32.1	±6.08
Height (cm)	150.7	±4.9
Weight (kg)	47.6	±5.9
BMI (Body Mass Index)	21.2	±2.5

Potential for use of twin wheel hoe for weeding

SWOT (strengths, weaknesses, opportunities and threats) analysis for use of twin wheel hoe for weeding by farm women in Morena district is presented in Table 2. It indicates that use of improved tools by farm women for weeding could be useful for reducing the drudgery of farm women with increased output. Apart from this, there are certain other advantages, which ensure the possibility of adoption of twin wheel hoe. These are useful in weeding of various crops, time saving and more income per unit time. Thus, it could be a good tool for reducing drudgery of farm women.

Table 2: SWOT analysis for weeding of crop using twin wheel hoe

Strengths	Twin wheels
	Frame
	V-blade fixed on a tyne
	U- clamp
	Scraper and handle
Weaknesses	Pressure as on specific time
	Unawareness and unavailability of improved implements for weeding
	Lack of interest
	Input free attitude of farm women
Opportunities	A good tool for farm women empowerment
	Useful in weeding of various crops
	Time saving more income per unit time
Threats	Exploitation of farm women by middlemen by purchasing of improved implements at very high rates
	Poor care and management by farm women may lead to reduce efficiency

Constraints of using twin wheel hoe

Major conspicuous constraints of using twin wheel hoe is unavailability of twin wheel hoe and lack of awareness among the farm women about benefits of using improved tools, poverty, illiteracy, lack of knowledge of improved tools, poor communication network and hand to mouth leaving attitude of farm women (Table 2).

Dissemination approach of improved tool for weeding

Keeping in view the drudgery reduction of farm women in weeding by using twin wheel hoe, higher efficiency, increase output, etc., it was planned to disseminate the technology of using twin wheel hoe for weeding in Morena district as a vital tool for reducing

drudgery of farm women.

Following steps were followed for the dissemination of use of twin wheel hoe for weeding in Morena district.

Creating awareness and developing desire

Farm women are not always aware of the improvements they could make by using scientific and technological knowledge. Thus, first of all, the attention of farm women was directed towards the women friendly improved farm tools especially of twin wheel hoe by conducting informal meetings and discussion with them. Their interest was stimulated by explaining to them how it could contribute towards their drudgery reduction. This interest was later transferred into desire by continuous persuasions and motivation for use of improved tool.

Capacity building

A training programme for this group of women beneficiaries for their empowerment was organized with the objectives of imparting knowledge and skill of improved farm tools, along with gaining confidence of farm women towards their participation in sustainable development of other aspects.

Follow up: Distribution of twin wheel hoe

After training, the participating farm women were fully motivated for use of twin wheel hoe, but being extremely poor and having no outside support, they showed inability to purchase it and thus needed financial support.

Thus to encourage and disseminate the technology of using improved farm tools, Krishi Vigyan Kendra, Morena, arranged twin wheel hoe for weeding with the condition that they would return back these wheel hoes after weeding, which they agreed to. The women received enough moral support from their families.

Women's opinion

To know the farm women's opinion on the use of both type of equipments for weeding, four factors namely stress factor, work output, tool factors and field acceptability were assessed. The percentage of attained score over maximum was categorized as given below:

- up to 20% = Highly unacceptable
- 20-40% = Unacceptable
- 40-60% = Neutral
- 60-80% = Acceptable
- >80% = Highly acceptable

Assessment of ergonomic parameters: Physiological workload

This is to refer that physiological or muscular effort required on the part of worker to accomplish a task or an activity. The period during which the work continues is known as work period and period during which the physiological function return to resting level is known as recovery period. Hence, to evaluate total physiological expenditure, physiological reaction both during the work and during the recovery period is considered.

Hence, the respondents were prepared by giving a rest for 15 minutes under shade before start of the experiment. The heart rate was recorded by using the heart rate monitor continuously during rest (15 minutes), during work (30 minutes) and during recovery (5 minutes) after the work.

Following formula was used to calculate the total cardiac cost of work (TCCW) and physiological cost of work (PCW) (Varghese et al., 1994).

Physiological cost of work = $\frac{\text{Total cardiac cost of work}}{\text{Duration of work (min)}}$

Total cardiac cost of work = Cardiac cost of work (CCW) + Cardiac cost of recovery (CCR) (TCCW)

CCW = (Average working heart rate – Average resting heart rate) x Duration of work (30 min)

CCR = (Average recovery heart rate – Averaged heart rate) x Duration of recovery (5 min)

Energy expenditure

Energy expenditure during work was also calculated by average heart rate (AHR) by using regression equation given by Varghese *et al.* (1994).

Energy Expenditure = $0.159 \times \text{HR (bmin-1)} - 8.72$

Subjective evaluation of postural discomfort

The assessment of overall discomfort rating (ODR), a 10-point Visual Analogue Discomfort Scale (0-No discomfort, 10-Extreme discomfort) was used which was developed by Corlett and Bishop (1976). A scale of 70 cm length was fabricated having 0 to 10 digits marked on it equidistantly. A movable pointer was provided to indicate the rating. At the end of each trial, respondents were asked to indicate their overall discomfort rating on the scale. The overall discomfort ratings given by each of the twenty subjects were added and averaged to get the mean rating. Rating of Perceived Exertion

Pain is the indicator of discomfort. The perceived discomfort was recorded in terms of pain felt in various

parts of the body by the subjects while performing the activity. The Rating Exertion scale developed by Varghese et al. (1994) will be used to subjectively assess the exertion perceived.

RESULTS AND DISCUSSION

Physical characteristics of the respondents

Basic anthropometric data of the subjects have been presented in Table 1. As shown in the table, the mean age of the selected farm women was 32.1 years with the average height of 150.7 cm and mean for gross body weight was 47.6 kg. The mean body mass index was calculated to be 21.2 which meant that they were in the normal category.

Physiological parameters

Working heart rate

The data presented in Table 3 shows the comparison of average working heart rate between the two methods of weeding activity. The average working heart rate with the traditional tool was found to be 108.45 beats/ min, which decreased to 100.33 beats/ min while performing activity with the improved tool.

The physiological cost of work (PCW) was determined on the basis of TCCW and duration of activity. The PCW was observed to be less with the improved weeder twin wheel hoe (13.15 beats/min) compared to the traditional method of weeding (18.93 beats/min) (Table 3).

Energy expenditure

Average energy expenditure during weeding was found 7.23 KJ/min with improved tool over the 8.52 KJ/min for traditional method of weeding, respectively (Table 3).

Work output

The work output is measured in terms of the length of the lines weeded in a given time of 30 minutes. After performing the activity the respondents were asked to rate the perceived exertion on a five point scale every time after the use of each technology.

The results presented in Table 3 depict the work output of the weeding activity with the traditional and improved technology. Improved technology has significantly increased work output (171 m) than the traditional technology (104.4 m).

Table 3: Circulatory stress and physiological parameters of the respondents working with the traditional and improved weeding implements

Implements used	Physiological parameters				Output (m ² /h)
	Average working heart rate (beats/min)	Average energy expenditure (kilojoule/min)*	Average TCCW** (beats/min)	Average physiological cost of work	
Traditional method	108.45	8.52	568.02	18.93	104.4
Improved method-	100.33	7.23	394.52	13.15	171.0
Weeder twin wheel hoe					

** TCCW - Total cardiac cost of work

Subjective evaluation of postural discomfort

The mean values of overall discomfort rating (ODR) of the respondents are presented in Table 4. It was noted that overall discomfort rate was 4.1 with traditional method of weeding. This activity is time taking and performed continuously for prolonged hours. The traditional method employs continuous sitting posture while weeding with traditional khurpi. On the other hand, the discomfort rate was found to be 8.3 while weeding with improved tool.

Table 4: Mean value of overall discomfort rating (ODR) and musculoskeletal problems in performing weeding activity by traditional and improved implements

Weeding method	Overall Discomfort Rating	Musculo-skeletal problem
Traditional khurpi	8.3	Severe pain in shoulders, upper back, hands and fingers
Twin wheel hoe	4.1	Moderate to light pain in shoulder, hands and arms.

Musculoskeletal problems

Musculoskeletal problems and posture were evaluated by asking the respondents as to where they felt pain in their body after weeding with traditional and improved technology. Table 4 depicts that weeding with traditional tools in strenuous posture cause severe pain in shoulders, upper back, hands and fingers and the farm women perceived the task as moderately heavy. On the contrary using improved weeding tool induced moderate to light discomfort/pain in shoulders, hands and arms. They were relieved from back pain and improved tool employed standing posture and eliminated continuous sitting posture as well as some movement is also employed while working on a twin wheel hoe.

Rating of Perceived Exertion

The results in Table 5 depict the average rate of perceived exertion as expressed by the respondents while performing the weeding activity with both traditional and improved technology. The weeder twin wheel hoe has proved to be very light while performing the moderately heavy by the respondents.

Table 5: Perceived exertion rate while performing the weeding activity with traditional and improved

Equipments used	Rate of perceived exertion
Traditional Khurpi	Moderately heavy
Weeder twin wheel hoe	Light

Farm women's opinion

The opinion of farm women on the use of traditional and improved tool for weeding is presented in Table 6.

Table 6: Farm women's opinion on the use of traditional khurpi and twin wheel hoe for weeding

Factor assessed	Maximum attainable score	Attained score		Per cent of attained score over maximum		Remark	
		Traditional khurpi	Twin wheel hoe	Traditional khurpi	Twin wheel hoe	Traditional khurpi	Twin wheel hoe
Stress factor	10	6	8.5	60.0	85.0		
Work output	10	6	8.5	60.0	85.0		
Tool factor	15	10	13	66.7	86.7	Acceptable	Highly
Field acceptability	15	10	13	66.7	86.7		acceptable
Over all	50	32	43	63.4	85.9		

The percentage of attained score for traditional khurpi was found to be 63.4 per cent while incase of twin wheel hoe, it was 85.9 per cent. Thus rate of perceived opinion for twin wheel hoe fall in the category of highly acceptable tool as compared to traditional khurpi.

Adaptation and dissemination of the improved tool

Though, training was provided to women only, the technology for using twin wheel hoe was picked up by men also by just seeing it. The farm women after weeding by twin wheel hoe have developed a feeling of drudgery reduction. Now they are able to purchase twin wheel hoe at their own which indicates the successful transfer of this improved tool to the farm women. Now they are capable to explain the proven technology to other needy resource poor farm women.

CONCLUSION

Results of the study showed that twin wheel hoe was more suitable for crop weeding by farm women and their preference was shown towards twin wheel hoe as compared to the khurpi traditionally used by them. Twin wheel hoe weeder demonstrated by KVK has reduced the cost incurred for weeding as well enhanced the yield, apart from reducing the drudgery of farm women in weeding operation. Thus, it can be concluded that twin wheel hoe is found suitable for weeding of crop.

Paper received on : December 26, 2017

Accepted on : January 06, 2018

REFERENCES

- Corlett, E.N. and Bishop, R.P. 1976. A Technique for assessing postural discomfort, *Ergonomics*, 19: 175-182.
- Garrow J 8. (1987). Human Nutrition and Dietetics. Nutrition News 1991. National Institute of Nutrition, Hyderabad.
- Goel. A.K., Behera. B.K., Mohanty. S.K. and Nanda S.K. (2008). Development and Ergonomic Evaluation of Manually Operated Weeder for Dry land Crops. Agriculture Engineering International: the CIGR Ejournal. Manuscript PM 08 009. VOL.-X. September.
- Prakash, N., Rishikanta Singh Kh., Punitha P, S.S.Roy, M.A. Ansari and S.V.Ngachan 2014. Gender Mainstreaming in Small Farm Production System. Souvenir: 7th National Extension Education Congress in ICAR Research Complex for NEH Region, Umiam, Meghalaya during 8-11 November, 2014
- Varghese, M. A, Saha P. N., Atreya, N. (1994). A rapid appraisal of occupational workload from a modified scale of perceived exertion. *Ergonomics*, 37: 485-491.