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## Performance evaluation and impact of small weeding tools for drudgery reduction of farm Women

**Veena Shahi, Brajesh Shahi, Vikas Kumar and KM Singh**

#### Abstract

Weeding is a main drudgery prone activity mostly performed by farm women. To resolve this problem Krishi Vigyan Kendra conducted OFT programme in adopted villages of two districts of Bihar viz., Vaishali and Muzaffarpur during 2014-17 to assess the impact of three different weeding tools viz., Khurpi, RAU Wheel Hoe and Improved Grabar refined by KVK Sheohar for weeding in pulses and vegetable crops in line sowing. In total 225 respondents were selected for the study. The main aim of the study was to assess women friendly weeding tools to alleviate them from backbreaking drudgery, pains and ill health and enhance productivity and efficiency in the weeding operations. The women traditionally carried out weeding operation by using tool like Khurpi in squatting and bending position which decrease the work efficiency as time progresses. Results revealed that Improved Grabar was very good in terms of area covered (0.15 ha/day), weed mortality (90%) and low cost of weeding (Rs 6000/- per ha for two times weeding). The work output of Improved Grabar was near about four times as compared to traditional weeding tool *i.e.*, Khurpi in terms of area covered, and the performance of RAU wheel was at par. Farm women adopted the Improved Grabar as it increased the efficiency of work, reduced the drudgery and helped in avoiding bending or squatting posture. It reduced the exertion and fatigue and women felt comfortable. There was high degree of adoption of this tool by the farm women in the adopted villages. Therefore, there is need to popularize this weeding tool in other areas.

**Keywords:** Weeding, Wheel Hoe, Improved Grabar, Drudgery reduction

#### Introduction

A huge proportion of rural women involve in agriculture and allied fields. Migration of rural male to urban areas forces women to carry out the farm work which is previously done by male in addition to their household work. Women are doing 70% of major farm works like transplanting, weeding, threshing, cleaning, winnowing, grading, etc., and constitute 60% of the farming population (NSWF, 2014) [3]. Consequently, women are increasing their workload which causes significant physical, mental exhaustion and other health problems (Agarwal, 2007) [1]. It is true that at national level modernization of agriculture is taking place at a rapid pace, but women continue to perform farm operations which are full of drudgery while mechanized operations are performed by men (Singh, 2002) [6]. To get the full benefit of mechanization, it is very much necessary to use proper weeding tools, which will reduce drudgery and cost of cultivation.

Weeding is one of the most important intercultural operation in crop production system and it is mostly done by women. Majority of the farm women do weed control using hand tools like sickle, khurpi and so on. Although, this method of weeding proves useful as it covers 98 % weed mortality but it demands more labour and is full of drudgery. During these activities they adopt bending and squatting body posture due to which their physiological workload increases and also, they face many types of musco-skeletal problems as a result of which the efficiency of women to work decreases to a great extent (Sharma, 1999) [5]. An average estimate of 45 mandays per hectare is the normal requirement of weeding by khurpi which amounts to Rs. 6750 per hectare depending upon weed infestation.

Now a days various types of weeders are developed in India. These weeders are helpful for weeding in agriculture. Weeding by manually operated weeder increase the efficiency of workers and productivity of work.

Behera and Swain (2005) <sup>[2]</sup> reported that manually operated weeders have found acceptability due to their low cost. In view of multiple and hard work done by farm women, it is necessary to make available women friendly tools and implements for labour saving, cost effective and simple farm work to save millions of farm women from drudgery, stress and ill health. Hence, present endeavor aims to develop women friendly weeding tools to alleviate them from backbreaking drudgery, pains and ill health and enhance productivity and efficiency in the weeding operations.

### Materials and Methods

The study was conducted in two districts of Bihar viz., Vaishali and Muzaffarpur with farm women in adopted villages of the districts under OFT programme during 2014-17. Initially an exhaustive list of all the farm women was prepared by conducting ex-trainees meet, group discussion and face to face interview with local leaders and women engaged in agricultural operation. Farm women are aged between 21-45 years without having any physical deformity.

In this study, three different weeding tools viz., Khurpi, RAU Wheel Hoe and Improved Grabar refined by KVK Sheohar was used for weeding in pulses and vegetable crops in line sowing. Khurpi or hand hoe is most commonly used hand tool for weeding tool which is used in squatting position. It consists of a sharp, straight-edged metallic blade with a tang embedded into a wooden handle. RAU Wheel Hoe is a manually operated tool for weeding and inter-cultural operation in wide spaced crops. It consists of wheel frame, V-blade and handle. Weeds cutting and uprooting are done through push and pull action of the unit. Improved Grabar is manually operated tool for weeding and intercultural operations. It consists of three claw shaped tines fitted with a handle. The cutting and uprooting of weeds in field is done through pull action. It is light weight, easy to operate which improves the work posture and also reduces the drudgery of the women workers. This is operated at optimum soil moisture condition and preferably after 20- 25 day of sowing i.e., when the weeds are small.

Impact of these weeding tools were assessed by seventy-five farm women by applying systematic random sample technique. Thus, in total 225 respondents were selected for the study. In this experiment various parameters viz., area covered, mandays required per unit area, economics involved with each process of weeding, weed mortality percentage and perception of farm women related to different weeding tools (Heart beat rate and blood pressure before start and

completion of work) were used to assess drudgery in weeding operation. The heart beat rate and blood pressure were recorded by using sphygmomanometer (Digital).

### Results and Discussion

The average of data on various parameters used in this study from selected respondents for assessment of impact of different weeding tools for drudgery reduction were presented in Table 1 & 2. Results indicated that the performance of Improved Grabar have significantly higher than the RAU Wheel hoe and Khurpi. It was found very good in terms of area covered (0.15 ha/day), weed mortality (90%) and low cost of weeding (Rs 6000/- per ha for two times weeding) (Table 1). The work output (Area covered-ha/day) of Improved Grabar was near about four times more and time spent in weeding is almost 50 % less as compared to traditional weeding tool (Khurpi), and the performance of RAU wheel hoe was at par (Table 1). Thus, weeding by Improved Grabar is recommended. Similar findings were also reported by Sharma *et al.*, 2015 <sup>[4]</sup>; Tripathi *et al.*, 2016 <sup>[8]</sup> and Swarna *et al.*, 2018 <sup>[7]</sup> using different weeding tools for drudgery reduction.

In order to ensure good health, safety, quality of work life and achieving higher productivity, it is essential that weeding implement must be designed ergonomically and should be women friendly. The design of Improved Grabar is women friendly because it avoids squatting position and requires less bending during weeding operation. It was also found highly acceptable by farm women in terms of perception due to less stress, time and energy during weeding operation and observed normal blood pressure & heart beat after weeding operation (Table 1 & 2). By observing the benefits of Improved Grabar, more number of farmers in demonstrated villages were shown interest to adopt this weeding implements and they themselves manufactured this in nearby welding shops and using them weeding in vegetable and other wide spaced crops.

The weeding efficiency of the Improved Grabar was found satisfactory because of its work efficiency, reduced drudgery and comfortable working posture during weeding. It reduced the exertion and fatigue and women felt comfortable. By introducing such small implements, the work and work environment can be improved, physiological workload can be reduced in the weeding and the efficiency and work output can be improved significantly. Hence, promoting such tools among the farm women engaged in the agricultural operation should be done on priority basis.

**Table 1:** Performance of different weeding tools

Weeding Tools	Crop	Area covered (ha/day)	Weed Mortality (%)	Economics	
				Weeding time per hectare (hours)	Cost of weeding (Rs /ha) (2 Times per crop)
Khurpi	Pulses & Vegetable crops in line sowing	0.04	98	320	12,000 (40 mandays/ha @Rs 150/-)
RAU Wheel Hoe		0.13	87	192	7,200 (24 mandays/ha @Rs 150/-)
Improved Grabar refined by KVK Sheohar		0.15	90	160	6,000 (20 mandays/ha @Rs 150/-)

**Table 2:** Perception and acceptability of weeding tools by farm women

Weeding Tools	Crop	Perception				Acceptability for drudgery reduction & economy
		Blood Pressure (mm Hg)		Heart beat/ minute		
		Before starting of work	After completion of work	Before starting of work	After completion of work	
Khurpi	Pulses & Vegetable crops in line sowing	120/80	120/86	73	79	-
RAU Wheel Hoe		120/80	120/84	73	76	Moderately accepted
Improved Grabar refined by KVK Sheohar		120/80	120/82	73	73	Highly Accepted

## Conclusion

Among all the three weeding tools considered for the study, Improved Grabar was found very useful in terms of saving time, needed less energy to operate, increasing work capacity and productivity as well as women friendly. It was also found most efficient for weeding vegetable fields. The body discomfort reduced with use of Improved Grabar because it involved standing posture eliminating muscular fatigue and excessive loading of inter-vertebral discs of backbone. This proved that the design of Improved Grabar was ergonomically sound, women friendly, drudgery reducing. Hence there was high degree of adoption of this tool by the farm women in the adopted villages. Therefore, there is need to popularize this tool in other areas.

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