COMPARATIVE STUDY ON TRADITIONAL AND IMPROVED METHOD OF WEEDING

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ABSTRACT

In agriculture most of the weeding activities are done by tradition methods. Traditional method of Weeding takes longer time for weeding. Now a day's different 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. Hence present investigation was undertaken with an objective to compare field performance of developed weeder with hand weeding (khurpi). Present investigation was undertaken in Dept. of Home Science, R.T.M.N.U.Nagpur, and Maharashtra state during the year 2010-2011. For this investigation farmers and farm workers are selected randomly from Nagpur district. The investigation was undertaken in the field of cotton, soyabean and groundnut crops. The test conditions such as soil moisture content, soil type, bulk density of soil, root zone depth of weed, density of weed, effective field capacity etc. were taken into consideration. Speed of travel in km/h was calculated by using a stop watch. Present investigation concludes that developed manually operated weeder increase field performance for weeding activity and decrease the plant damage. Weeding by manually operated weeder increase their efficiency, work output and reduces the drudgery while performing weeding activity. Most of the workers are not occurs musculoskeletal problem by developed manually operated weeder due to that most of the workers are satisfied about developed manually operated weeder. Most of the workers are occurs musculoskeletal problem by traditional method of weeding due to bad posture used for weeding. The weeding index of the treatments

varied significant at 1% level of significance whereas the replications were found to be non-significant.

Key words: ***Traditional method, improved method and comparison***

INTRODUCTION:

Manual weeding requires huge labour force and accounts for about 25 per cent of the total labour requirement which is usually 900 to 1200 man-hours/hectare. In India, this operation is mostly performed manually with cutlass or hoe that requires high labour input, very tedious and it is a time-consuming process.

Moreover, the labour requirement for weeding depends on weed flora, weed intensity, time of weeding, and soil moisture at the time of weeding and efficiency of worker. Often several weeding operation are necessary to keep the crop weed free. Reduction in yield due to weed alone was estimated to be 16 to 42 % depending on crop and location which involves one third of the cost of cultivation.

Weeding and hoeing is generally done 15 to 20 days after sowing. The weed should be controlled and eliminated at their early stage. Depending upon the weed density, 20 to 30 per cent loss in grain yield is quite usual which might increase up to 80 per cent if adequate crop management practice is not observed. Competition in the early stage of growth and failure to control weeds in the first three weeks after seeding, reduce the yield by 50 per cent.

Presently there are many types of weeders available from simple to complex and motorized weeders. Several innovative and cost effective designs were developed and experimented according to the requirements of the farmers and soil conditions. Efforts are still on to reduce the drudgery in weeding operation. While operating the weeder, there would be some weeds left near the plant. These weeds were manually removed, which is a supplemental effort to the mechanical weeding. The field was irrigated one day before weeding and at least half inch water was retained for easy operation. Weeder was moved front and back between every two rows both vertically and horizontally. Hence present investigation was undertaken with an objective to compare field performance of developed weeder with hand weeding (khurpi).

MATERIALS AND METHODS:

Present investigation was undertaken in Dept. of Home Science, R.T.M.N.U.Nagpur, and Maharashtra state during the year 2010-2011. For this investigation farmers and farm workers are selected randomly from Nagpur district. The investigation was undertaken in the field of cotton, soyabean and groundnut crops. The test conditions such as effective field capacity, Theoretical field capacity, Field efficiency, Weeding index and Plant damage. were taken into consideration. Speed of travel in km/h was calculated by using a stop watch. Ergonomical parameters like heart rate, energy expenditure, TCCW & PCW are evaluated while performing the weeding activity in cotton crop by traditional and improved method using developed manually operated weeder.

RESULT AND DISCUSSION:

Table No.1. Field Evaluation while performing weeding activity by traditional method and by developed manually operated weeder.

Sr. No.	Parameters	Traditional method of weeding (khurpi) (Average of 5 replications)	Weeding by developed manually operated weeder. (Average of 5 replications)	Significant changes in improved over existing
1.	Effective field capacity (ha/day)	1.28	2.16	-2.42**
2.	Theoretical field capacity (ha/day)	1.32	2.19	-2.51**
3.	Field efficiency (percent)	58.25	83.89	-5.82**
4.	Weeding index (percent)	62.72	88.54	-5.97**
5.	Plant damage (percent)	8.63	2.85	-4.07**

Test applied - Paired t-test

*Significant at one tail

** Significant at two tail

Field evaluation of the weeding activity showed significant reduction in the plant damage while. Significant increase in the effective field capacity (-2.42**), theoretical field capacity (-2.51**), field efficiency (-5.82**) and weeding index (-5.97**).

Table conclude that developed manually operated weeder increase field performance for weeding activity and decrease the plant damage. Yadav and Pund (2007) observed that the weeding efficiency depends on the root zone depth of weeds, shape of blades and moisture content of the soil at testing site and cutting depth of the weeder blades.

Table No. 2. Ergonomical evaluation of weeding activity (N=50)

Sr. No.	Ergonomical parameters	Weeding by "khurpi" (traditional	Weeding by developed manually operated weeder	Significant reduction	't' value
1.	Average working heart rate (Beats/min)	130.20 ± 9.12	122.48 ± 8.04	-7.81	6.72**
2.	Average peak heart rate (Beats/min)	139.12 ±9.85	129.62±8.97	-9.5	7.13**
3.	Average energy expenditure (kj/min)	11.99±2.34	10.75±2.11	-1.24	0.92^{N5}
4.	Peak energy expenditure (kj/min)	13.40±2.47	11.88±2.28	-1.52	1.32^{N5}
5.	Average TCCW (Beats)	558±160.65	523±150.57	-35	7.58**
6.	Average PCW (Beats/min)	31.72±7.14	29.13±6.09	-2.59	1.07^{N5}

**Significant at 1% level

N5 – Man Significant

'-' Sign indicate reduction over existing

TCCW – Total cardiac cost of work

Pckl – Physiological cost of work.

Note : Values are means of 5 replications

Ergonomically parameters like heart rate, energy expenditure, TCCW & PCW are evaluated while performing the weeding activity in cotton crop by traditional and improved method using developed manually operated weeder is shown in above table. It is observed that average heart rate (130.29 beats/min) and peak heart rate (139.12 beats/min) were noted higher for existing method of weeding than the improved method. On an average 7.81 beats/min reduction of heart rate were observed during working condition. Whereas 9.5 beats/min reduction of heart rate were observed during peak heart rate measurement statistical analysis of average working heart rate and average peak heart rate were observed significant values at 1 percent level. The same trend was followed in case of average and peak energy expenditure. But there was no significant difference found in average and peak heart rate and energy expenditure of existing and improved method when statistical test was applied. Total cardiac cost of work was found higher in case of weeding by khurpi (traditional method). There was a significant reduction in total cardiac cost of work (35 beats) when weeding activity was performed with the help of developed manually operated weeder. Average physiological costs of weeding activity were not shown significant result. Zend et al (2008) observed that total cardiac cost of work was found higher in case of existing method when dung collection was performed in bending posture. Borah and Oberoi (2008) shows that with the use of improved tools/technologies ergonomic cost viz heart rate, energy expenditure, TCCW & PCW were reduced significantly at 1 percent level of significance.

Table No.3. The work output of the respondents performing weeding activityin cotton crop

Subject	Area acquired by khurpi (Traditional method) (m^2/h)	Area acquired by developed weeder improved method (m^2/h)
Subject - 1	110	154
Subject - 2	108	135
Subject - 3	98	143
Subject - 4	105	108
Subject - 5	104	120
Subject - 6	111	115
Subject - 7	97	150
Subject - 8	102	120
Subject - 9	104	135
Subject - 10	111	122
Mean	105	130
S. D.	4.94	6.12

Table depicts that work output of the weeding activity with the traditional method of weeding and weeding by developed manually operated weeder. Average work out of weeding by developed manually operated weeder were 130 m^2/h whereas average workout put of weeding by tradition at method (khurpi) were 105m^2/h.

Table concludes that developed manually operated weeder increase their efficiency, work output and reduce the drudgery while performing weeding activity.

Table No.4. Percentage distribution of respondents according to musculoskeletal problems in weeding activity (N=50)

		Traditional method of weeding (khurpi)					Weeding by developed manually operated weeder				
		4	3	0	2	1	4	3	0	2	1
1.	Neck	-	-	-	3%	7%	-	8%	4%	-	-
2.	Shoulder Joint	-	-	-	2%	6%	-	3%	1%	2%	-
3.	Upper arm	-	-	-	2%	4%	-	4%	6%	-	-
4.	Elbows	-	-	-	3%	5%	-	2%	2%	-	-
5.	Wrist / Hands	-	-	-	3%	7%	-	9%	2%	3%	-
6.	Lower arms	-	-	-	2%	10%	-	5%	3%	-	-
7.	Low Back	-	-	-	2%	2%	-	4%	2%	-	-
8.	Upper leg/thigh	-	-	-	3%	5%	-	2%	2%	-	-
9.	Knees	-	-	-	4%	6%	-	10%	2%	2%	-
10.	Calf muscles	-	-	-	4	4%	-	7%	-	3%	-
11.	Ankles	-	-	-	4	6%	-	8%	4%	-	-
12.	Feet	-	-	-	2	4%	-	4%	6%	-	-

(highly satisfied-4, satisfied -3, neutral-0, dissatisfied-2 and highly dissationsfied-1)

Table shows that 7 percent agriculture workers are highly dissatisfied about traditional method of weeding because they occurs musculoskeletal problem at neck while 2 percent agriculture workers are dissatisfied about traditional method of weeding because they occurs musculoskeletal problem at shoulder joint. Most of the agriculture workers are highly dissatisfied about traditional method of weeding and they occurs musculoskeletal problem at feet (4 percent), ankles (6 percent) call muscles (4 percent), knees (6 percent), upper leg/thigh (5 percent), low back (2 percent), lower arms (10 percent), wrist (7 percent) and elbows (5 percent) respectively.

Weeding by developed manually operated weeder shows 8 percent agriculture workers are satisfied about musculoskeletal problem at neck because in this typed weeding workers neck is in normal condition 2 percent of agriculture workers are dissatisfied about developed weeder due to occurrence of musculoskeletal problem at shoulder joint.

When agriculture worker doing weedig operation by developed manually operated weeder that time workers push the weeder in forward way, due to that increase the stress on shoulder joint 9 percent agriculture workers are satisfied about occurrence of musculoskeletal problem at wrist, because worker push weeder easily that's why there is no stress on wrist. Three percent agriculture workers are dissatisfied about musculoskeletal problem at call muscles. In weeding activity by developed manually operated weeder push to the weeder is major work of workers. That's why workers are walking more for weeding activity due to that they occurs musculoskeletal problem at call muscles.

Table conclude that most of the workers are not occurs musculoskeletal problem by developed manually operated weeder due to that most of the workers are satisfied about developed manually operated weeder. Most of the workers are occurs musculoskeletal problem by traditional method of weeding due to bad posture used for weeding.

CONCLUSION:

Present investigation concludes that developed manually operated weeder increase field performance for weeding activity and decrease the plant damage. Weeding by manually operated weeder increase their efficiency, work output and reduces the drudgery while performing weeding activity. Most of the workers are not occurs musculoskeletal problem by developed manually operated weeder due to that most of the workers are satisfied about developed manually operated weeder. Most of the workers are occurs musculoskeletal problem by traditional method of weeding due to bad posture used for weeding.

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