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Participatory Evaluation of Gender Friendly Rice Weeder

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ABSTRACT

The weeder is to reduce drudgery and ensure a comfortable posture of the farmer or operator during weeding and increase production. The rotary mechanical weeder performed well in clay loam soil. The field capacity of developed rotary weeder was 0.0136 ha/h with 82% weeding efficiency. The operating cost of the rotary rice weeder was Rs.950 /ha compared to Rs. 2300/ha for manual weeding. The saving in cost of weeding was 60% and saving in time was 65% compared to manual weeding.. The cardiac cost, energy expenditure of weeder was 108 beats min^{-1}, 19.50 kJ min^{-1}. respectively.

Key words: *Drudgery Reduction, Rotary Weeder, Ergonomics*

INTRODUCTION

Weed control in rice cultivation accounting for major share in the cost of cultivation. According to Nag and Dutt (1997) weeding accounts for about 25% of the total labour requirement (900 -1200 man hours/ha) during a cultivation season. In Chhattisgarh weeding operation of rice is performed manually with hand in squatting and bending postures. in these postures the energy consumptions for a given load is about 30-50% mere as compared to standing posture[3].

In rice cultivation; women have an important role in the operation of weeding. The weeding tools available have been primarily developed for male workers. Woman workers have to use them whenever required. As a result the output is low and many occupational health problems occur. The use of female anthropometric data along with those of the male can help in the proper designing of gender friendly rice weeder for better efficiency, safety and human comfort.

Anthropometric data from randomly selected 41 female agricultural labours were collected and analyzed. The subjects were in the age group of 25 to 35 years (Mean 31 years with standard deviation ± 2.3 years). Twenty-two anthropometric measurements were taken, which were considered useful for rice weeder design. Standard anthropometric procedures[1] were followed for the study. Table 1 shows the body dimensions and estimates of the mean, standard deviation and percentile values (5th and 95th) from above anthropometric data following assumptions were made.

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Table 1: Anthropometric data of female farmer

S No.	Particulars	Mean	SD	P_5	P_{95}
1	Weight (kg)	43.6	4.3	36.5	50.7
2	Stature	145.8	4.2	138.6	152.5
3	Eye height	136.5	5.2	128.0	141.9
4	Shoulder height	120.9	3.6	111.4	125.3
5	Elbow height	90.1	4.1	85.3	112.5
6	Knuckle height	72.2	3.7	63.2	75.3
7	Knee height	46.5	4.3	39.5	53.5
8	Middle finger to elbow	43.4	3.4	36.7	50.9
9	Elbow to shoulder	28.7	2.3	26.8	38.7
10	Forward arm reach	51.1	3.6	48.2	59.0
12	Circumference at elbow	23.5	2.6	20.9	26.0
13	Circumference at biceps	35.6	5.3	30.8	38.4
14	Palm breadth at metacarpal	6.9	1.2	6.4	7.8
15	Hand length	51.8	4.7	39.2	64.4
16	Foot length	22.5	1.3	20.1	24.9
17	Elbow to elbow distance	48.7	2.5	44.5	54.7
18	Height of elbow from ground	96.8	3.4	91.5	102.4
19	Elbow to elbow at forward hands	44.0	3.9	38.5	51.5

(Measuring unit: cm unless otherwise specified)

Energy cost in weeding operation

The results of the study show that there was significant difference in physiological cost between the rotary weeder operation and weeding by hand. Energy cost was recorded significantly higher in weeding by hand than rotary weeder operation. The maximum energy cost observed to be 21.58 kJ min-1 in hand weeding, whereas with the rotary weeder this value was 13.96 kJ min^{-1}. In hand weeding the subjects were bending over work surfaces for targets which are too low. It may be suggested that pain rather than capacity may often be the limiting factor in such task situations. Since the rotary weeder is provided with a long handle, the subjects can comfortably do the weeding in a standing posture.

SUMMARY AND CONCLUSION

Tests were conducted in clay loam soil with an average weed density 350 weeds/ m^2. The fields were submerged with water. In order to evaluate the performance of the weeder 4 female operators of average health were used. A randomized complete block design was used in the test with four treatments replicated thrice. The test results indicate that weeding efficiency was 82 %. There was no plant damage during operation by the weeder. The field capacity of the weeder was ranged between0.0127 to 0.0146 ha/h. (Table.2). This range in field capacity may be attributed partly to the subject's capabilities and partly to the moisture variation and weed density in the field. It was noticed that the developed weeder

performed better if the field is submerged with water at about 20-30 mm depth. Average efficiency of human operator were found 62% and cost of weeding Rs. 955/ha.

Table 2: Performance and physiological cost in field operation

	Transplanted				Row seeded			
	Subject			CD	Subject			CD
	S1	S2	S3	(5%)	S1	S2	S3	(5%)
(A) Field performance data								
Depth of operation (mm)	27	26	26	1.9	25	26	24	2.1
Width of operation (mm)	120	120	120		120	120	120	
Height of crop (mm)	223	220	219	11.3	252	244	253	9.4
Weed intensity (weeds/m^2) (a) Before test	44	39	43	3.2	233	237	234	8.5
Weed intensity (weeds/m^2) (b) After test	6	5	5		44	36	39	
Weeding efficiency (%)	87	87	89		81	85	83	
Plant damaged (%)	1.7	1.5	1.9		2.0	2.3	2.4	
Field capacity (m^2/h)	177	165	152	12.4	156	149	138	14.6
(B) Physiological cost in field operation								
Heart rate (Beats/min) at Rest	62	63	63	2.1	64	63	62	1.9
Heart rate (Beats/min) at Work	116	114	117	5.8	121	119	123	4.1
Oxygen consumption (l/min) (a) Rest	0.18	0.17	0.18	0.02	0.18	0.18	0.17	0.02
Oxygen consumption (l/min) (b) Work	0.628	0.603	0.647	0.04	0.736	0.715	0.749	0.03
Body part discomfort rating	21	18	23	2.3	25	27	27	1.7

S_{1-3} – Subject 1 to Subject 3, Plot size - 20mx5m , The data given are mean values of 3 replication

REFERENCES

1. Agrawal, K. N., R. K. P. Singh and K. K. Satapathy, Anthropometric Considerations for Farm Tools/Machinery Design for Tribal Workers of North Eastern India. Agricultural Engineering International: the CIGR Ejournal. Manuscript MES 1406, Vol. XII. March, (2010).
2. Gite, L.P and Singh, G., Ergonomics in agricultural and allied activities in India. Technical Bulletin No. CIAE/97/70. (1997).
3. Phesant, S., Ergonomics, Work and Health. London: The Macmillan Press Ltd (1991).