

Modification of Existing Power Weeder and Study on the Cost Economics of Different Weeding Methods

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ABSTRACT

Weeding is a time consuming and tedious operation in rice farming system. So years ago a lot efforts are made to design different types of weeder like manual, animal drawn, self-powered or tractor operated. The existing STIHL power weeder is self-powered, low weight, two row type, have features like 1.8 hp, 2-stroke petrol engine. Modified version has float with centrally driven worm gear system for power transmission. The minimum row to row distance should be 25 cm with line sowing/transplanting for better operation of weeder. One extra covering attachment is given to protect the splashing of mud into the operator surface. Alternate peg system in weeding wheel is provided for weeding in row. Modified weeder took less time (2 hours) to cover one-acre area. The cost incurred to cover one-acre area for modified weeder is INR 500 in comparison to existing weeder is INR 750.

Key word: Power weeder, Cost, Modified weeder, Float, Row to row distance.

INTRODUCTION

In all over India weed is a major problem in rice cultivation. Weed is the unwanted plant which grows in agriculture field and compete with crop plants for nutrients and other growth factors and in the absence of an effective control measure, remove 30 to 40 per cent of applied nutrients resulting in significant yield reduction⁴. There are different methods to control the weeds. The major weed control methods are mechanical, cultural, biological and chemical etc. Utilizes manual energy,

animal power or fuel to run the implements (ranging from khurpi / hand hoe/sickle to multiple tractor drawn or power operated implements) to remove the weeds. Traditional, efficient and safer, and no special skill is required in adopting them. But these are more labour and drudgery intensive, and success depends on timely operation which could be limited by too wet or dry soil conditions and also sometimes its use is dependent on the availability of suitable implements.

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Hand weeding (mechanical/hoeing as well as manual) (through hand hoe, wheel hand hoe or hand-weeder, cono-weeder, power weeder), Spudding (hand weeding or hand hoeing aided by a sharp edged sickle mainly between rows in oilseed & pulses), rouging, beusaning in Orissa and beasi in Madhya Pradesh, Land levelling are some of the example of methods of mechanical weeding.

In mechanical weeding method there are different type of weeder are available such as cono weeder, mandawa weeder, self-propelled power weeder and tractor operated power weeder. Mechanical weeding is performed by de-rooting the whole weed plant either by hand tools or by mechanical weeder and are most effective in both dry and wet

lands^{1,3,2}. The common weed control methods in Odisha are beusaning operation, hand weeding and using of herbicides. In beusaning operation, weeds are removed by using an indigenous plough after 30-35 DAS. In this case, power weeder can also be used for weeding to make it more effective and economical also. In this study, STIHL made two-power weeder is being used which is modified to make it user friendly.

MATERIAL AND METHODS

The power weeder used in this study is made by STIHL, a German company. The weeder is operated by a petrol engine with an accelerator and is of two-row type.



Engine used in this power weeder is generally petrol operated. Petrol requirement for weeding of 1-acre land is 2.5 litres. For maintenance, engine oil (2-T) is required @ 40 ml/litre. Time required for weeding 1-acre area is 2.5-3 hrs. Weeding wheel is designed in such manner that pegs are present alternatively which will help to settle the weed in field itself. It is required to maintain 25-30 cm of row-row spacing during transplanting for better weeding without damaging the main crop. There is engine run and stop button to make the engine idle or running. Apart from that one accelerator is available along with one safety lock. Whenever accelerator pressed simultaneously we have to use lock lever otherwise accelerator will not work.

RESULT DISCUSSION

The operator of the weeder has to put machine on his/her body with the help of a belt and put hands on the handle. There were two major issue that is identified during the field operation. First issue was heavy vibration on human body and as a result operator has to take rest after one hour of operation. Second issue was heavy flash of mud water on the operator body. To address this issue, the existing weeder modified and supported by two cycle rim. By this modification, vibration was reduced but it was difficult to operate the machine between two rows. Most of the time it damaged the crop.



Original STIHL Power weeder in operation at field



First modification to reduce vibration on body and operation at field

So again, the machine was further modified by providing a float having length of 10 cm and 3 cm of inclined length. To bring engine the heavier part of weeder to front, the length of the machine was reduced with a new and different look. So to put engine properly one

housing is provided just above the float and the float height can be adjusted as per requirement of the operator. Additionally, one covering attachment was provided just back of the weeding wheel. So flash of mud water was also stopped.



Second modified weeder to reduce vibration and maintain in line and in operation at field

The economic aspects of weeding were analysed using the simple calculation method. The expenses associated with different weeding operations are depicted in following

table. The study showed that cost of weeding manually could be reduced by using power weeder or IWM.

Cost economics for different weeding method

Method	Time required for weeding	Mode of Operation	Cost of operation
Manual	8 hours	Labour (12 no/ acre)	3000/-
Cono weeder	6 hours	Labour (6 no/ acre)	1500/-
Herbicide	3 hours	Herbicide + labour (1 no per acre)	1150/-
Existing Power weeder	2.5 hours	Labour (1 per acre + Fuel)	700/-
Modified Power weeder	2 hours	Labour (1 per acre + Fuel)	500/-

Note: Labour cost: @ 250/- per day

CONCLUSION

The power weeder was modified, constructed to be put on a housing and to be operated on a two floats. The result of the modification of the weeder indicated, the weeder is user friendly and covering attachment helped to avoid splashing of mud water on operator body. The floats helped to maintain weeding in rows without damaging the crop. For different type weeder and method of weeder, cost of weeding varies. The study showed that modified weeder took 2 hours of time with a cost of operation INR 500/- for one acre of weeding, which is less to existing power weeder. The existing power weeder took 2.5 hours of time with cost of operation 700/- per acre. Manual weeding and cono weeder took more time with higher cost of operation.

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