

A REVIEW PAPER ON DESIGN AND DEVELOPMENT OF WEED REMOVER

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ABSTRACT: *The weeder is one of the many farm mechanization in promoting soil tiller and weeders especially considering the fact that the majority of farmers are having small land. It reduces human effort. The implements are mostly self-guided. Working of the project is based on engine and gear mechanism which moves the cutter or blades. It is a great saver of time and expenses on field operations. Thus it will have very effective uses on the farm field either for tiling as well as for weeding. Development of high capacity energy efficient versatile machines and combination machinery for increased labour productivity, reduced unit cost of operation, improved timeliness of operation and suitable for custom hiring. Weed remover reduce human effort as compared to operation by bullocks. The bullock implements require the hand and body pressure to achieve depth and alignment of the implement in use, whereas in soil tiller and weeder, the implements are mostly self-guided. This reduces human drudgery to a great extent. The comparative higher output of operation by the soil tiller and weeders as compared to bullocks reduces the operational time and achieves timeliness in operation. The maintenance of the soil tiller and weeder is easy. It is ideally suited for mechanizing small farm holdings which account for 80 % of the farm holdings of the country. Cost wise the soil tiller and weeder should be an obvious choice of smaller farmers, if they are intending to have a mechanical power source for farm- operation. Soil tiller and weeder reduce the drudgery of collecting the waste grass between crops in the field during operations as compared to operations by bullocks. The soil tiller and weeder makes the manual of that wastage grass by cutting it in small piece and thoroughly mixed with soil during operation.*

Keywords: Rotary Tiller, Blades, Wear, Tillage.

INTRODUCTION:

Weed Remover is one of the many farm mechanization. Unlike tractors, soil tiller and weeders are non-conventional so far as the displacement of labours is concerned. In promoting soil tiller and weeders especially considering the fact that the majority of farmers are having small land. So they can hardly afford costlier tractors. therefore, the soil tiller and weeder should become a useful machine in the internal cleaning of crops which having small distance between them like Tomato, Brinje, sugarcane, soya bin crops, cultivation of paddy, in particular, and other crops in general for the smaller farmers. Its main objective is to reduce the manpower as in today's scenario labours are very hard to find as well as it reduces the working time. As it could be far better than the conventional using of labours or bull for tilling purpose. Since the bullocks also cause destruction of crop while taking turns and also moving between the field. From the word "Weed Remover", one can make out that there is a tiller which is powered. In this case the tiller is powered by an internal combustion engine and so is the name derived. The soil tiller and weeder appear to be replacing the animal power more effectively and help in increasing demand for human labour. The small and marginal farmers form major clientele for custom hiring of soil tiller and weeder. In highly fragmented and small holdings, soil tiller and weeder is preferred for arduous farm operations like paddling and preparatory tillage. Soil tiller and

weeder is preferred by small farmers and is being used primarily for earning cash income through custom hiring. Thus, this machine provides opportunities for self- employment in rural areas. Even marginal farmers and landless labours effectively and profitably use the soil tiller and weeder for self-employment.

TYPES OF OPERATIONS:

Depending upon the mode of operation, two types of soil tiller and weeders are there

- a) Pull type – The weed remover in which pull to the weeder is required to perform the work like internal cleaning of crops, cultivation in paddy when helical cutter is used.
- b) Push type - The weed remover in which push to the weeder is required to perform the work like grass cutting when ripper is used as a cutter uses an engine power driven tilling device, such as rotary and crank or screw blades.

ADVANTAGES AND APPLICATIONS:

1. It is a great saver of time and expenses on field operations.
2. Because of smaller size, two wheels and limited constructional arrangements, the soil tiller and weeder becomes one of the lightest yet most effective farm power sources.

3. Its operations are controlled by an operator through its extended handles by walking behind it.
4. One of the special features of a soil tiller and weeder is that it's both the wheels can do two jobs at the same time.
5. It makes the soil tiller and weeder move forward through traction of its wheel with the ground and at the same time change the direction as operator desires.
6. Adjusting height of blades
 - i. When not in use, to make the Weed Remover mobile the wheels are brought down and operator can move it.
 - ii. When in use on soil the wheels are brought up and blades come in contact with the soil and hence weed removing is done.
7. Can be directed with the example of front wheel
8. Internal cleaning of crops having minimum distance between them like Tomato, Brinje soya bin crops etc.
9. In cutting of grass of height 3-4 feet's weeding of crops. Remove useless plants growing in cultivated field.

Therefore, it can be appreciated that there exists a continuing need for new and improved equipment with incorporated mechanical system which can be used as agricultural equipment that normally accumulates to be instantly consumed. In this regard, this project substantially full fills this need.

ROTARY BLADES (TILLER):

A tiller is a type of motorized cultivating equipment that breaks or works the soil with the aid of rotating blades. Rotary tillers are available with advanced technologies and innovative designs which provide great performance. The rotary tiller can be self-propelled and driven forward on wheels. Featuring a gearbox, the rotary tiller enables one to increase the rotation speed of the blades more than the forward speed of the equipment. Rotary tillers have become world famous for preparation of seedbed in fields. These equipments are often used for breaking or working the soil in lawns, gardens, etc. Garden rotary tillers are used for the plantation of seeds in your garden or backyard. Electric rotary tillers are commonly used in gardens and fields. Nowadays, utilization of rotary tillers has been increased in agricultural applications because of simple structure and high efficiency for this type of tillage implements. By taking advantage of rotary tillers, the primary and secondary tillage applications could be conjugated in one stage. Therefore, the agricultural soil could be prepared with only one cross of this type of tillage implements from the land. This results in a decrease in the number of machinery passes on the land and subsequently, causes a decrease in the soil compaction which could be obtained due to the excessive equipments crosses from the land. Despite of their high energy consumption, since rotary tillers have the ability of making several types of tillage applications in one stage, the total power needed for these equipments is low. Because rotary tillers power is directly transmitted to the tillage blades, the power transmission efficiency in rotary tillers is high. Moreover, the negative traction existence in rotary tillers causes the required tractive force to be decreased and consequently,

$$\lambda = u/v$$

Where,

u is the tangential speed of the blades (m/s),

v is the forward speed (m/s),

The proper selection of the forward speed is dependent to the tangential speed of the blades (that is a function of rotational speed of rotor) and the length of sliced soil. The tangential speed of the blades (u), the rotational speed of the rotor (n), and the length of sliced soil (L) could be obtained by the following equations:

$$u = (2 \pi n R)/60000$$

$$n = (6000 \lambda v)/(2 \pi R)$$

$$L = (2 \pi R)/(\lambda Z)$$

In the above equations, R is the rotor radius (cm), v is the forward speed (m/s) and Z is the number of blades on each side of the rotor flanges.



Fig. Tiller Blade

WORKING:

In our project of Weed Remover we are using the engine with petrol (especially we are using Bajaj M80 Engine) which is source of power to the entire project. For starting we use priming by using kick. The engine starts but the main challenge lies in transmitting power from engine output to blade axle. For this purpose we use two gear assemblies of bevel and worm.

The output shaft of the engine is connected to the bevel gear which is intersecting type of gear that transmits the power in right angle.

The gear ratio used here is 1:1 hence the speed which is available from the engine, same speed is the output of the bevel assembly. The output bevel gear shaft is made in such a way that other end of the shaft has got worm, this worm is double start. Since this shaft is long we use bearings to support this one. Worm gear assembly is capable of having large reduction ratio hence we use this to obtain the reduction ratio of 20:1.

Worm and worm wheel is kept inside the casing with the support of bearings so that it gets a clean operation, the assembly is well lubricated and packed so that no foreign material can enter inside this assembly. Worm wheel is on the output shaft which has got blade disks welded on this shaft, blades can be fixed on this such provision is provided so that any broken blade can be replaced by just the nut-bolt arrangement.

The rotation of shaft causes disks to rotate which ultimately rotate the blades, this output shaft is supported on the casing ends and at the end (on main frame)

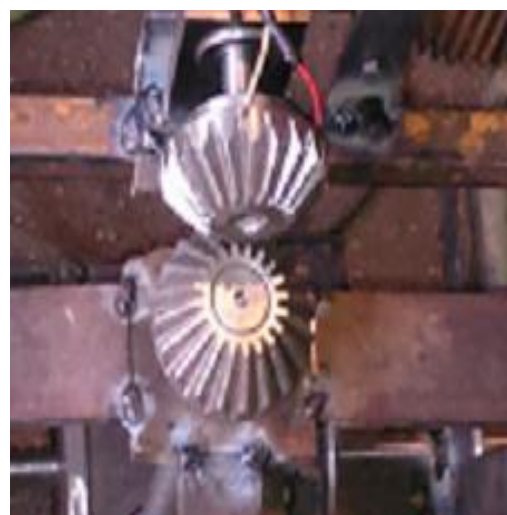


Fig. Bevel Gear



Fig. Worm & Gear

Hence finally the output of engine is transmitted from bevel and worm assembly to the output shaft which ultimately rotates the blades. Because of wheels an operator generally has to walk behind the weed remover to guide the direction of travel for various operations. Since front wheel is available the operator can move the Weed Remover in any required direction. In this operation the operator has to put some efforts to move the total assembly.

CONCLUSION:

We can conclude that it is less time consuming, worker friendly, portable machine respective to the conventional method of tilling. It assures of maximum work done with minimum work effort.

It helps us to extend imagination, engineering skills and fundamental knowledge. This machine is developed to reduce the time and effort required for weed removing and tilling up to the great extent. Also this machine manufacturing cost is less as compared to other. By selecting this project we could understand, become familiar and know the details of agricultural technology, with the help of this semi automatic machine we are trying to reduce labour cost, time of a middle class and small sector farmers. This is our little effort to make comfort to our farmers who feed our country. This project also teaches us the working in unity with proper co-ordination which is established within the project group. It also enhances the thinking or filling of mutual co-operation in the project group. Also the project members learnt to fabricate any model according to requirements. All the manufacturing processes are carried out with a great concentration and efforts.

REFERENCES:

- [1] The Aluminium Automotive Manual (2011).
- [2] M. Sabari et.al (2015) using Solid works software and then analysis performed by using CATIA software
- [3] T. Siva Prasad et.al (2014) has studied the properties of various types of wheel rims
- [4] Introduction to mechanical engineers, Ed Automobiles wheels and tyres, E conference publications.
- [5] Sagi Rama KrishnamRaju, Evaluation of fatigue life of aluminium alloy wheels under radial loads,(Department of Mechanical Engineering, Engineering College, Bhimavaram 534 204, Andhra Pradesh, India)
- [6] Reddy, J.N., An introduction to the finite element method, McGraw Hill Publishing Company
- [7] Cook, R.D., Finite element modelling for stress analysis, John Wiley & Sons, Pag: 27-45
- [8] Moaveni, S., Finite Element Analysis, Theory and application with ANSYS, Prentice Hall, Page: 1-36
- [9] S.Vikranth Deepak, Modelling and analysis of alloy wheel for four wheeler vehicle, Research Paper.