

Use of ‘V’ Shape Rotavator For Weeding And Cultivating In Ridge And Furrow Shape: Literature View

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Abstract— In India there are many states where ridge and furrow shape geometry is used for production of crops. The main problem in ridge and furrow shape geometry is for cultivation, weed removal or tilling operation after planting of crops becomes very difficult by mechanical equipment's. Due to inability of use of mechanical equipment's it is necessary to use man power for weed removal and conventional method for tilling operation. In recent days chemicals are used to control weed growth, but chemical method having its own drawbacks. Hence we developing a new idea which will helpful for mechanical weed removal, tilling operation and cultivation in ridge and furrow like soil arrangements crop farms. Various obstacles of weed removal in ridge and furrow type structure are discussed in this paper. Main focus of this paper is to study and develop various equipment's that may use for mechanical weed removal and made improvements in the methods of mechanical weed destroyer's as well as cultivation techniques. Some studies in agricultural field shows that majority of Indian farmers prefer tillage machines designed for preparing land with the help of machine with blades which rotates at very high Speed. Main attention of the project is on the arrangement of blades and the power transmission to achieve a desired function from project.

Index Terms— Weeding, portable tillers, mini-cultivators, sugarcane, rotary tillers, tiller blades.

I. INTRODUCTION

Agriculture is the backbone of Indian economy. India being developing nation in agriculture and industries based on agriculture products has prime importance in the national economy. Majority of the Indian population depends on agriculture and agro-based industries and businesses [2]. Tillage is an operation performed to obtain a desirable soil structure for a seedbed. A granular structure is desirable to allow rapid infiltration and good retention of rainfall, to provide adequate air capacity and exchange within the soil and to minimize resistance to root penetration [1].

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The recent trend toward restricting herbicide use due to rising cost and concern over potential health and environmental risks have intensified the search for alternate and integrated weed control strategies that include cultivation. As a result, newly-developed implements are now available to farmers. Mechanical weed control allows farmers to reduce or even eliminate herbicide use, and contribute to a more eco-friendly environment. In cereal crops, it costs the same or less than chemicals while still providing a satisfactory weed control [10]. There is a wide variety of cultivators/ridgers for soil preparation for potatoes available on the market. They differ mainly according to their cultivation and ridging elements and their drive [8]. 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 nibbles one to increase the rotation speed of the blades more than the forward speed of the equipment [4]. The geometry of tiller blades is considered to be the most important factor in their design, since both the shape of the blade tip and the length of the tiller blade facilitate cutting. The blade tip width exceeds the blade length. The contact between the blade and the soil moves slowly from the handle near the center of the shaft to the blade length. The blade tip cuts the intact grass at the boundary between the blade length and the blade tip. The grass can also be thrown away or torn off by the outward rotation [3]. The tillage quality is determined by the bulk density and soil structure.

II. LITERATURE REVIEW

Today's need of agricultural field is to use mechanical equipment's and complete all work in minimum time as early as possible considering this requirement there should be such equipment's which provide specific work with high efficiency and great performance. There are many agriculture machinery available in market for all works like cultivating, tilling, weed removal etc.

III. METHODOLOGY

Main attention of the project on the arrangement of blades and the power transmission to achieve a desire function from the project which is shown in figure. The actual method is simple as like other tiller's, weeder or cultivator's. Means there would any engine as a power source to give or provide required rpm or power. In this case we are using two stroke engine and which fulfill the requirement of any tiller or mini cultivator. Engine power connected to shaft which located at the back side known as middle intermediate shaft. This shaft also connected to main rotor shaft on which rotor blade is fixed. Hence engine will supply power to this rotor using chain and sprocket drives. This blade arrange in V shape we can discuss later in construction. Front big wheel drives the

machine and also supports. Another small wheel at middle which having adjustable height arrangements shown in figure. This small wheel control the depth of lades tiling which able to drive the operator easy and uniform depth. Later on this soil can be arranged in proper ridge shape using the outer casing of blade.

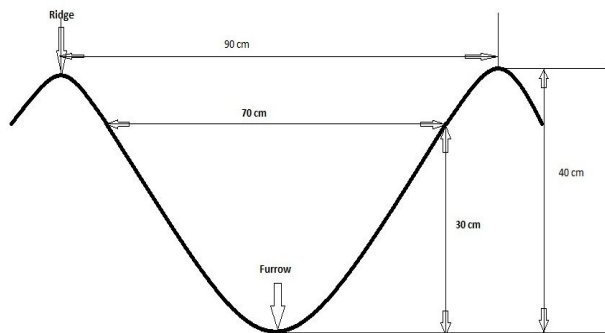


Fig.1- Dimension of ridge and furrow in sugarcane

The structure and shapes has been given to this cover will allow to us give proper soil arrangement in between two ridge of sugarcane. Hence we can say this would be satisfying requirement about the ridge making or weed removing from farm or also cultivating. The machine is worked on petrol hence having good power capacity also quite good average that is not so costly. This projects is gives us another way from not affordable agricultural giant machine which is also not possible for poor farmer who has small scale farms. The engine is about 80 cc and having maximum power of 4.7 HP which is sufficient for any tiller. Blade of rotor is made of high carbon steel. This metal is having good mechanical and chemical properties sufficient for tilling and digging in farm. Structural arrangement gives a proper balance for machine and easy to drive or handle. This machine have two wheel one is located at front and another is located at rear side of machine could need a stand for steady position. While in running condition machine is to be balanced by operator and all require controls is near to handle under the operator. Handle of machine at average height from which machine could balance easily and also provide great support to push the machine in front direction. Also press downward to avoid the back forces of rotor blade while in running or operating. Also this weeder have quite good aesthetic look which is impressive. Rather than using bulky machine this machine is much easier to operate and affordable.

IV. CONSTRUCTION AND WORKING

In this type of mini cultivator has a simple construction and also working. Basically we use here two stroke petrol engine a power source. For supporting purpose we have an arrangement of metal frame or body as shown in figure. Basically frame is supported by front wheel which has larger diameter. There is also a small adjusting wheel placed at back side. After the engine intermediate shaft is present and below that rotor shaft is connected which has a rotor blade arrangement.in rotor blade arrange in particular manner as per ridge requirement in most of agriculture farm like sugarcane means V shape. Middle blade of rotor is having large diameter than any other and from both side blade uniformly decreasing diameter. End of this rotor shaft is connected to frame by means of bearing.

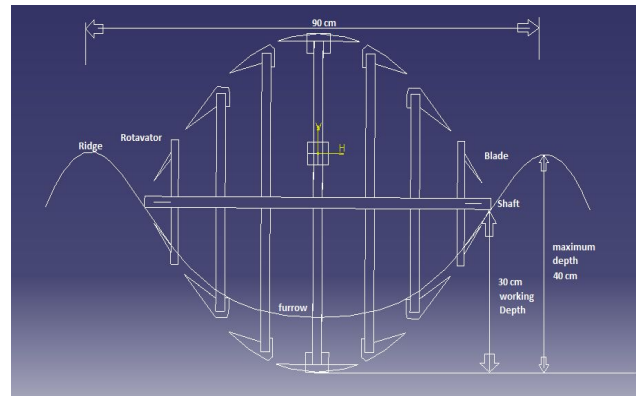


Fig.2- Rotavator blade arrangement in ridge and furrow

Most of the cases power is transmitted by V belt or chain and connected exactly middle of the shaft. In this case chain is connected at the one end of rotor shaft. At the top of engine there is another supportive component present like carburetor, choke valve, fuel tank, air intake pipe, and silencer. Engine acceleration wire connected to the handle at one side indeed right side as usually like scooters. Another handle of operator will be connected to engine gear box. Silencer of engine is revers as usual in bike, means its exhaust opening direction is at front. So this engine work on petrol and have kick to start. Working of this mini cultivator which is also use to remove weeds and can make ridge particular way of soil arrangement by using rotor blade. After starting engine user can control the rate of fuel injection into cylinder by using the accelerator provided at right side of the cylinder. Sometimes the reduction in power and rotation per minute is needed to control depends on the situation of land and crops conditions. That is why we use the gear engine and control is given to operator at left side of handle with clutch to shift to next gear and hence it would easier to make a shifting of gear in running condition. For another way to make it so advance and safe there is a brake provide at front wheel to stop at anywhere or farmers desire place. This stuff gives a so many operating and controlling choices, depends on which type of engine we using. So there is some certain condition which is actually needed for practical working purpose which is shown in table.

Specification	Value	Specification	Value	Specification	Value
Body frame material	Mild steel	Blade material	Carbon steel	Body frame material	Mild steel
Piston displacement	43cc	Fuel tank capacity	5 liter	Oil/gas ratio	50:1
Oil type	Viper	Gas type	Regular	Spark plug	BM 6A
Transmission	Gear	Tilling width (inch)	6-10	Tilling width (inch)	4
Rpm (minimum)	214	Rpm (maximum)	3600	Power (Hp)	3

Table 1- Specifications of mini cultivator or weeder

Main working of mini cultivator and its process is as usual simple like other mini cultivator. When engine is start using kick, then engine will be at running condition. The main shaft of engine is connected to the intermediate middle shaft which will rotate at same speed and rpm like engines shaft. Power is transmitted through the chain drive which is widely using in automobiles thus this power will forced to rotate middle shaft. This middle shaft which already has been connected using chain and sprocket, which is not at middle but at end. so it's end to end connection of chain drive from the middle shaft and rotor shaft. This is why just because in many case middle transmission could occupies the imported space of rotor blade. Which is remain as it is, and not removed by blade. In this case there is nothing between all blades to disturb the function of blades. Hence this end to end transmission of middle shaft to rotor is very useful.

Actual need of this project is to satisfy the need of farmer in sugarcane farm. That is to do soil arrangement on ridge in between two. In describing the blades which is made of stainless steel and other part material is mild steel. Shapes and size always matter about proper function of the weeder and cultivator made. Thus it can be improve using this new improvement making in this project. Blade is arranged in v shape design as shown in design in figure above. Most of the cases this blade is uniform in size and shape. If supposed to use in cultivated farm like sugarcane the ridge is usually V shape hence for next operation about soil and farm our blade usually uniform diameter no longer will be supportive. Hence to fight against that kind of problem this project would give satisfy answer using new kind of V blade geometry. Also this would be possible for this machine to dig all the soil under the blade. This v shape of blade will work on already made ridge and this won't be destroying that. Hence this new improvement is able to do good soil cultivating processes, and which is beneficial and cheap use machine.

V. ADVANTAGES

1. Forms ridges and furrows without totally destroying previous one.
2. Weeding for crops like sugarcane, cotton, vegetables, fruit orchards, grapes, etc.
3. Reduces the weed bulk with less manual effort.
4. Kill or suppressweeds through physical disruption.
5. Easy to operate and do not require any type of prior training for safe operation.

VI. LIMITATIONS

1. This type of tiller, weeder or cultivator can only be used on soil arrangements like ridge and furrow shape.

VII. RESULT AND DISCUSSION

The result from this above project outcomes are assurance of much efficiency, less time consuming, worker friendly machine respective to the conventional method of tilling. It assures you of maximum work done with minimum work effort. The main importance is to achieve the V shaped ridge soil arrangement with removing weed and tilling or digging soil. Most of crops having this kind of situation like sugarcane, maize etc. This machine is useful for small scale

farm owner farmers due to machine affordability and ease of operation.

This semi-automatic machine is developed to reduce the time and effort required for production up to the great extent. Also this machine manufacturing cost is less as compared to other tiller or cultivators. By selecting above topic we got familiar with and understood the details of agricultural technology. With the help of semi-automatic machine we are trying to reduce labor cost, time of middle and small sector farmers.

This is our little effort to make comfort to our farmers also this machine is manufactured in less cost as compared to other. All the manufacturing processes should be carried out with a great concentration because any defective design may have result in the failure of machine.

CONCLUSION

Rotary tillers are primary tillage tools which used for cultivating soil in the agricultural lands. This research focuses on the change in geometry of rotary tillers blades with different shape and size. Results showed that change in shape of blade has made excellent advancement in farms like sugar cane maize, paddy etc. According to the results, V shape mini tillers and cultivators are very useful than the any other equipment especially in case of ridge like formation. It shows that V shape has better design than the others and this does not destroys ridge but still done it's work perfectly and consequently makes it better choice. This paper presents a new theoretical method for rotary tilling, weeding and cultivating with the help of mechanical equipment. The results of this study should be verified by further field trials on rotary tillers according to the results offered in this paper.

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