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Technical Aspects of Multipurpose Weed Cutter or Power Weeder

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ABSTRACT

Automation is quickly advancing in today's technologies, and the agriculture area is no exception. Agriculture will benefit from automation in terms of progress as well as farmer comfort. Brush cutter/ Grass Cutting Machine/ Power Weeder / Harvester are the names of single multipurpose agricultural equipment. This equipment is very useful to all farmers for their intertillage operations. It makes it possible to do tedious farming jobs easily in a very short span of time and with lesser cost. This equipment is also fuel efficient consumes very less fuel. Weed cutter is the first machine widely accepted by the farmer in recent times. It has become multipurpose equipment on farms for performing different operations with various blade attachments. In this paper, all technical aspects of weed cutter or power cutter and safety use of this multipurpose machine is explained are presented.

Keywords: Weed Cutter, Brush Cutter, Power Weeder, Blade Attachments, Technical aspects, Applications

INTRODUCTION

Agriculture has been and will continue to be the backbone of the Indian economy for a long time. Agriculture is a branch of applied science and the art of farming that involves soil cultivation, crop production, and livestock rising. Agricultural activities have been carried out by small-holders cultivating between 2 and 3 hectares over the years, using human labour and traditional tools such as the wooden plough, yoke, leveller, harrow, mallet, spade, and large sickle, etc. Land planning, seed sowing, weeding, and harvesting are all done with these methods. Small landowners do not use modern farming methods and machinery because they are too costly and difficult to obtain. Maximum yield and good quality crops can be achieved by using modern farming methods, which can save a farmer from going bankrupt. However, the majority of farmers still use primitive farming techniques due to a lack of expertise or investment in modern equipment. Since tractors need resources that many Indian farmers do not have easy access to, hand tools are still widely used for land cultivation in India. As a result, the need for agricultural mechanization in India must be evaluated in light of a better understanding of the activities of small-scale farmers. For small and marginal farmers, there is a significant gap in technology adoption and implementation. The adoption of improved resource conserving cropping systems is critical to improving the livelihoods of poor farmers in developing countries. Although the majority of the required components are already in place, knowledge on equipment availability and efficiency is missing, and farmers and agricultural research and development departments are unable to communicate effectively.

Weed is any plant that grows in an unpleasant or inappropriate location at the wrong time, causing more damage than good. It's a plant that competes with crops for water, nutrients, and light. This can reduce crop production and land value, as well as raise cleaning costs. Weed control is one of agriculture's most daunting activities, and it accounts for a significant portion of the cost of production. Weeding is the process of removing unwanted plants from field crops. Mechanical weed control is very effective because it reduces the drudgery of manual weeding, destroys the weed, and maintains the soil surface loose, leading to better soil aeration and water intake. Farmers also expressed a general desire for effective weed control measures to stop weed growth and propagation. Chemical weed control is more common than manual and mechanical weed control. However, because of the harmful effects on the ecosystem, farmers are considering and accepting mechanical weed control methods. Modern agriculture makes extensive use of engineering, technology, and biological and physical sciences. Agricultural engineers are involved in drainage, irrigation, restoration, and channeling, both of which are important aspects of agriculture.

Evolution of Weed Cutter Machine

A weed is a plant that grows in the wrong place at the wrong time and does more harm than good. Weed consumes an unsustainable amount of farmer time, putting a halt to production. Weeding is one of the most important farm operations in the crop production system. Weeding is an effective agricultural unit activity that also has a high labour incentive.

Weeding takes up around 25% of the total labour required during a cultivation season (900-1200 man hours per hectare). The labor requirements for the weeding depend on weed flora, weed intensity, time of weeding and efficiency of worker. Weeding operations that are delayed or neglected can reduce crop yield up to 30 to 60%.Every year, India spends about 4.2 billion rupees on weed control in the cultivation of major crops.

TECHNICAL ASPECTS OF MULTIPURPOSE WEED CUTTER OR POWER WEEDER

Weed Cutter is the first machine widely accepted by the farmer in recent times. It has become multipurpose equipment on farms prefined both 2 -stroke and 4 -stroke models of various capacities from many companies in the open market. Most of the popular 2 stroke models have a 1.8 to 2.1 HP lightweight aluminum body petrol engine. It consumes 600 to 900 ml oil mixed petrol per hour depending on the work. The average total weight of the equipment is 7-8 kg. Hence the operator never feels heavy in operation. Most of the models hang on the shoulder and vibration is often less, hence it exerts very less strain on the operator. However, the operator should be quick enough to cover more area in a specified time.

Figure 1. Engine of Brush Cutter

Cutting tool is nylon rope of 2.7 to 3 mm thickness shown in figure 7; the head attached at the end holds 10 to 12 meters of this rope winded inside. Both ends of the rope come out of these two holes for 6 inch length. This rope rotating at 10,000 rpm cuts any weed up to finger thickness. The flexibility of the rope enables uninterrupted weeding, even if there are stone hidden in between. However wearing and braking of the rope will be more in rocky surface and experienced operators spends 5 to 7 meters of rope per acre. New operator more length need nylon rope of good quality cost 10 to12 rupees per meter. Operator has to knock the revolving head on the ground to release required length of rope from inside. Flexible rope and hanging method of the machine enables weeding even on unrelated surface and knobs and corners of the land. Cutting of the weed before flowering is practice in resent year instead of uprooting. Here, the farmer practicing organic farming gets enough herbage for marching. This weeder can bring down the application of chemical herbicides. Nylon rope are enough most of the weeds including parthenium and nepatherium. But for clearing shrubs needs three tooth blade attaching and detaching is needed, as shown in figure 6. This cutting tool is easy and takes very less time. The circular blade attachments shown in figure 5, is useful to cuts small trees. It can cut even dry flyer wood. It is been used for harvesting for the grass also. The cut herbage gets powdered when the nylon ropes is used. But three tooth the circular blades cut of the weed just above the ground.

Rotating cutting tool of the weeder throws small stone and pebbles on the front side; hence one should not stand in front of working machine. The guard shown in figure 8 protects the operator. Using this guard is must for the safety of the operator. Manufacturers of these machines recommend using helmet, ear pads to avoid noise, eye glass, hand gloves, thick pants and shirts covering full body and shoos; farmer never wear all these. However, it is better to use at least eyeglass and ear pad put off the engine while changing the cutting toot apart from these the weeding machine is safe enough for the operator. Do not forget to mix 2T oil at proper rate for two stroke machine, if the oil is mixed early itself in the can, sake the can well before filling the engine tank.

Weeding machine of a standard company needs no major repair work, at least up to 800 hours of operation. 2-stroke engine consumes 750 ml of petrol and works at 10,000 rpm while 4 stroke models consumes 500ml fuel and works at 6 to 7000 rpm. It means that, 4 stroke machine takes more time to complete work in a unit area compare to 2 stroke model. Hence 2 stroke models are preferred for efficient and continues heavy work. This equipment costs 20,000 to 35,000 rupees depending on the make and model. Most of the state government provides subsidy up to 50%. It is better to select the machine from a reputed company after confirming service after sales, guarantee, warrantee, availability of spares, etc.

This weeding machine has become multipurpose equipment now. It is a common practice to cut off the mulberry plant at the base ones in a year. It is necessary for healthy fresh growth and leafier. Manual pruning is laboring intensive. Weeder is been used by attaching special circular blade for this propose. Mulberry pronging has become easy and fast with this equipment. Pruning tree plants at half height are practiced once in 4 to 5 years. This is necessary of high heel

of better quality sprouts. The stem of this Plant is very hard and manual pruning is laborious. These plantations with thousands of acres and lacks of tree plant have to divert hundreds of labour for this work alone. Now, the use of power weeder with special circular blade having carbide tip, it cuts the steam without splitting. Now, most of tree plantation uses this equipment. Steel weeder has rubber roll attachments; this is useful to hip, paddy, arecanut, coffee etc spread on the floor of the yard. It can clean the cow shed. Some manufactures has designed special tiny cage wheel attachments. This is useful in weeding in paddy transplant in rose. This operation helps for better tillering also this equipment saves lot of labour necessary for manual weeding. This paddy weeder is popular in SRI method of paddy cultivation and also in transplant plant paddy fields still some popular companies have introduced hedge trimmer and other attachment for this weed cutter machine. Innovative farmers are using weeder for many interesting purposes; it can rub the floor of cow shed with metal wire brush attached to the weeder. The same attachment can clean algal growth on the RCC wall. The Cements floor is getting wax polished; a metal blade covered with thick cotton cloth act as polishing tool, now the same machine has become a grinder which is useful for sharpening the different cutting tools and other implements. Likewise the weed cutter is good companion of creative farmer.

The one more important uses of the weed cutter machine; innovative farmers converted into a paddy riper. Circular blade and bucket are attached at the end. Blades cut the paddy plant and bucket helps to keep the same in systematic rope and efficient operator can harvest paddy in one acre in a day which otherwise needs fifteen labours. Combined harvesters are not suitable for small compartments and turrets land. This weed cutter cum paddy ripper is sufficient for small farmer; they can harvest finger millet, wheat, soybean, sorghum etc. with same ripper. The farmer of the western Ghat region uses the same equipment for cutting jungle grass use as mulching material. Many people provide brush cutter service on higher bases and earn attractive income. In this case, one machine is sufficient for many farms. Likewise this weeder as becomes essential equipment of our farms.

Brush Cutter with Various Attachments

A brush shaper (additionally called a brush saw or clearing saw) is a controlled nursery or horticultural apparatus used to manage weeds, little trees, and other foliage not open by a grass trimmer or rotating cutter. Different edges or trimmer heads can be connected to the machine for explicit applications. It consists ofA power unit held close to the body, A pole through which the power is transmitted and A rotary cutting head at the opposite end of the pole to the power unit.

a) Power Units

The power units having three major forms; The more powerful units use two-stroke or four-stroke gas engines, A power cord connects electric motors to mains power, Rechargeable batteries fuel cordless electric motors.

b) Shaft

There are three types of shaft can be used; a curved shaft, similar to that of a basic line trimmer, is used in basic consumer units, a straight shaft with a gearbox at the cutting head end is used by more professional units. Top-of-the-line units have a straight "split" shaft with a disconnection point halfway down the shaft, allowing other attachments including pole pruners, cultivators, edgers, and hedge trimmers to replace the cutting head.

Figure 2. Brush Cutter with all major components

Brush cutter handles come in a variety of sizes and shapes, depending on the unit's weight and height. Bike handles (two handlebars on either side of the shaft) are used on larger, more powerful saws, while a D-shaped handle fixed on the shaft is used on smaller units. Harnesses are normally needed for heavier saws for protection and fatigue reduction. On units that need a brace, the shaft has several slots where the harness can be attached for overall balance.

c) Cutting Head

Circular saw blades (chisel tooth or scratcher tooth), brush knives, grass blades, and other cutting heads are examples. Other heads, such as bump feed and fixed line heads like those used on line trimmers, or adapted saw blades like a beaver blade that resembles a chainsaw, can be fitted to most brush cutters. Deflectors are mounted on the machine's cutting side to keep the user safe from debris thrown by the cutting head.

Figure 3. Two brush knives and a bump feed trimmer head (for smaller foliage)

Figure 4. Bump feed trimmer head, brush knife and chain flail

Accessories and other attachment of Brush cutter

Brush cutters are divided into three categories, each of which is equipped for a specific task. Brush Cutter can be used to cut shrubs and small trees if it is equipped with a steel circular saw blade (less than 150 mm. diameter) shown in Figure 5. Figure 6 shows the Brush Cutters with a rubber, plastic, or steel cutter blade are ideal for cutting grass, weeds, or pasture, among other things. Brush cutters with synthetic cutting cords or pivot-mounted thermoplastic blades are ideal for trimming and mowing grass and weeds shown in Figure 7. A blade guard is required on all brush cutters to protect operator from flying objects shown in Figure 8. Brush cutters may be used to cut dense weeds if they are combined with a weeder attachment as shown in Figure 9.Tilling operations within ridges and furrows can be effectively accomplished with the Tiller attachment shown in Figure 10.

Figure 5. 80 Teeth Blade

Figure 6. Three Teeth Blade

Figure 7. Nylon Wire Cutter

Figure 8. Blade Guard

Figure 9. Weeder Attachment

Figure 10. Tiller Attachment

MAINTENANCE AND THE SAFE USE OF BRUSH CUTTER

Single multipurpose agricultural machinery is known as a brush cutter, grass cutting machine, power weeder, or harvester. For intertillage activities, this equipment is extremely beneficial to all farmers. It enables time-consuming farming activities to be completed in a fraction of the time and at a lower cost. This equipment is also extremely fuel efficient, requiring very little fuel. It's important to understand how to operate this multipurpose machine safely so that it doesn't hurt the user in any way.

Figure 11. Brush Cutter with Weeder Attachment

Avoid damages while working with Brush Cutter

Brush Cutter will fling up items like stones and sticks at high speeds, injuring both the user and anyone nearby. If the spinning blade or cutting cord comes into contact with the operator's face, hands, legs, or feet, it may cause severe injuries. There are other risks during the operating the brush cutters. The brush cutter's noise can cause permanent hearing loss. Furthermore, the vibrations will permanently harm hands. A fire hazard may arise from fuel spillage, hot sparks, or smoking.

To start the Brush Cutter

i. Place the Brush Shaper on firm ground.
ii. Clear away any deterrents, particularly close to the front of the cutting sharp edge.
iii. Place one hand on the machine and work the starter with the other hand.
iv. First draw the beginning switch gradually up to the elbow of you hand to make the locking of starter and afterward pull a little quicker and the Brush shaper will begin
v. Keep it inactive for 30 minutes when utilizing first time and a short time later keep somewhere around 5 minutes inactive condition.
vi. Do not neglect to blend recommended 2T oil (40 ml) with fuel while powering.

Before starting work operator should check the following things

i. Whether the Brush Cutter is clean and free of grass and leaves.
ii. The cutting blade or cord is not bent, cracked, dull or worn. Damaged cutting blade and worn mounting components are major hazards.
iii. The safety harness (with larger model Brush Cutters) fits so that your shoulders, arms and hands are relaxed and your back is straight.

PERSONAL SAFETY EQUIPMENT

The clothing worn by the operator should be appropriate for the temperature conditions under which they are operating. Operator must wear approved:

i. Safety helmet when brush cutting the bush.
ii. Ear muffs or ear plugs to minimize the risk of permanent hearing damage.
iii. Eye and face protection (goggles or a visor) to protect against flying objects or saw dust.
iv. Leg protection.
v. Steel capped safety boots with a non- slip treads or metal spikes.
vi. Safety gloves or mittens to keep your hands warm and dry to prevent vibration white finger.

Using the Brush Cutter

i. Don't let operators' consideration slip while operator is utilizing the Brush Shaper. Ensure that operator keep a solid hold on the machine with two hands and get the sharp edge or cutting string far from operators' body.
ii. Ensure that operators' balance is strong, and that operators' stance is in every case even . Try not to cut above shoulder level.
iii. It is perilous to compel the brush shaper at unnecessary rates. So don't cut a speed that the brush shaper can't deal with.

iv. Difficult and overgrown terrain, or slippery wet conditions can pose an extra hazard.
v. Do warm up practices prior to beginning work and take normal rest breaks. Openness to consistent vibration, especially during chilly climate, may cause deadness or vibration white finger Raynauds Marvel – Raynaud's illness (or Raynaud's Condition) is an uncommon problem of the veins, as a rule in the fingers and toe). On the off chance that operators' fingers begin to shiver or feel numb, see a specialist.
vi. Exposure to the high noise levels emitted by brush cutters can cause permanent hearing damage. Wear suitable hearing protection that fits you properly.

Training

Operator of the brush cutters should be trained in:

i. Safe working techniques.
ii. Operating conditions in all areas including abnormal or hazardous conditions.
iii. Basic information on the particular brush cutter, its controls, attachments and components, design, capacity, stability and limitations.
iv. Correct starting and stopping techniques.
v. Cleaning and servicing.
vi. Correct adjustment of harness and handles.
vii. Selection, maintenance and correct use of protective clothing and equipment.
viii. First Aid and procedures.

CONCLUSION

Weed cutter machine which is used to perform different activities in agriculture field. In the general view, each of those activities requires different kind of machinery or an extra set of expert hands which ultimately cost the farmer a fortune and brings down their monthly income even less. It has been concluded that the weed cutter machine will save a lot of money and time for the farmers which will directly affect the economy of India as the income of the farmers grow. As a result of the work, it can conclude that the work will meet the needs of small-scale ranchers who cannot afford to purchase expensive agrarian equipment. It took less labour and time than traditional methods, so if a farmer uses it on a large scale, his costs will be cut in half.

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