

Brush Cutter: A Multipurpose Solution for Mechanised Agriculture

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Conflict of interests: The author has declared that no conflict of interest exists.

How to cite this article?

Mahapatra, 2024. Brush Cutter: A Multipurpose Solution for Mechanised Agriculture. *Biotica Research Today* 6(1), 15-17.

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Abstract

Brush cutter is a small powered tool primarily developed for weeding and vegetation management. Being low cost, portable and easy to manoeuvre it is advantageous for small and marginal farmers. It is also suitable for fragmented land and hilly regions. Looking at the demand, gradually different attachments were developed for brush cutter. Presently a farmer can do maximum of the field operations using a brush cutter. The different activities performed like tillage, hole digging, weeding, spraying, pumping water, pruning, mowing, harvesting etc. are discussed in this article. Although brush cutter has several advantages research on reduction of vibration and its effect on human body are required for its wide adaptation.

Keywords: Brush cutter, Multipurpose, Tool attachments, Vibration

Introduction

In the ever-evolving landscape of agriculture, efficiency and versatility are key factors for success. One tool that has proven to be a game-changer in this regard is the brush cutter. A rotating cutting head, a power transmission pole and a power unit located close to the body form a brush cutter. These brush cutters have either a straight or curved shaft, depending on the needs of the task. While small brush cutters employ a D-shaped (loop) handle raised on the shaft, large brush cutters use bike handles called as cow-horn brush cutter. Backpack brush cutter is suitable to transport and operate in flat area. A brush cutter and its important parts are shown in figure 1. Bello *et al.* (2015) developed and fabricated a brush cutter to eliminate inherent ergonomic designs and costs of imported brush cutters and improve performance efficiency. The machine incorporated an electric power pack which provides 4hours of continuous power for cutting, ergonomic design and a ground wheel roller was introduced to reduce carpal disorder that could be associated with hand held brush cutters.

Originally designed for clearing overgrown vegetation, brush cutters have now found a multitude of applications in agriculture, making them indispensable for modern farming practices.

Article History

RECEIVED on 02nd January 2024

RECEIVED in revised form 14th January 2024

ACCEPTED in final form 15th January 2024

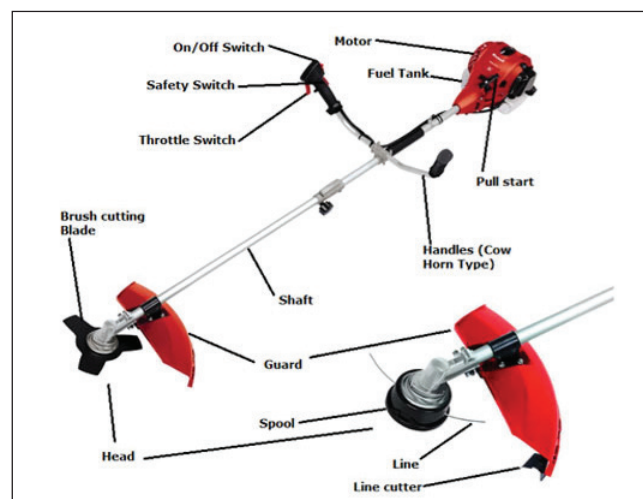


Figure 1: Brush cutter and its different components

Brush Cutter for Multiple Operations

Land Clearing and Preparation

Before planting a new crop, fields often need to be cleared of existing vegetation and debris. Brush cutters excel in land clearing, making it easier for farmers to prepare the soil for planting. The versatility of these machines allows them to handle various terrains and vegetation types. Rotary tillers

are added to till land, however, not recommended for tilling large areas due to high vibration caused by the attachment. By bending the shaft portion between the engine and the steering wheel downward and adding thickness to the shaft pipe wall (without increasing its weight) where the drive shaft bearing and handles are mounted, it is possible to reduce vibration by 20-30% (Yoshida *et al.*, 2013).

Weed Control and Vegetation Management

Brush cutters are highly effective in controlling weeds and managing unwanted vegetation in agricultural fields. With their powerful engines and sharp blades, these machines can swiftly clear dense undergrowth, ensuring that crops receive maximum sunlight, nutrients and water.

Irrigation and Spraying

Centrifugal pump can be added to the power outlet of the brush cutter engine. The sprayer attachment is added to the power outlet of brush cutter engine. A long hose pipe up to 50 meters length may be used for spraying without carrying the engine.

Orchard and Vineyard Maintenance

Orchards and vineyards require meticulous care to thrive. Brush cutters are ideal for maintaining the spaces between rows of trees or vines, eliminating grass, weeds and low-hanging branches. This helps in promoting optimal air circulation and sunlight exposure, contributing to healthier and more productive fruit-bearing plants. Brush cutter based sugarcane leaf stripper with axial fan for blowing or suction has been developed by researchers. Brush cutters like portable motorised equipment are becoming popular among coffee growers for pruning, mowing and harvesting.

Cover Crop Management

Cover crops are crucial for soil health and fertility. Brush cutters play a pivotal role in managing cover crops by cutting them down when needed. This ensures that cover crops do not compete with the main crops for resources and are effectively integrated into the soil, enriching it with organic matter.

Crop Harvesting

Parcianello *et al.* (2022) compared double disc, triple disc and double wire cutting tools for harvesting of crops like wheat, ryegrass and spices plants. The results indicate that the brush cutter equipped with the triple-disc blade had greater operational capacity compared to the other cutting tools. Dixit *et al.* (2022) developed a brush cutter based paddy harvester with a 40-teeth circular saw blade with a carbide tip. The machine's field capacity was found to range between 0.031 and 0.033 ha h⁻¹. A break of 10 minutes for each 30 minutes of working was suggested. The benefits-cost ratio and payback duration of the portable rice harvester were found to be 1.35 and 74.91 hours, respectively.

Horticultural Applications

Brush cutters are widely used for maintenance of lawn and landscapes. The nylon wire cutter attachment is used for cutting lawn grass. Hedge trimmer with brush cutter is a convenient way to shape hedge bushes. The trimming of

branches is done by using chain saw attachment with an extension rod. The engine of brush cutter can also be used as power source for areca nut or coconut plant climber. Tea plucker attachments having a cutter bar, blower and collection bag are used for tea leaf harvesting. Brush cutters are also used for pruning tea plants. Different attachments available for brush cutter are presented in figure 2.



Figure 2: Attachments available for different field operations by brush cutter

Conclusion

Brush cutter has evolved from a mere clearing tool to a versatile and indispensable asset in modern agriculture. Its ability to handle various tasks, from weed control to land preparation, makes it a multipurpose solution for farmers worldwide. Its importance multiplies for countries having more small and marginal farmer with small and fragmented land holding. As agricultural practices continue to advance, the role of the brush cutter in promoting efficiency and sustainability is set to expand, contributing to the overall success and productivity of the farming industry. However more studies regarding reducing brush cutter vibration and its effect on human health are required.

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