

DESIGNING OF A TWO-WHEEL TRACTOR COUPLED FODDER CHOPPING MACHINE

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Compost is a mixture of decayed organic matter used for fertilizing and conditioning soil. *Gliricidia* (*Gliricidia sepium*) and Mexican sunflower (*Tithonia rotundifolia*) locally known as *Wal suriyakantha* are readily available sources for composting in Sri Lanka and enliven the compost by increasing its nitrogen and phosphorus content. Despite this, most composters are unwilling to use tender stems of *gliricidia* and *wal suriyakantha* other than their leaves, because the long stems act as barriers to the mixing process. Therefore, it is necessary to reduce the size of tender stems of feedstock to diminish the maturation and make the process easier. The aim of this study was to design a two-wheel tractor coupled fodder chopping machine for small and medium-scale composters in Sri Lanka. The chopping machine was designed to comprise with the feeding tray, chopping chamber, chopping assembly, power transmission system, and outlet. The preliminary tests revealed the mean diameters, lengths, mass of *gliricidia* and *wal suriyakantha* tender stems as 14.2 mm, 1531.2 mm, 297.1 g and 7.6 mm, 752.7 mm, 109.9 g, respectively. The feeding tray was designed to be shortened rectangular-based pyramid. The slant angle was made to be 38°, allowing for the simultaneous feeding of minimum five *gliricidia* tender stems. The chopper assembly was composed of two blades with a flywheel which was mounted on a shaft. Power was designed to be transferred from the tractor's flywheel (4.85 kW) to the chopper assembly shaft by means of a belt and pulley system. Blades at 900 rpm were designed to achieve a maximum mean cutting length of 19 mm. Furthermore, the capacity of the machine was to be 40.1 kg h⁻¹ and 29.7 kg h⁻¹ for *gliricidia* and *wal suriyakantha* respectively. Hence, this design has a potential to develop as a prototype of a two-wheel tractor coupled fodder chopping machine.

Keywords: Belt and pulley system, Compost, *Gliricidia*, Tender stems, *Wal suriyakantha*