

## Manually operated sugarcane set cum forage cutter for women

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### ABSTRACT

The assignment on Development and Testing of Manually Operated Sugarcane set cum Forage Cutter was under taken with the objectives of developing a machine useful for both cutting operation and energy consideration specially of women. The design considerations were specially given for feeding the forage, collection arrangement and ease in operating the pedal of the machine. The output of forage cutter was found to be 16.25, 21.25, 32.50 and 41.25 kg/hr for dry sorghum and 24, 38, 64 and 86 kg/hr for green maize for 25, 50, 75 and 100 mm length of cut, respectively. The working capacity of female worker per day was found to be 5.33 hr. The actual output in eight hours was 86.61 kg for dry and 127.92 kg for green forage. The fabrication cost of the machine was Rs. 7000/-. The total weight of the machine is 41.1 kg. Hence, it is easy for transportation. The trial was conducted on sugarcane for cutting the single eye sets with the help of forage cutter and it was found that nearly 600 sugarcane single eye sets were cut per hour and collected without crushing and damaging the bud. The overall performance of the forage cutter during operation was found satisfactory without breakdown.

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**F**arming community is the backbone of Indian economy and they put their rigorous efforts for uplifting the status. For getting the maximum return from their fields, they have to offer a lot of hard slog which is facilitated only by timely operation and proper utilization of machineries.

Sorghum is one of the four major food grains of the world in addition to foods of human beings. The crop provides good fodder for animals. Forage is basic feed for cattle and horses. Forage can be cereal forage and herbaceous forage. Such as straw, corn stalks, sugarcane tops; Napier grass and other forage materials are used for livestock production, fish culture and compost making. Forage is environment friendly as it reduces soil erosion, pesticide usage and fertilizer application and can increase soil structure, organic matter content of soil and enhance agriculture profitability in conclusion.

Sorghum and maize are mostly used as feed for cattle. Forage sorghum is used primarily as silage for livestock. The small farmers having 1 or 2 cattle, feed their animal by cutting whole stem into 2 to 3 pieces which is neither recommended nor can be used efficiently. On the other hand, the farmer cannot either hire or purchase the power operated forage/chaff cutter to make the small pieces of forage stalk. Presently the farmers are using sickle or axe to cut the forage stalk into the pieces, which is time consuming and require more human energy.

Taking above facts into consideration, there exists a need for suitable manually operated pedal type forage cutter. Taking women energy into consideration, thought

was given to develop a manually operated (especially by woman) pedal type forage cutter to achieve maximum output. The machine is portable and is within the reach of common farmer.

After development, modification and testing of said machine for cutting forage, it was decided to make an additional arrangement for making sugarcane set of single eye bud so as to increase the utility of the machine.

Belvin (1956) carried out a series of experiments to study the phenomena of cutting and the energy required in the process. He observed that at higher speeds, cutting takes place both due to shear and impact, whereas at lower speeds the effect of impact is insignificant.

Chancellor (1958) studied the energy required to cut the stem of different thickness and reported that force and energy required to cut the greater, aggregate thickness was more than smaller aggregated thickness of material.

Pradhan, (1977), O'Dogherty and Gale (1986) cutting energy required to cut the stem is directly proportional to the stem diameter *i.e.* as stem diameter increases cutting energy required to cut also increase and *vice versa*, at constant moisture content.

Nagpal and Agarwal (1973) observed that the cutting energy was found to vary with moisture content. It was observed that the cutting energy required to cut a given cross sectional area of the throat with fixed dimensions (112.50 cm<sup>2</sup>) was more (*i.e.* 393 kg cm at 76.5 % moisture content) in case of drier than in case of green matter (323 kg cm at 93.5 % moisture content).

Patel *et al.* (2001) Studied on ascertaining optimum