

Development and performance evaluation of bullock drawn turmeric digger

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ABSTRACT

Bullock operated turmeric digger was developed in the Department of Farm Machinery and Power, college of Agril. Engg. and Technology. It consist of various parts Frame, Shank, Blade, Handle. The prototype was developed considering spacing and varieties used in Parbhani and Nanded districts. The newly developed bullock drawn turmeric digger was evaluated for its field performance. The field trails were conducted as per IS code (11235, 1981). The machine had shown better performance for turmeric harvesting in terms of rhizomes damage percentage, digging efficiency, field efficiency, draft requirement over existing machine and manual methods, respectively. The rhizome damage was less 10.7 per cent for V blade with 70° angle. The digging efficiency was found about average 86-95 % V blade with 70° angle. The field efficiency was found to be 71-88% V blade with 70° angle. Draft requirement of bullock drawn turmeric digger was found to be 108 kgf.

Key words : *Pongamia pinnata*, Karanja methyl ester, Biodiesel, Economics.

Harvesting of turmeric rhizome is labour intensive, requiring skilled men labour to dig out the crop. The general practice in conventional method of harvesting is to wet the crop after removal of the cut foliage, which are spread in the field for drying. The conventional practice is to cut the leaf shoots upon maturity and slightly wet the field. The turmeric rhizomes are dug out after a week by skilled labour with a special fork type of spade/pick axe. Normally turmeric digging is done by contract labour that demands very high wages during peak season. The charge demanded is very high and the damage caused to rhizome by the fork type spade is 10 to 15 per cent because the labour has to dig out the clump all around and in doing so, the fork bruises the rhizome every time it hits the rhizome. The present situation of migration of labour to various scholastic jobs and thrust for more production to feed the increasing population makes the harvesting during peak season a tiresome one. The non-availability of such skilled labour and the high wages demanded by them to harvest the crop, the baliram plough is being used in recent years to harvest the turmeric crop. The collection of rhizomes is carried out manually. The efficiency of this operation is very low and cost required is high. The objectives of this research were to develop and fabrication of bullock drawn of turmeric digger and Evaluation of turmeric digger in field.

METHODOLOGY

Design of functional component of turmeric digger:

Following are various parts fabricated for turmeric digger.

Frame, Shank, Blade and Handle

Frame:

Design of main frame was made by considering mild steel subjected to bending, torsional and shear stress,. The frame was manufactured from M.S. Angle 50x50x5 mm. The size of the frame was 60 x30 cm.

Design of shank:

Design of shank was made by considering squire mild steel rod subjected to bending, torsion and shear stresses. M.S. square of 40x10mm was used for this.

Design of blade:

For design of blade M.S. flat was taken having shear stress and torsional stress greater than 150 kg/cm² and 450 kg/cm², respectively. M.S. flat having thickness of 20 mm was used to over come the problem of bending and breaking V blade with 70° angle was used for digging of turmeric

Design of handle:

It was fabricated from M.S. angle 25x25x5 and 50mm pipe The height of the handle was kept 65 cm as per the ergonomic specification of the man.

Specification of turmeric digger were :

- Make - MAU, Parbhani
- Type - Bullock drawn
- Power source - 0.8 HP bullock pair
- Spacing - 30, 45, 60 cm (adjustable)
- Frame dimension- 60x20 cm rectangular

Moisture content of soil :

Moisture content of soil was determined by oven