

Research Paper :

## Optimization of blade for bullock drawn turmeric digger : A practical approach

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### ABSTRACT

Bullock operated turmeric digger was developed in the department of FMP, College of Agril. Engg and Technology. It consisted of various parts viz., Frame, Shank, Blade and 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 has shown better performance for turmeric harvesting in terms of rhizomes damage percentage, digging efficiency, field efficiency, draft requirement over existing machine and manual methods. The rhizome damage was less 10.72% in V blade with 70 degree angle. The digging efficiency was found 86-94.87% in V blade with 70 degree angle. The field efficiency was found to be 71-89.83 in V blade with 70 degree angle. Draft requirement of bullock drawn turmeric digger was found to be 108 kgf.

**Key words :** Turmeric digger, Bullock drawn, Optimization

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 as 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 objective was to optimize the blade for bullock drawn of turmeric digger and evaluation of turmeric digger in field.

### METHODOLOGY

The bullock drawn turmeric digger was designed and developed in Department of Farm Machinery and Power College of Agricultural Engineering and Technology,

Marathwada Agricultural University, Parbhani. The design and dimensions were based upon local crop spacing and harvesting conditions. The prototype was developed considering spacing and varieties used in Parbhani and Nanded districts.

#### Design parameters:

The turmeric digger was developed by considering the following parameters

#### Crop parameters:

Whole or split mother rhizome or finger rhizome are used for planting. It is either planted on raised beds of 60 cm to 90 cm width with 15 cm height on ridges and furrow or in flat system. The spacing is kept 30 cm x 15 cm or 30 cm x 20 cm (in beds) and 40 to 60 cm x 25 cm (on ridges and in furrows) and 60 cm x 15 cm (in flat system).

Turmeric takes 9 months for harvesting, drying up of the aerial portion indicates maturity. On an average a yield of 25-30 t/ha of fresh rhizomes may be obtained.

In most of the varieties of turmeric rhizomes depth ranges from 17 to 20 cm. It was therefore necessary that the operating depth of implement would be more than 20 cms.

#### Soil parameter:

It is defined as the resistance offered by the soil to the implement while working. The soil resistance varies from soil to soil. Table 1 gives the soil resistance values for different types of soils.