

Performance evaluation of power tiller drawn groundnut digger

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ABSTRACT

Groundnut digging operation is labour intensive and losses due to incomplete uprooting of the crop are heavy in conventional method. This calls for mechanization of groundnut digging operation. Power tiller is a promising source of farm power which can perform different farm operations including digging operation in groundnut production process. A prototype consisting of serrated blade, clevis for changing blade angles, shank, supporting frame having provision for depth adjustment, drawbar hitch bracket assembly etc., was developed and its field performance was evaluated. The developed digger can relieve the farmer from fatigues work of hand pulling of groundnut pod and saved 11 to 13 per cent pods, which were lost in local method of harvesting. The test results indicated that effective field capacity of the digger as 0.256 ha/day, with 87.98 per cent digging efficiency.

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Groundnut (*Arachis Hypogaea*) is tropical-subtropical oil seed crop popular due to its content and quality of the oil. The important groundnut growing countries are China, Nigeria, U.S.A., Brazil, India and Burma. Among these, India ranks first in area and production. During 1995-96 the area under groundnut cultivation in country was 8.60 Mha with annual production 7.09 Mt (Singhal, 1997). The major groundnut producing states of India are Gujarat, Andhra Pradesh, Tamilnadu, Karnataka and Maharashtra. The total area under Maharashtra is 742 lakh hectares, production 5.46 lakh tonnes and average yield 736 kg/ha. In India, the harvesting of groundnut is done by manually, using hand tools, animal drawn groundnut digger and tractor mounted groundnut digger. According to Seshadri (1962) the harvesting of groundnut shares about 23 per cent of the total cost of groundnut cultivation. About 140-150 man-hours are required to harvest one hectare in a day of 8 hours (Quadri, 1985; Toor and Nigam, 1972). Power tiller drawn groundnut digger reduces 50 per cent cost of operation per hectare (Pardhan and Das, 1989). In order to reduce the time required in digging operation, the drudgery involved and operational cost etc., a power tiller drawn groundnut digger has been designed and developed and its field testing was carried out to assess its field performance for groundnut digging operation.

METHODOLOGY

After reviewing the relevant literature and considering all the important soil crop and machine parameters, a groundnut digger compatible with 8-12 Hp power tiller has been developed in Farm Machinery and Power Department of Mahatma Phule Krishi Vidyapeeth,

Rahuri. The machine is simple in construction and operation suitable to the recommended plant geometry.

The digger mainly consisted the following functional units

Shank:

Shank is made of 65 x 25 mm mild steel flat having curvature at its one end. It is the most important component in draft transmission from hitch to blade. The straight length is 530 mm and curvature has 135mm radius. The straight parts have four holes, three of which are of 15mm diameter and one of extreme rear has 20 mm diameter. These holes provides weight placement. At curvature end, two holes of 15 mm diameter are drilled for blade adjustment clevis.

Supporting frame:

It consists of vertical support and horizontal support. Horizontal support is further welded to the shank. Vertical support is made of two mild steel angle of size 50x 50 x 6 mm having length of 263 mm. Each angles of 5 holes of 15 mm diameter drilled at 40 mm spacing center to center. This arrangement provides depth adjustment. Horizontal support is also made of 50 x 50 x 6 mm mild steel angle of 502 mm length and welded to the shank using two angle pieces of 50 x 50 x 6 mm and 155 mm length.

Serrated blades:

It is made of mild steel flat having curvature of 350 mm radius. Its width is 48 mm and having 5 triangular serrations placed 160 mm apart from it's apex. The height of serration is 85 mm and base is 75 mm. Blade is coupled to the shank with the help of blade adjustment clevis.