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Development and performance evaluation of power tiller drawn planting and interculturing equipment for groundnut

P.B. KADAM, L.V. GHARTE, V.A.SALVE AND V.N. MATE

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See end of the article for authors' affiliations

Correspondence to:

L.V. GHARTE
Department of Farm Machinery and Power, Dr. A.S. College of Agricultural Engineering, Mahatma Phule Krishi Vidyapeeth, Rahuri, AHMEDNAGAR (M.S.) INDIA

ABSTRACT

The power tiller promises to be a good source of power for performing different farm operations in wetland and upland cultivation as well as horticultural and agro-forestry plantations. To overcome the timeliness constraint of farm operations and to make efficient use of available power of the power tiller, the power tiller drawn implement was developed for planting and interculturing operation to suit the power tiller for increasing its versatility. The functional trials of the developed equipment was taken for groundnut for sowing and interculturing. The test results indicated an average effective field capacity of 0.139 ha-h^{-1} at an average speed of 1.90 km-h^{-1} and with an average efficiency of 61.19 per cent for groundnut planting. The functional trial for interculturing with the developed tool mounted on a planting equipments frame was done satisfactorily with an average field capacity of 0.048 ha-h^{-1} at an average speed of 1.20 km-h^{-1} with the average weeding efficiency of 60.91per cent for groundnut crop. The newly developed power tiller drawn planting and interculturing equipment worked satisfactorily for the planting and interculturing in 30 cm above row spacing.

Key words : Power tiller, Planting, Interculturing, Multipurpose equipment.

The economics of use of power tillers is adversely affected due to limited use and non-availability of few matching equipments. In order to increase the annual use, it is essential to develop matching equipments for various farm operations. In view of increasing the versatility of power tiller, some matching equipments have been developed for power tiller (Chavan, 1990). However, the use of single specific equipment is not economical. To overcome the timeliness constraint of farm operations and to make efficient use of available power of the power tiller, the power tiller drawn planting, an interculturing equipment has been developed for increasing its versatility (Varshney *et al.*, 1991; Guruswami, 1985; Kadu, 1996).

Due to lack of suitable technology, weeds cause a major problem to agricultural crops especially to cereals, pulses and oilseeds. As a result, the use of traditional tools like *khurpi* or manual uprooting of weeds is still followed by majority of farmers for weed control. It is slow process resulting in delayed weeding and high cost of operation. The mechanical interculturing/weeding operations with power tiller result in better quality of work, higher yield and ease in operation than traditional methods (Bansal, 1987).

METHODOLOGY

The machine consisted of the following components:

Main frame:

The main frame assembly consisted of square pipe frame of size 42x42x4 mm of 'C' shape to which all parts were assembled. To this frame, two square pipe of size 42x42x4 mm were welded diagonally up for furrow openers at two different places. These two square pipes were placed diagonally up so that a clamp to which furrow opener was attached and mounted on this pipe and was free to move horizontally so that the row to row distance could be adjusted as per the requirements. The two numbers of hitch plates of 8 mm thickness were welded at the centre of front square pipe of the main frame placed 203 mm apart from each other. The arms of 'C' frame were extended beyond the rear diagonal square pipe for 228 mm long. To this extended arms ms flat of size 40x40x8 with 12 mm diameter hole was welded 185 mm from rear end for attaching the side supports with nut bolt. Two bushes for ground wheel of size 26 mm ID and 30 mm OD 50 mm long were welded under the arms of 'C' frame at 55 mm distance from the front face of the frame. The seed metering box was mounted on this frame by nut and bolt arrangements.

Power transmission unit:

Ground wheel:

The ground wheels provided on either sides of the planter formed the functional component of power transmission unit. The two numbers of ground wheel were made of twelve numbers of M.S. round bar of 12 mm diameter forming the spokes and welded at the centre. Each spoke was provided with a lug made of M.S. flat of size 60 x 40 x 5 mm with a hole of 12 mm diameter. The