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Research Paper :

Performance evaluation of tractor drawn inter-raw rotary weeder

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ABSTRACT

The tractor drawn rotary weeder was developed with an objective of mechanical means of weeding and keeping in view the crop, soil and machine parameters. Weeding is an important practice to be carried out during the initial stages of crop growth especially for controlling the weeds competing with the crop, stirring the soil for aerating the crop root zones and for burying the weeds into the soil. The developed weeder was evaluated at different test fields for different crops. From the field tests it is seen that, as the moisture content was increased cone index decreased steadily, speed of operation with the depth of operation resulted significant decreases weeding efficiency. The maximum weeding efficiency of 81.39 was obtained at 1.1 km/hr speed and at 13.00 per cent moisture content. While the minimum weeding efficiency of 69.04 was obtained at 1.5 km/hr of speed and at 13.75 moisture content hence the weeding efficiency decreased with increase in speed of operation, weeding efficiency increased with increase in depth of operation

Key words : Power performance of tractor operated weeder, Inter row rotary weeder, Weeding parameters

Weed control in Indian farm is a serious concern weeds pose major problem during warm and humid climate especially affecting *Kharif* crops. The problem of weed control is more acute in black soil during *Kharif* season. Weed control is one of the most expensive operations in crop growth. The high cost of weeding can be understood from a comparative study of the loss in the farm due to various causes. Infection of weeds is more in *Kharif* than in *Rabi* season. Often weeding is incomplete or delayed as a result there is significant loss of 20% or more. Weeds increase cost of production and lower the quantity as well as the quality of the crop. Depending on the weed density 20-30% loss in grain yield is quite usual which may increase to 50%, when crop management practices are not properly followed. In production technology plant protection is a key in increasing the productivity of crop. Under plant protection, weed control plays an important role for increasing the yield. Weed alone was found to be reducing the yield of the extent of 58-85%. The yield losses in cotton due to weeds alone was assessed as 13.60 per cent than that of insects and diseases which was about 35.80 per cent, while the losses due to weeds alone was assessed was 33.80 per cent. This shows the necessity of effective weeding operation. Usually tractor mounted cultivators are used for weeding and inter-culturing operations in farm. The rotary type weeder stirs the soil more accurately, disturb the weed root and remove them from the soil. In addition this helps in keeping the soil in loose condition for proper aeration. Especially for the wide row spaced crops like cotton, maize where the tractor can be run in the rows. Looking to the above facts tractor drawn inter-row rotary weeder was developed for widely spaced row crops.

METHODOLOGY

Performance evaluation of the unit:

The laboratory test and field tests are taken of the rotary weeder. The details about tests are mentioned below, the main objectives of the laboratory test are to study and confirm the specifications and essential components of the unit such test assist in modification and improvement of the machine design.

Some of the items examined by the laboratory test are-

Adjustment of working width and depth:

A inter- row rotary weeder has a operating width of 400 mm which can be adjusted 400 mm to 550 mm and spacing between consequent rotary weeding was240 mm which can adjusted as 240-300 mm. The depth of operation was 40-55 mm.

Power transmission system:

The mechanical power transmission system components were telescopic shaft, safety device, pinion shaft, pinion, crown, transmission shaft, driving gear driven gear and bearings.

A power from the tractor was reduced from 540 rpm to 337 rpm with the help bevel gear arrangement, which was having a gear ratio of 1.6:1. Again power reduction of 1.2:1 was obtained by chain and sprocket.