

Design and development of a low cost double bottom mouldboard plough for power tiller

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Ploughing is the first and most important operation in crop production. Without proper land preparation, higher yield of crop production by applying other input cannot be expected. The Paddy farmers in Sri Lanka use expensive, untested, imported Ploughs for Land preparation. The commercial ploughs used in many developed countries, which are beyond the financial capabilities of local paddy farmers. A properly designed Mouldboard plough can cut and turn the soil towards one side and invert it with less power. The share cut the furrow slice and Mouldboard turns the soil completely in one side. As a result, the plough-man can till a field in a judicious way in one operation without leaving any unploughed strip of land. Considering the above facts, a low cost double bottom mouldboard plough for power tiller was designed and constructed after testing first model plough in the field and implementing necessary modifications.

An experiment was conducted in the paddy field to compare the performances of the developed plough with conventional plough. Effective field capacity, Effective working width, Soil inversion, Field efficiency, Labour unit per hectare, Ploughing depth, Travel reduction, Fuel consumption, Average operation speed, Total variable cost for land preparation and Cost of production of Ploughs were considered as criteria for the evaluation of designed plough.

The result shows that the Effective field capacity, Effective working width, Labour units per hectare of designed plough were 0.04 ha/hr, 0.38 m and 2.1 Unit/ha respectively. Above observations for Conventional plough were 0.03 ha/hr, 0.30 m and 2.5 Unit/ha respectively. Therefore effective field capacity and effective working width were greater by 33 % and 25 % respectively. Labor requirement was 19.8 % lower than the conventional plough. These results are significantly different. Soil inversion, Ploughing depth, Travel reduction, Average operating speed of designed plough were 93.5 %, 14.5 cm, 14.4 % and 1.6 km/hr respectively. Above observation for conventional plough were 93.9 %, 15.4 cm, 16.7 % and 1.65 km/hr respectively. These results are not significantly different. Fuel consumption of designed plough and conventional plough was 10.2 L/hr and 11.1 L/hr respectively. Variable cost per hectare of designed plough and conventional plough was 914 Rs and 1063 Rs. The total cost of production of designed plough and conventional plough was 7050 Rs and 25000 Rs respectively. On the basis of above results, Design plough can be recommended as a better tillage equipment.

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