

## **DESIGN, DEVELOPMENT AND EVALUATION OF TWO-WHEEL TRACTOR COUPLED DRAINAGE CHANNEL DIGGER**

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Since there is no any effective manual or mechanical method to construct upland drainage channels in Sri Lanka. This study was aimed to develop a two-wheel tractor coupled drainage channel digger. Main components of this digger were a set of tines, blade, bucket, soil guider, frame and hitch attachment. All parts were made using flat metal bars, sheet metal and “L” iron bars and connected with permanent and non permanent fastening methods. The digging depth of the tines, depth and angle of bucket can be adjusted. Fabricated engineering models were tested for its performance and modified by using the classic approach of farm machinery design and development. After series of modifications, final prototype was fabricated and tested for its performance. Digger was evaluated separately on un-ploughed land ( $T_1$ ), land with primary tillage ( $T_2$ ) and land with both primary and secondary tillage ( $T_3$ ). For  $T_1$ ; average bulk density, penetrometer reading and moisture content by wet basis were  $1.85 \text{ g cm}^{-3}$ , 2 cm penetration/500N, 9.9% respectively and for  $T_2$ ;  $1.80 \text{ g/cm}^3$ , 13.3cm penetration per 500N, 9.6% respectively and for  $T_3$ ;  $1.75 \text{ g cm}^{-3}$ , 15 cm penetration per 500N, 6.2% respectively. The digger showed highest performance with a land with both primary and secondary tilled. The depth of channels could be changed from 8 cm to 12 cm with the design. Digging capacity of the digger was 188.68 m long, 0.229 m width and 0.08 m depth drainage channels within one hour with 67.8% field efficiency. Compared to the manual method, the digger can save 85% of the time and 79% of construction cost of drainage channels in upland fields.

**Key words:** Angle of bucket, Digging depth, Drainage channel digger, Field efficiency, Manual method