

Labour Saving Farm Machinery for Coconut Cultivation

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Introduction

The coconut palm holds the title of 'Kalpavriksha' known as the 'tree of heaven,' due to its multifaceted utility. It serves various purposes and making every part of the palm valuable. In India, the livelihoods of ten million people are directly or indirectly connected to coconuts. The country stands as the global leader in coconut production, ranking third in terms of cultivation. According to the latest data available (2021-22), India yields approximately 19.24 billion coconuts annually which contributes around Rs. 307,498 million (US\$ 3.88 billion) to the country's gross domestic product (GDP). cultivated across 2.15 million hectares.

Among the states, Kerala, Tamil Nadu, Karnataka, and Andhra Pradesh, primarily located in the southern region, collectively contribute over 90 percent of the total coconut cultivation area and production in India. Scientific research has shown that the adoption of modern agricultural practices can lead to a four-fold increase in coconut yield compared to traditional methods. This underscores the significant potential for augmenting coconut productivity through the implementation of advanced farm machinery for coconut cultivation are detailed as below.

Raising Nursery

Coconut is propagated through seedlings raised from selected seednuts. Generally, 9 to 12-month-old seedlings are used for planting which have 6-8 leaves and 10-12 cm collar girth. Before this, to rise quality seedlings in nursery it is essential to fill nursery bags with potting mixture containing soil, sand and farm yard manure or other ingredients in required proportions. Generally, it is being done manually with human labour; to resolve this, Central Institute of Agricultural Engineering, Regional station, Coimbatore has developed a machine to powder, sieve and mix different ingredients in the required proportion and fill the same in poly bags for

raising seedlings in Nursery. The unit consists of 3 HP motor, a feed hopper, paddles, sieving tray and an electronic vending instrumentation which can fill the potting mixture at a set quantity (100 g, 250 g, 500 g, 1,000 g, etc) at a set time gap. In addition, a pedal has been provided for the operator to manually control the quantity of potting mixture. Any unskilled person, male or female, can operate the machine. Total two workers are needed for its operation. It can fill 200 poly bags in one hour with 500 gm potting mixture.



Fig.1 Nursery pot media filling machine

Land Preparation

1. Formation of trench by tractor drawn trencher

Tractor drawn trencher is used to form rectangular trench of 30 x 30 cm. The unit consists of two mould board bottoms placed in line one behind the other. The front and rear bottoms operate at a depth of 0-15 cm and 15-30 cm respectively. The two bottoms throw the removed soil in opposite directions and form vertical walls one on each side of the trench. The mould board shape is formed for easy lifting and throwing of soil away from the trench opened. A safety pin is provided to protect the unit from over loading. An adjustable bar point share is provided in addition to the trench bottom cutting share this can be used for lying drip laterals in the coconut field.



Fig.2 Tractor drawn trencher

2. Coconut basin former

The Agricultural Research Station of Kerala Agricultural University at Mannuthy, Thrissur has developed a base opening machine useful for coconut palms. It is a tiller attachment which can till the basin and open up the basin around the palm. It can open up a basin of 60 cm width with 15 to 25 cm deep within 5-6 minutes. The machine consumes 1.5 liters of diesel per hour.



Fig.3 Coconut palm basin former

WEEDING OPERATION

Weeding is an essential task in agriculture, as it helps to remove unwanted plants (weeds) that compete with crops for nutrients, water, and sunlight. Traditional manual weeding can be labour-intensive and time-consuming, but the introduction of weed cutters has revolutionized this process

1. Brush cutter

A brush cutter is a versatile and powerful tool designed for cutting dense vegetation and weeds in the areas where traditional mowers or trimmers may struggle, such as overgrown fields, uneven terrain, or areas with thick weeds. They provide efficiency and precision in clearing out unwanted vegetation in and around the coconut plantation it consists of power source (Engine/Battery) power transmission arrangement through elongated pole, cutting blades or nylon threads attached to rotating head at the bottom end of the pole, handle and safety guards. The machine is handy and operator friendly too.



Fig. 4 Brush cutter for weeding operation above the ground



2. Rotary power weeder

A power weeder was developed at TNAU, Coimbatore. The equipment consists of a 5.4 hp, 34 kg light weight diesel engine mounted on the frame. From the engine, the power is transmitted to the transmission gear box and then to the ground wheels and rotary weeder. The machine is suitable for coconut and other plantation crops. The row mounted hoe and sweep type weeders have three staggered tynes with provision for adjusting row-to-row spacing. The engine is mounted in front of the drive wheels for balancing of the machine. The cost of the machine is Rs 50,000/- and its cost of operation is Rs 380/ha. The effective field capacity and field efficiency were 0.09-0.11 ha/h and 85%, respectively.



Fig. 5 Rotary power weeder developed by TNAU

Harvesting

The traditional way of climbing coconut tree for harvesting the nuts is quite tedious, risky and requires lot of skill. It requires competent labours who are specialists in tree climbing. Difficulty to get the service of skilled coconut climbers in time and their high wage are thus perceived as important constraints.

1. Kerala model coconut tree climber

Coconut tree climbing equipment is designed to facilitate the ascent and descent of individuals harvesting coconuts manually. The equipment consists of climbing strap, lifting handles, pedal assembly and safety guards it is less in weight and compact which facilitates the easy operation and transportation. The equipment aims to enhance safety and efficiency during the climbing and harvesting.



Fig. 6 Coconut Tree Climber for Harvesting

2. TNAU model coconut tree climber

The device consists of two sections which includes upper frame and lower frame. These frames are independently movable and positional along the coconut tree trunk. The upper frame member is a tubular frame work consisting of a rigid base section and an adjustable tree gripping section. The rigid base section carries a seating arrangement for accommodating the user, front support rail, cross rear rail and side rails. The user can sit comfortably facing the tree and receive support from the cross-rear rail and the side rails. The seat is a flexible sagging type made of rexin fabric attached through loops between the rear and front cross rails of the frame. The upper and lower frame members are connected with canvass belt to prevent them from slipping down the tree trunk. Handles provided on the side rails of the upper frame enable the user to lift the unit during ascending or descending the tree. After reaching the coconut tree top, the unit can be fitted to the one of the fronds with the help of hook so that the user can get into the crown of tree for harvesting coconuts.



Fig. 7 TNAU Model Coconut Tree Climber for Harvesting



3. Coconut Dehuskers

A coconut dehusker is a device or tool specifically designed for the removal of the tough outer husk from a coconut, exposing the inner seed or "nut" inside. This process is essential for obtaining the edible part of the coconut, which can be used for various culinary purposes and to extract coconut water and coconut milk. Coconut dehuskers play a crucial role in coconut processing by facilitating the extraction of the edible parts of the coconut. There are manual, semiautomated, motorized/automated dehuskers available in the market. The choice of dehusker depends on the scale of operation, available resources, and the specific requirements of the user.



A. Manual Dhusker



B. Semi-automated dehusker



C. Automated/motorized dehusker