

Development and comparative performance of manually operated tamarind harvesters

■ G.S. PATANGE, V.B. SHINDE, P.D. BADGUJAR AND B.S. GHOLAP

ABSTRACT : Traditionally farmers have been using a variety of methods in tamarind harvesting instead of tools and machinery. In India, harvesters may merely shake the branches to cause mature fruits to fall and they leave the remainder to fall naturally when ripe. By using the modern wisdom, these traditional methods needed to standardized keeping in mind the economy of rural poor. Proper designing in accordance with the farmers requirements surely popularize these harvesters in future. Keeping these views in mind design and development of various tamarind harvesters (TH 1, TH 2 and TH 3) was taken at MAU, Parbhani, Maharashtra and comparing their performance with traditional method (TM). On the basis of harvesting output (kg/h), cost of operation (Rs/h), per cent damage and ease of operation, it was found that, the performance was better in case of TH 3 as 10.70kg/h, Rs 31.25/h and 10.71 per cent.

KEY WORDS : Development, Comparative performance, Tamarind, Harvester

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INTRODUCTION

The 'Indian date' is one of the most common fruits grown all over the India mostly under rainfed conditions, particularly in Tamil Nadu, Maharashtra, Karantaka, Andhra Pradesh, Madhya Pradesh and Orissa. It is also one of the most popular avenue trees which yield useful fruits and timbers besides providing shade. Tamarind is believed to native of tropical. But now cultivated through South East Asia, Australia and America. During 1995-96 the export from India was of the order of 16587.66 MT valued at Rs.20.86 crores. The mechanization of Indian agriculture is in its early stages. Human power still

predominates, although it is often augmented by animal and/or mechanical power. Indigenous tools and weapons were basic but well designed to suit farmers needs. Traditionally farmers have been using a variety of tools and weapons in their everyday life, often for agricultural operations and household purpose (Hernandez Unzon and Lakshimanarayan, 1982).

In India, harvesters may merely shake the branches to cause mature fruits to fall and they leave the remainder to fall naturally when ripe. Pickers are not allowed to knock the fruits off with poles as this would damage developing leaves and flowers (Bundit *et al.*, 2008). To keep the fruit intact for marketing fresh, the stalks must be clipped from the branches so as not to damage the shell. A mature tree may annually produce 330 to 500 lbs (150-225 kg) of fruits, of which the pulp may constitute 30 to 55 per cent, the shells and fibre 11 to 30 per cent and the seeds 33 to 40 per cent. The fruit is an indehiscent legume, sometimes called a pod, 12 to 15 cm (3 to 6 inches) in length, with a hard, brown shell (Bhattacharya *et al.*, 2003). The fruit has a fleshy, juicy, acidulous pulp of which pulp is edible. The hard green pulp of a young fruit is considered by many to be too sour and acidic, but is often used as a component of savory

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dishes, as a pickling agent or as a means of making certain poisonous yams in Ghana safe for human consumption (Karthikeyan *et al.*, 2009).

This abundant store of knowledge in the area of traditional hand tools, their craftsmanship, technique of production and metallurgy are still in practice and of great value. Village artisans are the main source of supply, repair and maintenance of farm equipments. About 80 per cent of the hand tools and traditional implements are made by village artisans. Materials used are mainly mild steel, scrap (files, blades, auto lead spring etc.) forged and hardened by quenching though the quality is lacking, the cost effectiveness is encouraging (Das and Nag, 2006). By using the modern wisdom, these traditional implements needed to be standardized keeping in mind the economy of rural poor. Proper designing in accordance with the farmers requirements surely popularize these harvesters in near future. By considering the above problems, it was decided to design and develop various tamarind harvesters and compare their performance with traditional method (TM) on the basis of harvesting output kg/h, cost of operation, per cent damage, and ease of operation.

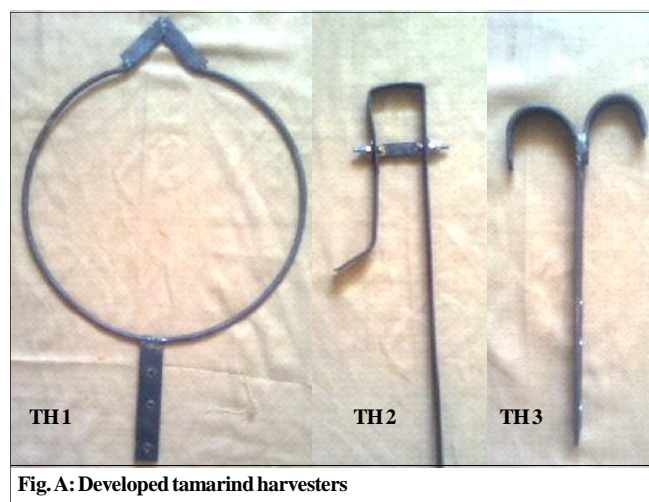
EXPERIMENTAL PROCEDURE

Most of the implements and tools which were developed and is being produced by local artisans were made from stone, wood, bone, shell, teeth and plant fibre. Farmers can quickly adapt it on the spot to change its purpose. In tamarind harvesting we have to consider the vegetative loss and damage to the fruits which decreases its quality as well as its market price while harvesting (Anonymous, 1960). Considering study of work done on tamarind harvesting in Maharashtra, it is decided to fabricate manually operated tamarind harvester. The idea was to harvest the tamarind fruit from the ground without climbing on the tree all the movements in harvesting were considered and for that adjustments in the new tamarind harvesters herewith were made.

Development of tamarind harvester :

The main body of tamarind harvesters was supported by alluminum pipe of 20 mm diameter, the height of which can be extended as per the height of the tamarind tree through the nuts and bolts. The main body of tamarind harvester 1 (TH 1) was made of ring of M.S. bar of size 5 mm of 300 mm diameter to which a V-notch of length 55 mm and width of 65 mm was attached which was designed with purpose to cover a bunch of fruits within 300 mm diameter circle. Tamarind harvester 2 (TH 2) was made of frame of inverted U-shaped M.S. flat of 3 mm size of length of 450 mm, a blade of 60 mm width and 1 mm thickness was fixed inside the frame which was designed with purpose to cut the bunch of stems within 60 mm. Tamarind

harvester 3 (TH 3) was made of two hooks inverted on frame of M.S. flat of size 5 mm which shakes the branches. Using these harvesters, farmers can avoid climbing trees to harvest fruits. With long handle, without any drudgery, farmers can harvest the fruits easily. Fig. A shows the developed tamarind harvesters and Fig. B shows the actual tamarind harvesting with the help of developed harvester. The performance was evaluated at the Marathwada Agricultural University campus, Parbhani, Maharashtra.



Experimental procedure :

Traditionally tamarind is harvested by using 2-3 workers climbing on the trees and shakes the branches or worker on the ground strikes the branches with the help of bamboo stick. Thereafter collecting fruits on the ground and store them in a gunny bag. For the performance evaluation of the developed tamarind harvesters a polythene sheet was spread all over

ground to collect the harvested fruits. For calculating output capacity while harvesting the fruits, it was collected in polythene bags for each reading and it was collected for time interval of 15 minutes. For calculating cost of operation, we have to consider the daily wages of a worker at Rs. 250/day. The percentage of damaged tamarind fruits was calculated by collecting 100 number of tamarind fruits from the polythene sheet for each reading. Ease of operation for tamarind harvester was evaluated by considering the operators opinion about harvesting.

EXPERIMENTAL FINDINGS AND ANALYSIS

The developed three harvesters with the traditional method were tested for performance evaluation of the harvesters in terms of the harvesting output (kg/h), cost of operation (Rs/day), per cent damage (%) and ease of operation are presented and discussed as follows.

Harvesting output :

The output (kg/h) of the each method was collected for every 15 minutes and it was observed that highest harvesting output was measured in traditional method *i.e.* 11.50 kg/h and the lowest was measured with TH 2 *i.e.* 5.73 kg/h. These are presented in Fig. 1 graphically.

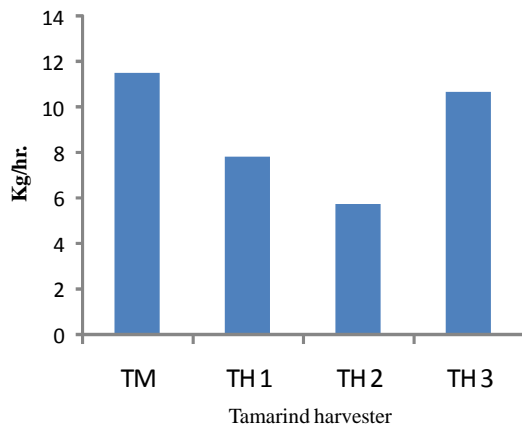


Fig.1: Output rate of tamarind harvesting (kg/hr)

Cost of operation :

The cost of operation required in harvesting the tamarind with the developed harvesters was calculated by considering the daily wages of an operator as Rs. 250 and cost of manufacturing the developed tamarind harvester. The cost of operation was maximum for traditional method *i.e.* Rs. 35.00/h and minimum for TH 3 *i.e.* Rs. 31.25/h. It is presented in Fig. 2 graphically.

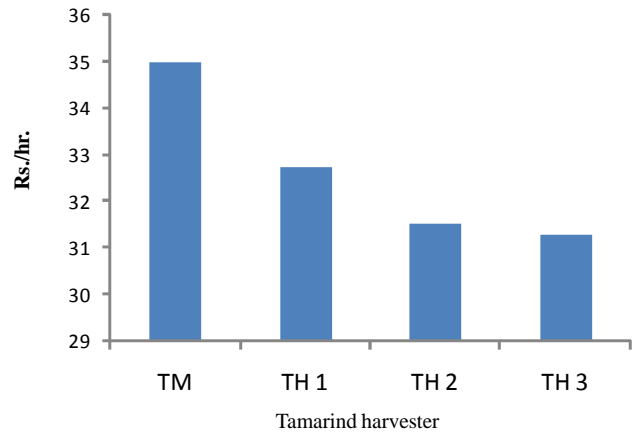


Fig. 2: Cost of operation of tamarind harvesting

Per cent damage :

It was observed that the maximum per cent damage was observed with traditional method *i.e.* 31 per cent and minimum with TH 3 *i.e.* 10.71 per cent. It was presented in Fig.3 graphically.

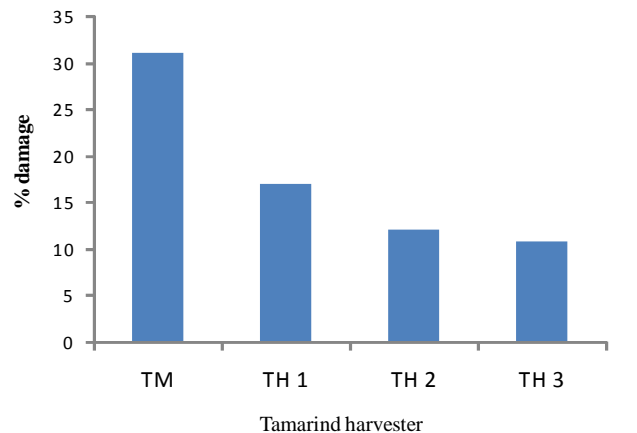


Fig. 3: Per cent damage during tamarind harvesting

Ease of operation :

The problems of climbing trees while harvesting tamarind fruits and harvesting operation with the help of female operator was studied. It was observed that, operation could be easier with developed tamarind harvesters as compared to the traditional method in terms of above aspects.

Conclusion :

- While harvesting the tamarind, output (kg/h) was observed 11.50 kg/hr in case of traditional method of harvesting. But considering vegetative loss and damages to fruits it was fair to say that it was better in case of TH 3 *i.e.* 10.70 (kg/h).

- The cost of operation for performing tamarind harvesting traditionally was observed 35.00 Rs / h, which was higher than harvesting with developed harvesters. But considering drudgery occurred in harvesting traditionally and ease of operation with developed tamarind harvesters it was better Rs. 31.25/h in case of TH 3.
- The per cent damage occurred during tamarind harvesting observed greater in traditionally method which was 31 per cent, because of shaking branches and striking with bamboo. The lesser per cent damage to the fruits with developed tamarind harvester TH 3, which was 10.71 per cent.

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