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Assesment of Scientifically Designed Mango Harvester for Drudgery Reduction over Conventional Methods

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ABSTRACT

In the harvesting of different fruits two major methods were followed by Indian farmers that are manual plucking and tree shaking. The tree branches are shaken to speed up the harvesting, which results in post harvest losses due to the physical damage, stem end rot and sap bleeding in mangoes due to absence of pedicel. To overcome these local harvesting methods and to reduce to drudgery of the farmers Krishi Vigyan Kendra, Kalaburagi has conducted frontline demonstration in farmer's field of Kalaburagi district during summer 2017, for mango harvesting during summer KVK BRDmango harvester was introduced, over local harvester and manual plucking. The local harvester harvests fruit without pedicel, whereas KVK BRD Mango harvester, an improvement on the conventional harvester harvests the fruit with pedicel. The fruit harvest per hour was more in KVK BRD that was (542 fruits/hr) when compared to local harvester, manual plucking and tree shaking The number of labours per day for fruit harvesting was more in manual plucking and tree shaking, where as in KVK BRD harvester took less labours that is (18 labours/day). Among harvesters KVK BRD model has higher efficiency over local model in labour and time saving.

***Key words:** Conventional harvester, Drudgery, Harvesters, Labours, Local harvester, Mango harvester, Pedicel.*

INTRODUCTION

Mango (*Mangifera indica* L.) belongs to family *Anacardiaceae*. It is called "the king of fruits" on account of its nutritive value, taste, attractive fragrance and health promoting qualities[1]. It is commercially cultivated in more than 80 countries including Brazil, China, Egypt, India, Indonesia, Mexico, Pakistan, Phillipines, Thailand and Vietnam among these countries India is ranks number one in mango production. In India, the major mango growing states are Karnataka, Bihar, Gujarat, Tamil Nadu, Andhra Pradesh and Uttar Pradesh, and it occupied about 46 per cent of the global area and 40 per cent of the global production[4]. Mango is cultivated over an area of 25 lakh hectares with an annual production of 180.02 lakh metric tons in India during 2012-13.

India produces around 40 million tones of fruits per year. Timely harvesting of fruits is important for maintaining quality and shelf life. Harvesting of fruit trees is a cumbersome and time-consuming process. Different methods are being practiced. The Totapuri variety of mango is being harvested by shaking the tree manually and by plucking the fruits manually by climbing the tree. The fruits are allowed to fall on the ground and then picked up. This causes internal injury to the fruits and subsequent spoilage during ripening. The fruit is held between frame and the pole and get detached while pulling the harvester[1]. The fruits harvested without pedicel oozes out the sap from the pedicel end, thereby reducing the shine of fruit, making it susceptible to the diseases like stem end rot.

The local mango harvester generally consists of a bamboo pole fixed with a small wooden piece at an angle to make 'v' shape at the end. The fruits are harvested by cutting the pedicel and dropped on the ground. In conventional harvesting the laborers climb the tree to harvest and throw the fruits on a gunny bag held by a person on the ground to reduce the injury to the fruit. This is a time consuming process and sometimes can be dangerous to the labour. The fruit harvesters have been modified to increase the harvesting capacity of the person and reducing damage to the fruits. The harvesting capacity depends upon the plant height, yield and type of fruit[3].

MARERIAL AND METHOD

To study the efficacy of mango harvester, ICAR- Krishi Vigyan Kendra, Kalaburgi has conducted front line demonstration of 10 trials at 6 different places of Kalaburagi District. Manual plucking and tree shaking methods along with use of local harvesters were the methods of harvesting normally followed by farmers. The efficacy KVK BRD model (Fig 1) selected for the study was determined on the basis of the number of fruits harvested per hour, drops & damaged fruits per hour. All the farmers are having a minimum of 1 ha Mango orchid were selected to conduct the field trials using different types of harvester in comparison to manual plucking & tree shaking. Profile of the individuals was collected by interview. The economic analysis of different methods of harvesting was also calculated per hectare per day.

RESULTS AND DISCUSSION

The trials were carried out at 10 trails in different places of Kalaburagi District. The plant heights ranged from 15-30 feet height. Area of mango orchard ranged from 1.0-5.0 Hectare. The varieties found in this area were Alfanso, Mallika, Kesar, Totapuri. The results of different methods of harvesting are presented in Table 1. The local harvester harvests fruit without pedicel, KVK BRD Mango harvester, an improvement on the conventional harvester harvests the fruit with pedicel (Fig. 2). The fruit harvest per hour was more in KVK BRD model that was (542 fruits/hr) when compared to local harvester, manual plucking and tree shaking these results are in line with results reported by[5]. The harvesting capacity of KVK BRD model was 125 kg/hour, as compared to 81, 73 and 67 kg/hour for local harvester, manual plucking and tree shaking methods. The fruit damage was observed more in tree shaking method followed by manual plucking and use of local harvesters. The results are in line with the results reported by Mandhar and Senthil[2].

The beneficiaries of this study expressed that manual plucking and tree shaking methods were labour intensive process, time consuming with more per cent of damaged fruits and had high chances of breakage of the branches. The number of labours per day for fruit harvesting was more in manual plucking and tree shaking, where as in KVK BRD model harvester took less labours that is (18 labours/day). These results were in line with the study conducted by[5]. The local model harvested fruits without pedicel resulting in oozing out of sap thereby reducing the shelf life and had a high percent of damage to fruits as they were dropped to the ground, whereas KVK BRD model was observed to be slightly heavy and found harvest plants with higher height, but harvested fruits with pedicel

thereby increasing the shelf life of the fruit. The results are in accordance with the results of KVK BRD report. KVK BRD model is comparatively highly suitable for harvesting the fruits for export.

The cost and economics of use of harvester over other conventional methods of harvesting for one hectare per day is presented in Table 2. The highest amount saved was in KVK BRD model as compared to local harvester, tree shaking and hand plucking. Thus use of harvesters helps to save some economy as well as time by reducing the number of labour required to harvest one hectare.

Table 1: Comparison of different mango harvesters with conventional techniques of harvesting mangoes

Method of harvesting	Fruit harvest per hour	Damages Per hour	Drops per hour	Fruit harvest per net	Preferable unload of fruits per net
	No.	No.	No.		
Manual plucking	360	37	360	-	-
Tree shaking	312	52	312	-	-
Local harvester	427	22	427	-	-
KVK BRD Model	542	8.0	542	11-14	12

Table 2: Economic analysis of different methods of mango harvesting of one hectare/day

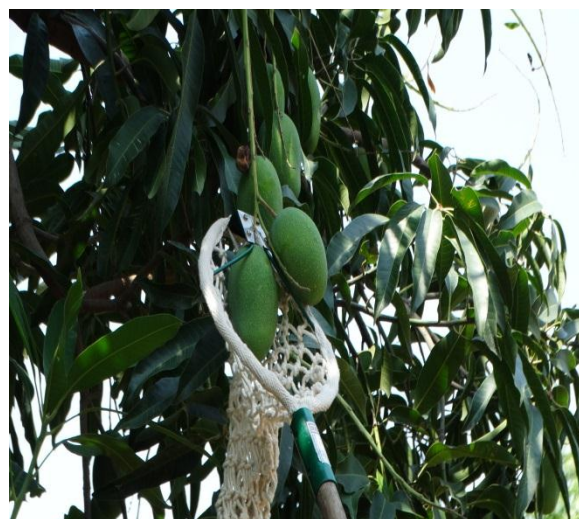| Method of harvesting	Cost of Harvester (Rs.)	No. of labour / day	Amount required / day (Rs.)	Amount saved compared to hand plucking (Rs.)
Manual plucking	-	32	4800	-
Tree shaking	-	28	4200	600
Local harvester	-	25	3750	1050
KVK BRD Model	300	18	2700	2100

Fig. 1: SCIENTIFICALLY DESIGNED KVK BRD MANGO HARVESTER

Fig. 2 MANGO HARVEST FROM THE TREE WITH KVK BRD MODEL

CONCLUSION

It could be concluded that the mango harvester can be used for harvesting mango fruits with less drudgery & fatigue on labour and also preventing damage to the tree branches as well as fruits as compared to local harvester, manual plucking and tree shaking. Among harvesters KVK BRD model has higher efficiency over local model.

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