Assesment of IIHR mango harvester for drudgery reduction over coventional practice

■ **P. Aparna, G. Prasad Babu and B.H. Chaithanya**

■**ABSTRACT :** Mango the "King of fruits" is the most important fruit crop in India. Harvesting of the mangoes are done with different methods by Indian farmers like manual plucking, tree shaking or local harvesters which are manufactured by the farmers. 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, Banavasi has introduced IIHR model for harvesting mangoes and conducted frontline demonstration in farmer's field. Harvesting efficiency of different harvesters was studied in comparison to manual plucking and local made harvester was compared with that of Indian Institute of Horticultural Research, Bangalore (IIHR) model. Among all the methods IIHR model is found to have higher efficiency as compared to the local b models.

■**KEY WORDS:** Mango, Drudgery

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Mango (*Mangifera indiaca*, Linn), a native of India is one of the most relished fruits in the topics. It occupies a prominent place among the fruits of the world and is considered as the king of fruits in India. India number one top mango producing country in the world. The production reaches over 18 million tonnes, which is approximately 50 per cent of the global mango supply. The principal mango producing states in India are Andhra Pradesh, Bihar, Gujarat, Karnataka, Maharashtra, and Orissa, although many other Indian states also cultivate mangoes. Andhra Pradesh was the leading state in area by accounting for 14.72 per cent of total mango area under country in 2016-17.

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 alphanso 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 (Mandhar and Kumaran, 1993). The fruits harvested without pedicel oozes out the sap from

P. Aparna, G. Prasad Babu and B.H. Chaithanya

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 of IIHR model were introduced to increase the harvesting capacity of the person and reduce the damage to the fruits. The harvesting capacity depends upon the plant height, yield and type of fruit.

■ RESEARCH METHODS

To study the efficacy of mango harvester, Krishi Vigyan Kendra, Banavasi has conducted front line demonstration of 10 trials at 2 different places of Holagonda Mandal and kadimetla village. Manual plucking and tree shaking methods along with use of local harvesters were the methods of harvesting normally followed by farmers. The efficacy with local model, manual plucking and compared with IIHR model. The parameters like time required for plucking, cost of harvesting, drudgery and fruit damage during harvesting were observed.

IIHR model:

It consisted of a pole and frame assembly, shearing blade and net. The shearing blade with a length of 11 cm was welded to the frame at a distance of 12cm from the top. The blade was sharpened and sufficiently curved to avoid contact with the fruit and to cut the pedicel with 1 to 2 cm. the fruit was harvested by properly positioning the harvester to warp around the fruit, ensuring that the fruit was sufficiently low inside the harvester so that the pedicel was sheared with the blade while the fruit was held between the frame and pole.

Local model:

It consisted of a pole and frame assembly and net. It does not have any shearing blade as shown in the figure.

Drudgery index:

Drudgery was operationalized as physical and mental strain, fatigue, and monotony and hardship experience by farm women while doing weeding operations (Kumar et al., 2011).

Drudgery index (DI) was calculated on the basis of

Drudgery index = $[(X+Y+Z)/3] \times 100$

X = Co-efficient pertaining to difficulty score.
Y = Co-efficient pertaining to performance score.
Z = Co-efficient pertaining to average time spent

| Local harvester | IIHR Model |

■ RESEARCH FINDINGS AND DISCUSSION

The trials were carried out at 2 different places of Holagonda and Kadimetla mandals. Area of mango orchard ranged from 1-8 Hectare. The varieties found in this area were Alfanso, and Banginapalli

The comparative results of different methods are presented in Table 1. The IIHR model harvests fruit with pedicel, manual plucking and local harvester.

Table 1 : Comparison of different mango harvesters with conventional methods of harvesting mangoes		
Method of harvesting	Fruit harvest per hour	Damages Per hour	Fruit harvest per net
	No.	No.	
Manual plucking	250	25	-
Local harvester	290	18	7-8
IIHR model harvester	354	10	11-12

From the Table 1 it is evident that manual plucking and local harvester were labour intensive when compare to the IIHR model. Fruits harvested per hour were also observed to more when compare to the other practice.

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	-	30	9000	-
Local harvester	100	25	7500	1500
IIHR model harvester	300	18	5400	2100

Table 3 : Drudgery index

Sr. No.	Drudgery index score	Manual plucking	Local harvester	IIHR Model
1.	Drudgery index Score	72 %	65%	43%
		(Maxi)	(Moderate)	(Minimum)

Over all discomfort (ODR) response on musculo - skeletal
DI score between 70 and above = Maximum drudgery
DI score between 50 and 70 = Moderate drudgery
DI score between 50 and below = Minimum drudgery

Plate 1 : Plucking with IIHR model mango harvester

The damage to the fruit is found to be high in manual plucking method followed by local and IIHR harvesters.

The cost economics of use of harvester over other conventional methods of harvesting for one hectare per day is presented in Table 3. The amount saved is highest for IIHR model followed by local model when compared to hand plucking. Thus use of harvesters helps to save some economy by reducing the number of labour required to harvest one hectare.

From the Table 3 it is observed that drudgery index score is reduced in IIHR model (43%) with minimum drudgery followed by local harvester (65%) and manual pucking (72 %) with maximum drudgery.

Conclusion:

IIHR harvester was found to be more feasible and may easily be popularized amongst the mango growers. The presence of pedicel could control the sap oozing and lateral infection which increase shelf life. It could be inferred that the mango harvester can be used for harvesting mango fruits with less drudgery and fatigue on labour, also preventing damage to the tree branches and fruits as compared to local harvester and manual plucking.

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