

## A comparative study of tikhur traditional and partial mechanical processing and cost economics

■ SOUMITRA TIWARI AND S. PATEL

Received : 12.03.2013; Revised : 26.04.2013; Accepted : 30.04.2013

See end of the Paper for authors' affiliation

Correspondence to:

**SOUMITRA TIWARI**  
Department of Processing  
and Food Engineering, Punjab  
Agricultural University,  
LUDHIANA (PUNJAB) INDIA  
Email :  
tiwaridadu@gmail.com

■ **ABSTRACT** : The edible rhizome rich in powder content is processed to obtain tikhur flour which is cooked in different forms and preparations and consumed in many parts of India. The traditional way of tikhur powder extraction or processing leads to a very high loss of powder along with huge time and labour requirement. In the developed partial mechanical method of processing, all the process is similar to that of traditional method except the size reduction of rhizomes and drying. By this method 300 to 400 kg of rhizomes could be handled in a day and it also saves Rs. 30per kg.

■ **KEY WORDS** : Tikhur, *Curcuma angustifolia*, Traditional processing, Mechanical processing

■ **HOW TO CITE THIS PAPER** : Tiwari, Soumita and Patel, S. (2013). A comparative study of tikhur traditional and partial mechanical processing and cost economics. *Internat. J. Agric. Engg.*, 6(1) : 213-215.

**T**ikhur (*Curcuma angustifolia*) is a medicinal plant native to Central India, distributed in the West Bihar, North Bengal extending to Maharashtra and South India. It's has various synonyms such as Tavaksira (Sanskrit), East Indian Arrow Root, Bombay arrowroot, Tikhur in Hindi. Tikhur is commonly found in moist deciduous sal and mixed forest of Madhya Pradesh, Chhattisgarh and Jharkhand. Its rhizomes are good source of starch and fibre (Misra and Dixit, 1983). Over exploitation has made tikhur scarce in natural habitat and costly in the market. In traditional, propagation of tikhur powder occurs through rhizome, which is a slow process. The action of the rhizome is cooling, demulscient and nutritive, and the material is used in consumption, excessive thirst, jaundice, kidney disorder, fever and for vitality and fattening the body. The rhizomes are used in inflammation, bone fracture, intestinal diseases, etc. by the tribes of Madhya Pradesh and Chhattisgarh states of India ( Ray *et al.*, 2011).

The fresh rhizomes of tikhur are used for the preparation of starchy flour, which has medicinal value and is effective for of many diseases. The powder obtained from the rhizomes is highly nutritious and easily digestible, therefore, it is recommended for infants, weak children and invalids. The tikhur powder can be consumed by individuals during fast as (Upwash) it is rich in energy. It is used for the preparation of many sweetmeats like halwa, barfi, jalebi etc. (Tiwari *et al.*, 2012). Processing of rhizomes through traditional method for tikhur powder extraction, farmers yield less tikhur powder due to unrefined extraction process. Therefore, a study was done

to improve the processing technique and worked out the cost economics of both practices.

### ■ METHODOLOGY

The study was conducted at Faculty of Agricultural Engineering, Raipur and S.G. College of Agriculture and Research Station, Jagdalpur, (IGKV) in 2011. In traditional practice, fresh rhizome bulbs were cut and washed thoroughly with running water and simultaneously peeled out. The peeled rhizomes were rubbed on a rough surface stone or sieve. The obtained paste was added with water in the ratio of 1:2 to make solution and passed through muslin cloth. Supernatant part of the solution remained on the cloth was thrown away as the waste. The filtered solution of tikhur powder was collected in an earthen pot. This solution was kept for about 4 to 6 hours to allow settling of the powder particles. Powder mass was settled down in earthen pot as sediment. The decanting of water was done initially after 6 hours. The process of decanting was repeated 8 times till the bitterness taste was not experienced.

In the mechanical method of processing, all the process was similar to that of traditional method except the size reduction of rhizomes by motorized wet grinder and drying of sediment particles by tray drying. All other steps were repeated as in case of traditional method.

The hourly cost of operation was calculated considering fixed and operational cost taking the unit purchase price,

annual use, salvage value, interest rate, maintenance cost and life of the machine (Kepner *et al.*, 1987). Few of the utensils and equipment such as sieve, motorized grinder, matka (earthen pot) and muslin cloth were required.

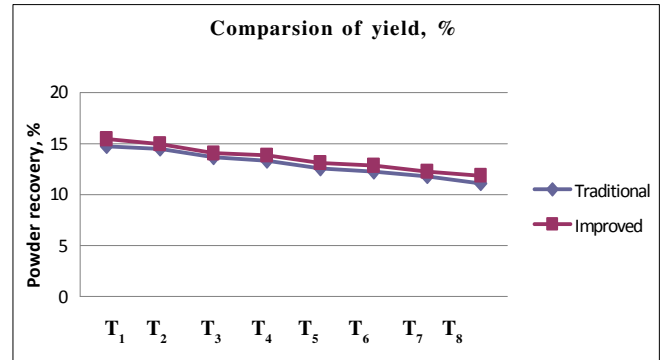
**RESULTS AND DISCUSSION**

In traditional practice an average 20-25 kg of green rhizomes could be handled by one man in a day. Table 1 gives the yield recovery of powder for each of the decanting process. It can be seen that the weight of powder gradually decreased as the number of washing or decanting increased. It reveals that after one decanting 14.73 per cent powder recovery was obtained while after eighth decanting the recovery reduced to 11.10 per cent indicating 3.63 per cent loss in the recovery. It is worth mentioning here that the skill of decanting may affect the recovery percentage. There is possibility of loss of starch powder with the water decanted. Therefore, decanting of tikhur is critical parameter.

In this improved method 300 to 400 kg of rhizomes could be handled in a day. The result of the mechanical method is given in Table 2. The table depicts that the recovery of starch granules were slightly higher than the traditional method. It can be seen that after eighth decanting the recovery was increased only by 0.7 per cent which can be considered as negligible. But on the other hand, the volume handled by one unit or one man was increased by more than 12 times. This also helped in reducing

the drudgery to a great extent. The particle size of the powder granules was also found to be finer in this case.

The comparison of traditional and mechanical method of tikhur powder extraction is presented in Fig.1. Mechanical method gave slightly higher recovery. However, there was gradual decrease in the powder recovery with the number of washing or decanting.



**Fig. 1: Variation in tikhur powder recovery with number of decant**

On the other hand the labour requirement per unit extraction of powder was very less in case of mechanical extraction. In mechanical extraction process it possible to handle 300 - 400 kg of raw rhizomes/bulbs whereas only 20-25

Table 1: Effect of number of decant on the yield of starch in traditional method		
Sample No.	No. of decants	Yield (%)
T <sub>1</sub>	1	14.73
T <sub>2</sub>	2	14.50
T <sub>3</sub>	3	13.65
T <sub>4</sub>	4	13.30
T <sub>5</sub>	5	12.56
T <sub>6</sub>	6	12.26
T <sub>7</sub>	7	11.80
T <sub>8</sub>	8	11.10

Table 2: Effect of number of decant on the yield of powder in partially mechanized		
Sample No.	No. of decants	Yield, %
T <sub>1</sub>	1	15.45
T <sub>2</sub>	2	14.97
T <sub>3</sub>	3	14.05
T <sub>4</sub>	4	13.85
T <sub>5</sub>	5	13.10
T <sub>6</sub>	6	12.85
T <sub>7</sub>	7	12.25
T <sub>8</sub>	8	11.86

kg of rhizomes is possible to process by the traditional practice.

For processing of 100 kg of rhizome requires 2 man -day for 2 days. The processing of 100 kg of rhizome gave nearly 14 kg of powder. Hence, 1 kg of powder costs Rs. 155/- The details are given below:

Rhizome (10 x 100 kg)	=	Rs. 1000.00
Sieve (2 x 100)	=	Rs. 200.00
Cloth (2 x 50)	=	Rs.100.00
Matka (10 x 30)	=	Rs.300.00
Labour (2 x 145 for 2 days)	=	Rs. 580.00
Total	=	Rs. 580.00

Processing by mechanical method using grinding machine for crushing rhizome and tray dryer for drying the pulp were the added facility required. Capacity of this unit was 4 to 5 quintal per day and 5 man-days are required. The total cost of processing operation of powder was calculated 125 Rs./kg by mechanical method. Cost of processing and equipment are following:

Grinding machine	=	Rs. 85000.00
Tray dryer	=	Rs. 25000.00
Building	=	Rs. 1, 40000.00
Total	=	Rs. 2,50000.00

#### Conclusion:

Traditional method is very tedious and takes long time. The rubbing of rhizomes over the rough stone surface involve much of the drudgery, on the other hand the total output by

this method remains meager. It was possible to introduce partial mechanization of the process by replacing rubbing on rough surfaces with wet grinding machine, which increases the output per man-days by 12-13 times which save the Rs.30 per kg of powder. However, innovative approach in the direction of mechanization can further reduce the cost of processing/ production such as centrifugation use in the place of natural sedimentation.

---

#### Authors' affiliations:

S. PATEL, Department of Agricultural Processing and Food Engineering, Indira Gandhi Agricultural University, RAIPUR (C.G.) INDIA

---

#### REFERENCES

- Kepner, R.A., Bainer, R. and Barger, E.L. (1987).** Principles of farm machinery (3rd Ed.). CBS publishers and distributors, NEW DELHI, INDIA pp.23-45.
- Misra, S.H. and Dixit, V.K. (1983).** Pharmaceutical studies on starches of some Zingiberaceous rhizomes. *Indian J.Pharm. Sci.*, **45** (5): 216-220.
- Ray, S., Sheikh, M. and Mishra, S. (2011).** Ethnomedicinal plants used by tribals of East Nimar region, Madhya Pradesh. *Indian J. Tradit. Know.*, **10** (2):367-371.
- Tiwari, S., Deo, S., Patel, S., Kumar, M., Kumar, Y. and Talukdar, D. (2012).** Physico-chemical variation on starch obtained from mother and finger rhizomes. *J.Crop Improv.*, **13**:25-26.

\*\*\*