Turmeric is the dried rhizome of Curcuma longa L. (family: Zingiberaceae). It is a herbaceous plant, native to tropical South East Asia. The genus curcuma may be derived from the Persian word Kurkum, which is also used to refer to “Indian Saffron” because of its brilliant yellow colour. The rhizome has 1.8 to 5.4 per cent curcumin, the pigment, and 2.5 to 7.2 per cent of essential oil. It is used as condiment, dye, drug and cosmetic in addition to its use in religious ceremonies. The most important application is the pharmaceutical extraction and purification of bioactive constituents of the rhizomes. The major turmeric producing states in India are Andhra Pradesh, Tamil Nadu, Maharashtra, Orissa, Bihar, West Bengal, Kerala and Assam.

There are four important species of Curcuma. They are a. Curcuma longa, the widely cultivated type b. C. aromatica, the cochin turmeric or kasturi manjal c. C. angustifolia, East Indian arrow root having plenty of starch in its rhizome and d. C. amada, mango ginger, which has the taste and flavor of raw mango.

Processing

The various unit operations in post harvest aspects of turmeric are as given below:


Curing

Curing of fresh rhizomes is the next unit operation in processing of turmeric to get dry turmeric. Curing is a process that kills the vitality of fresh rhizomes, serves to obviate the raw odour, reduce the drying time, gelatinize the starch and disperse the pigment uniformly so that it provides a more uniformly coloured produce. After the rhizomes have been removed from the ground, curing must be completed within 10 days to secure maximum usable product.

Although, the curing quality of turmeric is mostly a varietal character, factors such as moisture content and maturity also determine the final percentage of cured raw turmeric. Short duration types have the highest curing percentage (24-26%) and medium duration types provide...
the lowest curing percentage (14-20%) and long duration has medium curing percentage (21-24%). The curing percentage is reported to increase with increasing the maturity of rhizomes.

• **Traditional method of curing**

Traditionally the washed fresh rhizomes are boiled in water in the earthen vessels, iron pans or metal containers. This process is known as blanching. The pan or pot is normally filled to three fourth of its capacity with raw turmeric and water is poured in it, just enough to cover the material. In certain parts of the country viz., Tamil Nadu, and Rajasthan turmeric is cured by boiling it with cow dung water solution. The mouth of the pan is covered with a lid or moist gunny cloth or turmeric leaves. Boiling is carried out till a froth comes out and white fumes comes out of the pan with a characteristic odour. The other indications of the completion of boiling are softness and easy breaking of rhizomes when passed between free finger and thumb and a yellow interior instead of red one. Sometimes few leaves of turmeric are also added to the water in the cooking vessel. The boiling lasts for 45-60 minutes.

• **Improved method of curing**

In the improved, approximately 50 kg of cleaned fingers is taken in a perforated trough made of GI or MS sheet of size 0.9 m x 0.5 m x 0.4 m is provided with handle. The perforated trough is filled with fingers and then immersed in a pan containing 100 l of water such that it is sufficient to immerse the turmeric fingers. Then it is boiled until the fingers become soft and taken out from the pan by lifting the trough and drain the water into the pan.

**TNAU developed the model for turmeric boiling**

A farm level turmeric boiling unit of 150 kg capacity per batch was developed by the Department of Food and Agricultural Process Engineering, Agricultural Engineering College and Research Institute, Tamil Nadu Agricultural University, Coimbatore -3. This is a modification of farm level boiling unit in which steam is used for curing the turmeric.

It consists of large size rectangular container made out of 20 g GI sheet to hold water into which two or three inner containers can be placed to hold rhizomes. The washed rhizomes are loaded and placed in the outer container after filling the required quantity of water. Sodium bicarbonate is added to add colour to the rhizomes. Agricultural wastes are
used to boil the water, and the steam produced are used to boil the rhizomes. This method is more effective since the specific heat of steam is higher than water and reduces the fuel requirement and also reduces the drying time. The inside containers can be taken out easily using the handles provided and the water can be reused for next batch. The capacity of the turmeric boiling unit is 16 quintals / day and the fuel requirement is 10 kg of fire wood / batch. Fuels like kerosene and petrol can also be used to produce steam.

CFTRI method of curing:

The method developed by Central Food Technological Research Institute, Mysore, for curing of turmeric rhizomes involves the use of chemicals viz., lime water or sodium carbonate. The rhizomes are boiled in these chemicals. To get the desired yellow tint, about 20g of sodium bisulphate, 20g of hydrochloric acid is added in the water per 45.3 kg of tubers.

Drying:

After the fingers are cooked, drying is carried out under sun or using mechanical dryers at a temperature of 60°C. The cooked fingers are spread on an open yard or on bamboo mats to thickness of 5-7 cm. It is avoided to spread as thin layer as it leads be bleaching of colour. During night hours the dried fingers are heaped and drying is carried until it is completely dried and it takes 10-12 days. The dry product yield will vary from 10-15 per cent depending on the variety and location where crop is grown up.

Polishing:

The dried rhizomes are polished to remove the scales and root bits. In traditional method the dried rhizomes are loaded in a bag and beaten on a hard surface. In the improved method hand operated barrel or a drum mounted on a central axis is used for polishing. The barrel or drum has an expanded metal mesh into which dried rhizomes are loaded and rotated. Polishing is carried out by the action of abrasion of the surface against the mesh and rubbing between the rhizomes.

Colouring:

The colour of the processed turmeric will fetch high price in the market. So to get an attractive product, turmeric powder is sprinkled in the last phase of polishing. CFTRI, Mysore has recommended to produce an emulsion with the following materials: Alum – 0.04 kg, turmeric powder – 2.00 kg, castor seed – 0.14 kg, sodium bisulphate – 30 g and concentrated hydrochloric acid – 30 ml. The prepared emulsion is poured on the half polished turmeric where it is shaken well in a wicker basket. Once the coating of half polished turmeric is over, it is dried in sun, the quantity given above is sufficient to coat 100 kg of half polished turmeric.