Postharvest Management and Processing of Turmeric

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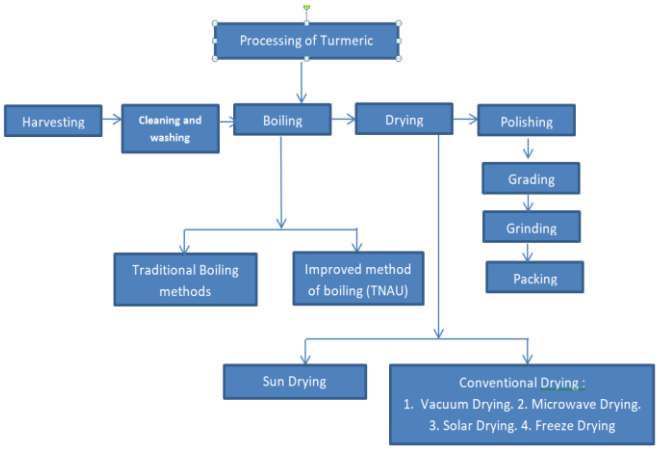
Introduction

Turmeric is high value export-oriented crop and India is a major exporter of turmeric and its products. In the quality front, the major consuming countries like Europe and USA are demanding more and more quality compliance by the producing countries. The harvested turmeric rhizomes before entering into the market are converted into a stable commodity through a number of post-harvest processing operations like boiling, drying and polishing. Turmeric has the advantage of not requiring special cultural practices, it presents good productivity and contains on average 6% curcuminoid pigments and 5% of essential oils. However, there is need to develop processing technology in order to obtain products of added value and good quality. To meet this challenge, we have to equip ourselves to produce process and market high quality turmeric, with internationally accepted food safety standards. Hence precautions have to be taken from the harvesting, primary processing which includes, boiling, drying, polishing, coloring, grading and packaging in order to meet the standards. The improvements in post-harvest processing, mechanization and value addition in turmeric is needed for good quality produce with international standards.

Fig 1. Process flowchart for preparation of turmeric powder

Unit Operations Involved in Turmeric Processing



Harvesting

Turmeric is harvested when the plants are between 8 - 10 months of age, when the stems and leaves start to dry out and die back. The whole plant is removed from the ground, taking care not to cut or bruise the rhizomes.

Cleaning and Washing

The leaves are removed from the plant and the roots carefully washed to remove soil. Any leaf scales and long roots are trimmed off. The rhizomes are washed thoroughly with water to remove soil and mud particles.

Boiling

Boiling is the first post-harvest operation to be performed at the farm level which involves cooking of fresh rhizomes in water until soft before drying. The benefits of boiling turmeric include the following: 1. destroys the vitality of fresh rhizomes 2. Reduction of drying time 3. More even colour distribution throughout the rhizome. The boiling operations helps that the roots to soften them and remove the raw odour. After curing, the starch is gelatinised, which reduces the drying time required, and the colour is uniformly distributed throughout the rhizome. The specifications for curing turmeric vary from different places. There are two methods for boiling of turmeric.1. Traditional Method 2.

Improved boiling method (TNAU Model). The indications of the completion of boiling process are softness and easy breaking of rhizomes when pressed between the

fore finger and thumb and a yellow interior instead of redone. An effective cooking time of 45 to 60 minutes for fingers and 90 minutes for mother rhizomes is considered essential. Overcooking and under cooking are found to affect the quality of the rhizome.

Drying

After boiling, the rhizomes are subjected to drying to improve the quality of the final product and easier to achieve a lower final moisture content in small pieces of rhizome without spoiling the appearance of the product. Traditionally the rhizome pieces are laid on clean concrete floors and dried in the sun. This method can take anything from 10 to 15 days, depending on the climate and the size of the rhizome pieces. It is important that the rhizome pieces are not placed in direct sunlight as this will cause the colour to fade. Turmeric should be dried on clean surface to ensure that the product does not get contaminated by extraneous matter. Care should be taken to avoid mould growth on the rhizomes. Rhizomes are turned intermittently to ensure uniformity in drying. Using a mechanical drier will result in a better colour and a higher quality product. There are several different types


of mechanical drier that are suitable for drying turmeric. These include the tray drier, cross flow air tunnels, solar driers and cabinet driers. The optimum drying temperature is 60°C temperature higher than this result in a darker coloured product. Farmers often dry harvested turmeric rhizome up to a final moisture content 15–35%, depending upon the farmers and location.

Polishing

After drying the rhizomes are polished to remove the rough surface. Dried turmeric has poor appearance and rough dull outer surface with scales and root bits. The appearance is improved by smoothening and polishing the outer surface by manual or mechanical rubbing. This can be done by hand or by shaking the rhizomes in a gunny bag filled with stones. Polishing drums are used in many places. These are very simple, power-driven drums that have an abrasive metallic mesh lining. Polishing is done till the recommended polish of 7-8% is achieved. Usually 5 to 8%of the weight of turmeric is the polishing wastage during full polishing and 2 to 3% during half polishing.


Grading

Based on the marketing, Turmeric was classified into three types: 1. Fingers: Fingers usually range in size from 2.5 to 7.5 cm in length and may be over 1 cm in diameter. These are the lateral branches or secondary ‘daughter’ rhizomes which are detached from the central rhizome before curing. 2. Bulbs: These are central ‘mother’ rhizomes, which are ovate in shape and are of shorter length and having larger diameter than the fingers. 3. Splits: Splits are the bulbs that have been split into halves or quarters to facilitate curing and subsequent drying.


Grinding

Grinding can be a method of adding value to a product. Grinding is one of the most common operations used to prepare turmeric powder for consumption and resale. The main aim of particular spice grinding is to obtain smaller particle sizes, with good product quality in terms of flavour and color. There are different ambient grinding mills and methods


available for this process; such as hammer mill, attrition mill and pin mill. In India, traditionally, plate mills and hammer mills are used for turmeric grinding. Grinding can be a method of adding value to a product. However, in general it is not advisable to grind spices as they become more vulnerable to spoilage. The flavour and aroma compounds are not stable and will quickly disappear from ground products. The storage life of ground spices is much less than for the whole spices.

Packaging

Dried rhizomes and rhizome pieces are packed in jute sacks, wooden boxes or lined corrugated cardboard boxes for shipping. Ground turmeric should be packaged in moisture proof, air-tight polyethylene packages. The packages should be sealed and labelled with attractive labels. In order to maintain the quality of the turmeric powder during handling, transportation, storage and distribution, the packaging material to be used is to be selected with care, keeping in mind the functional as well as the marketing requirements.

- To protect the product from spillage and spoilage.
- To provide protection against atmospheric factors such as light, heat, humidity and oxygen.
- The packaging material should have a high barrier property to prevent aroma/flavour losses and ingress of external odour.
- The volatile oil present in the spice product has a tendency to react with the inner/ contact layer of the packaging material.
- Besides the above functional requirements, the packaging material should have good machinability, printability and it should be easily available and disposable.

Storage

The bulk rhizomes are stored in a cool and dry environment, away from direct sunlight. The bright colour of ground turmeric will fade when it is left in the light for a long period of time. Therefore, the packets should be stored in a cardboard box, away from the sunlight. The storage room should be clean, dry, cool and free from pests.

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