

Studies on quality evaluation of blanched turmeric

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SUMMARY :

Turmeric is one of the important cash crops. The area under turmeric cultivation is increasing day by day but its processing is done by traditional method leading to loss of fuel, time and quality. Processing of turmeric assumes importance from of appearance and colour point of view. The processing of turmeric by blanching was compared to the conventional method of boiling the rhizomes. It was observed that the average length, breadth and thickness of fresh turmeric rhizomes was 71.29, 25.19 and 24.08mm whereas that of blanched turmeric rhizomes, it was 69.72, 24.42 and 22.99mm, respectively. The average values of weight, volume, and true density of fresh and blanched single turmeric rhizome were observed 26.86g, 26.15cm³, 1.026 g/cm³ and 25.62g, 24.23cm³, 1.07g/cm³, respectively. The skin removal and stick piercing in turmeric rhizomes blanched for 25,30 and 35 minutes is less easy, easy and more easy, respectively. The turmeric rhizomes blanched and boiled for 25, 30 and 35 minute retains curcumin content 4.27 per cent, 4.09 per cent, 4.01 per cent and 4.21 per cent, 3.91 per cent, 2.29 per cent, respectively.

KEY WORDS : Turmeric, Blanching, Turmeric processing

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Turmeric (*Curcuma longa*) a herbaceous, perennial crop with thick underground rhizomes giving rise to primary and secondary rhizomes called fingers. Turmeric is valued for its deep yellow colour and aromatic flavour. It is used both as a spice and as a food colouring agent in pickles, chutneys, curries and other culinary preparations. It is also used as a drug and cosmetic. Processing of turmeric assumes importance from of appearance and colour point of view. The core of turmeric is reddish which after boiling becomes, yellow and of uniform in colour. Curing is the process of cooking raw

rhizomes in hot water to obtain attractive colour, characteristics aroma, destroy and viability of fresh rhizomes and obviate the raw odour, reduces the time of drying, ensures an even distribution of colour in the rhizomes and gives better quality product by gelatinization of starch. In steam blanching, water vapour hardly escapes in the atmosphere, steam is uniformly distributed throughout the mass and uniform blanching is facilitated. Loss of heat is prevented, easy handling and cost of processing is reduced. The overall cost of processing will be reduced due to above reasons and due to faster rate

of blanching quality of turmeric will also be improved.

EXPERIMENTAL METHODS

Determination of physical properties :

Size and shape :

The maximum tri-axial dimensions *i.e.* length, breadth and thickness were obtained from 20 randomly selected turmeric rhizomes using a vernier caliper. The samples were divided into two categories *i.e.*, fresh/raw and cure at atmospheric pressure. The averages of the readings were taken as its length, breadth and thickness.

Volume and true density :

The volume and true density of fresh /raw turmeric rhizomes as well as cured rhizomes were measured by toluene displacement method.

Blanching process :

Soil and other particles adhering to rhizomes were removed by hand cleaning and washing before blanching under clean running water. Roots and fibres were trimmed off. After that the mother and finger rhizomes were separated and weighted. Then the rhizomes were loaded manually into the blanching vessels and the lid at the top of vessels were closed and tightened by nut and bolt arrangement.

The water tank was filled with clean water from water inlet situated at the top of water tank. Fuel was fed to the furnace. Furnace provides space for combustion of fuel. The combustion of fuel heats up the water in the water tank. The flue gases passes through the fire tubes surrounded by water in the tank up to the chimney. After reaching the water temperature to 100°C, steam was generated which rises up and gets collected in the steam chamber.

Steam conduit conveys the steam from the steam chamber to the blanching vessel. After reaching the steam pressure to 0.1kg/cm² in the boiler the valve of first vessel was opened and steam was diverted into the blanching vessel. In the blanching, the steam was distributed by four long vertical perforated pipes. The rhizomes were blanched for 25, 30 and 35 min. with the help of timer. The pressure and temperature were regulated duration this period with the help of control valve and fuel feed rate. Pressure gauge indicates the pressure in the vessels. The blanching was carried out batch wise in the vessel

alternatively. The rhizomes in one vessel were blanched and during this interval the rhizomes in other vessel were unloaded in the trolley by opening the shutter with the help of wheel located at the bottom of vessel. The trolley full of blanched turmeric can be pushed by one person to drying yard to spread. Blanched turmeric was spread on the drying yard near by end and allowed to dry upto 6 per cent moisture content. The procedure was repeated for different time interval and different observation were noted and tabulated.

Turmeric boiling :

For comparative study the 3 quintal turmeric rhizomes were boiled for 25, 30, and 35 minutes

Chemical analysis :

About 0.1 to 0.2 g finely ground turmeric powder was extracted by refluxing over a water condenser with 40 ml of distilled alcohol for 2.5 hours. The extract was transferred to 100 ml, volumetric flask and made to volume with alcohol. It was then filtered and an aliquot of 5 ml was transferred to a 100ml volumetric flask. It was mixed well and the absorbance of this solution was measured at 425 nm against alcohol blank. Using the absorbance value of standard solution of curcumin (0.0025g/100ml gives and absorbance of 0.42) the curcumin percentage was calculated

EXPERIMENTAL FINDINGS AND ANALYSIS

The findings of the present study as well as relevant discussion have been presented in Table 1 to 3.

Effect of blanching on physical properties of turmeric :

The average length, breadth and thickness of fresh turmeric rhizomes was 71.29, 25.19 and 24.08mm whereas that of blanched turmeric rhizomes it was 69.72, 24.42 and 22.99mm, respectively. The average size of fresh and blanched turmeric rhizomes is 34.51 mm and 33.88 mm, respectively. The sphericity of fresh and blanched turmeric rhizomes is 0.495 and 0.489. The average values of weight, volume, and true density of fresh and blanched single turmeric rhizome were observed 26.86g, 26.15cm³, 1.026 g/cm³ and 25.62g, 24.23cm³, 1.07g/cm³, respectively.

The decrease in the axial dimensions is due to oozing

out of moisture in the form of vapour at the temperature 100 °C in the blanching vessels. No water droplets observed on the blanched turmeric rhizomes after taking out of vessels as in the traditionally boiled turmeric in boiling pots.

Effect of time on blanched turmeric rhizomes :

It was observed that the skin removal and stick piercing in turmeric rhizomes blanched for 25, 30 and 35 minutes is less easy, easy and more easy, respectively. It is also observed that turmeric blanched for 25 minutes attains non-uniform yellow colour with separate core and outer layer. Turmeric rhizomes blanched for 30 and 35 minute attains uniform yellow colour but the rhizomes becomes very soft after 35 minutes. Turmeric boiled for 25 minutes was not boiled uniformly.

Effect of method of turmeric processing on curcumin and oleoresin content :

It was observed that the turmeric rhizomes blanched and boiled for 25, 30 and 35 minute retains curcumin content 4.27 per cent, 4.09 per cent, 4.01 per cent and 4.21 per cent, 3.91 per cent, 2.29 per cent, respectively. Also the values of oleoresin content in the rhizomes blanched and boiled for the above time period were observed 5.01 per cent, 4.92 per cent, 4.90 per cent and 4.98 per cent, 4.86 per cent and 4.81 per cent,

respectively. The of loss curcumin and oleoresin content in turmeric boiling is more as compared to steam blanching.

Effect of blanching on drying of turmeric :

The initial moisture content of turmeric was found to be 76 per cent. After blanching the moisture content of steam blanched and boiled turmeric was observed as 74.5 per cent and 77 per cent, respectively. The time of drying for blanched and boiled turmeric was 8 days and 12 days, respectively

Conclusion :

Turmeric is one of the important cash crops. The area under turmeric cultivation is increasing day by day but its processing is done by traditional method leading to loss of fuel, time and quality. Hence, turmeric growers get very little return out of their produce due to traditional methods of processing post harvest technology of turmeric should be scientifically explore so that farmer may incorporate modification and take processing equipment. The following conclusions were drawn from blanching study of turmeric processing :

- The quality of turmeric steam blanched for 30 minutes is better than boiled turmeric with respect to curcumin and oleoresin percentage retained.
- Blanched turmeric required less time as compare

Table 1 : Average length, breadth, thickness, size, sphericity and true density of fresh and cured turmeric rhizomes

Turmeric	Length (mm)	Breadth (mm)	Thickness (mm)	Size (mm)	Sphericity	Weight (g)	Volume (cm ³)	True density g/cm ³
	a	b	c	(abc) ^{1/3}	(abc) ^{1/3/a}			
Fresh av.	71.29	25.19	24.08	34.51	0.495	26.86	26.15	1.03
Cured av.	69.72	24.42	22.99	33.88	0.489	25.62	24.23	1.07

Table 2 : Effect of time on blanched turmeric rhizomes

Time interval (Minutes)	Skin removal	Stick piercing	Colour uniformity
25	Less easy	Less easy	Non-uniform yellow, core is visible
30	Easy	Easy	Uniform yellow
35	More easy	More easy	Uniform yellow, very soft rhizomes observed

Table 3 : Effect of blanching time on curcumin and oleoresin content

Content %	Time interval in minutes					
	Steam blanching			Boiling		
	25	30	35	25	30	35
Curcumin %	4.27	4.09	4.01	4.21	3.91	2.29
Oleoresin %	5.01	4.92	4.90	4.98	4.86	4.81

to boiled turmeric.

- Loss of fuel, labour, time and quality can be reduced by using Turmeric Steam Blancher.

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