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ADVANCES IN CINNAMON PROCESSING: ENHANCING QUALITY AND FUNCTIONAL PROPERTIES

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Cinnamon is a popular spice derived from the bark of various *Cinnamomum* species, has been using centuries having valued for its distinctive flavour and medicinal properties. This article provides an overview of recent advancements in cinnamon processing techniques aimed at improving the overall quality and functional properties of this aromatic spice. Modern processing methods discussed and address challenges related to flavour retention, nutritional preservation, and increased consumer demand for high-quality cinnamon products. Innovations in harvesting, drying, and storage practices have been crucial for maintaining the essential oil content and bioactive compounds that contribute to cinnamon's unique sensory profile and health benefits.

Furthermore, this explores novel extraction and encapsulation technologies designed to enhance the bioavailability of cinnamon's bioactive components, such as cinnamaldehyde and polyphenols. These advancements not only contribute to the spice's flavor intensity but also expand its potential applications in the food, pharmaceutical, and cosmetic industries. Quality control measures, including the use of advanced analytical techniques and sensory evaluation, are discussed to ensure the consistency and safety of cinnamon products. Additionally, this provides highlights sustainable and environmentally friendly processing methods to address concerns related to the ecological impact of cinnamon cultivation and processing.

These article underscores the significance of ongoing research and technological advancements in cinnamon processing, emphasizing the potential for creating superior-quality products with enhanced functional attributes, thus cooking preferences of consumers in various industries

Cinnamon, derived from the bark of several species within the *Cinnamomum* genus, stands as one of the oldest and most prized spices in the world. Renowned for its distinctive aroma, flavor, and therapeutic properties, cinnamon has been an integral part of culinary and medicinal traditions across cultures for centuries. As global demand for high-quality cinnamon continues to surge, the focus on optimizing cinnamon processing methods has become imperative to meet both consumer expectations and industry standards. In India Cinnamon is cultivated in an area 1,000 ha. With an annual production of 1,670 tons. The productivity is 1000 kg/ha. The complex process of transforming raw cinnamon bark into the fine spice we know involves various stages, each critical for preserving its unique characteristics. From harvesting and drying to extraction and packaging, each step plays a pivotal role in determining the final quality of the cinnamon product. In recent years, researchers and industry professionals have been dedicated to refining these processing techniques, addressing challenges related to flavor retention, nutritional preservation, and environmental sustainability.

This article provides a brief information of world of cinnamon processing, setting the stage for a detailed exploration of the latest advancements and innovations in the field. By investigating into these developments, we aim to uncover how modern technologies and sustainable practices contribute to the enhancement of cinnamon's flavor profile, nutritional value, and broader applications across diverse industries. As we navigate through the intricate journey of cinnamon processing, we unravel the layers of tradition, innovation, and science that converge to bring this beloved spice to our tables and beyond.

Processing of Cinnamon

How successfully the bark is cut off the stems determines the quality of the cinnamon. Compared to tiny broken pieces, the larger bark fragments known as quills are sold for more. Because removing the bark from the stem requires a lot of labor and is typically done by hand by professional workers, processing costs make up over 60% of the total cost of producing cinnamon.

Scraping

Epidermal tissue layer on stems is removed by a process called scraping. This is accomplished with a traditional hand tool known as a "Koketta." Two kinds of tools are available: one featuring a short handle and a sharp, curved blade, and the other. "Sawthtuwa"

is the Sinhala name for the later. Choose a blade curve that complements the stems' diameter. As a result, this step's automation is challenging. The amount of time it takes to scrape is influenced by the stillness and physical characteristics of the stems, such as their straightness, knob count, and stick diameter.

Rubbing

A copper rod later took its place, and that copper rod was later replaced by a brass rod. The brass rod's average dimensions are 15 mm in diameter, 203 mm in length, and 1.1 kg in weight. The hardest part of processing cinnamon is rubbing, which makes the bark loose enough to separate from the stem's core. Pushpitha (2006) states that only male peelers are used for this task because the rubbing process is quite taxing. The length of time needed for rubbing varies depending on the stem's diameter, evenness, number of knots, season, cultivar, etc. The peeler's productivity decreases after rubbing for 4-6 hours. This may result in damaged bark and low-quality quills. During the rubbing process, bark sap oozes indicating proper rubbing. However, extreme rubbing can damage the bark (Gunasena et al. 1997; Pushpitha 2006).

Peeling

After selecting the proper method for removing the bark, a small pointed knife is used to make two incisions around the stems at the greatest length of intervals. The bark is then peeled off by delicately inserting the knife between the hardwood and bark and lifting and releasing it. The bark is finally split into two parts by making a second longitudinal slit across from the first. Bark can be separated into three or even four strips along a stem when its diameter is large enough. Cinnamon can be harvested at any time of year, although it is best during the monsoon season; in Sri Lanka, this means that it is only picked for roughly two months during the dry spells. When the earth becomes dry and the moisture content decreases, peeling becomes fairly challenging. Conserving soil moisture through mulching with cinnamon leaves is an excellent practice (Wijesekara et al. 1975; Gunarathne 2011). Following the bark's removal, the long, undamaged peels that form the quills' outer covering are allowed to dry for two to three hours in the shade. Bark curls flipped during this time. This interval is prolonged by up to 5–8 hours during the wet season. Currently, racks constructed of steel or coconut rope are utilized to reduce the drying time. Skilled peelers prepare cinnamon quills so that they are consistently thick from end to end. Bark halves are pressed together until they form tubes that resemble cigars. Thin bark fragments that are

inappropriate for forming the quill's outer covering are crammed into the hollow inside of the quill. To make quills, one needs a pair of scissors, a 107-cm measuring rod, and a wooden lifter known as a "Pethi Kotuwa" in Sinhalese. After trimming the end with scissors when it reaches the desired length, it is carefully lifted and placed on a mat to continue drying. The processed quills are piled into 45 kg bundles, known as bales for sale and transportation purposes. The quills are covered from the sun with gunny sacks or Cadjan leaves (Administration Reports 2009–2018). An experienced cinnamon peeler may peel approximately 50 collected stems in ten to fifteen hours in order to generate 4-5 kg of dry processed cinnamon in a day.

Rolling

Pressing and stacking peeled barks one on top of the other creates a roll. 20cm is the minimum length of peeled bark, which is then heaped up in little enclosures covered in dried leaves or mats to help with mild fermentation and maintain moisture for the following day's operations.

Piping

Slips that have been peeled and rolled are bundled and brought to the piping yard. The horizontal rod that holds these slips is raised on a stand. Using a curved knife, scrape off the outside skin of the slip. Next, grade the scraped slips based on thickness. Finally, roll the graded slips over the outer cover of pipes to construct pipes. Slips are dried after they are piped. We refer to these piping slips as quills. Compound quills are made by inserting tiny quills into larger ones; to prevent warping, the compound quills are then dried in the shade on coir rope racks. The quills are dried for 4-5 days, then the filling is tightened by rolling them on a board before being dried in indirect sunlight. Once they have dried, they are arranged in mats for promotion.

Grading

The quills are categorized into finer and coarser grades, ranging from '00000' to '0'. After the quills are prepared, the minute fragments of bark that remain are categorized as "Quillings." Quills, Quillings, and scrapes (Katta) that are used for oil distillation are the three main commercial groups into which they are divided; yet, during the processing of quills, a number of other valuable by-products are produced (Dayananda 2011). Dry "featherings" are made from the extremely thin inner bark portions. The coarser canes are known as "scrapped

chips" because the bark is scraped off rather than peeled. "Un scrapped chips" are bark that has been scraped off without removing the outer bark. "Cinnamon powder" is made by powdering various bark grades. The best quality is always found in the middle of the shoot & not at ends.

Packaging

For commercial purposes, cinnamon quills are often sliced into 10cm long pieces and placed inside moisture-resistant polypropylene bags. Moisture infiltration can be avoided by sealing the bags. All pertinent product and legal details, including the product's name, brand name, manufacturer's details (including name and address), date of manufacturing, expiration date, weight of the contents, and any added ingredients, should be listed on the labels of the bags.

Storage

Dried cinnamon quills should be kept out of direct sunlight in moisture-proof containers. If they have absorbed moisture, they should be dried again until a moisture content of 10%. It is imperative that the storage chamber is pest-free, dry, and cold. A room containing strong-smelling foods, detergents, or paints should not be stored with cinnamon since they will overpower the flavor and aroma of the spice. Mosquito netting should be installed on windows to keep insects and vermin out.

Conclusion

In summary, the processing of cinnamon involve several steps like Scraping, Rubbing, Peeling, Piping, Grading, Packaging & storage. Low efficiency & high labor cost are the drawbacks.

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