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# Value-added turmeric products you can make at home

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## Turmeric: A versatile and popular herb

Turmeric (*Curcuma longa*) is a tropical perennial herbaceous plant in the family Zingiberaceae, genus *Curcuma*, and species *longa*. Turmeric tuberous rhizomes, or underground stems, have been used as a condiment and golden spice in Asian cuisine for more than 4,000 years, particularly in China, India, and Indonesia (Sahoo et al., 2021). Turmeric is also valued as a medicinal herb, a tonic for various health conditions, a natural dye for food and textiles, an aromatic stimulant in cosmetics, and an element in religious ceremonies. Due to the diverse applications, global turmeric production is projected to reach 1.5 million metric tons with the market value estimated at \$5.65 billion by 2027 (Sahoo et al., 2021).

## Growing conditions and harvesting

Guam's tropical conditions are ideal for turmeric cultivation. Turmeric prospers in warm, humid climates with temperatures of 20–35°C (68–95°F) and altitudes up to 1,500 meters (4,900 feet), requiring 70–225 cm (27–88 inches) of annual rainfall (Verma et al., 2021).

Turmeric can typically be harvested seven to nine months after planting. In Guam, it can be harvested year-round, with the peak season spanning from January to May.

The yield and quality of production is greatly affected by the genotypes, varieties, and cultivars of turmeric as well as the conditions of cultivation. Harvesting the turmeric when its foliage is dried can produce a yield of turmeric ranging from 0.24 to 1.0 kg per plant or about 22,500 kg per hectare (Taveres et al.).

To extend its shelf-life, wash the turmeric with clean water after it is harvested to remove soil and organic matter, and sanitize it using sanitizer solution (e.g. sodium hypochlorite bleach at the concentration of 50 ppm free chlorine). Trim

and grade roots by size to meet market standards. To prevent dehydration and maintain freshness, place the turmeric in paper bags, plastic baskets with cardboard covers, or perforated plastic bags and store in a cool, dry place at 10–16°C (50–60°F) for a shelf-life of two weeks (Kirk et al., 2023).

High-quality turmeric for consumption and processing value-added products should have bright yellow-to-orange flesh and be free from bruises, soil, rot, insect damage, dehydration, and fungal issues.

## Health benefits of turmeric

Turmeric contains numerous phytochemicals that provide health benefits. Unique curcumin, demethoxycurcumin, and bismethoxycurcumin — known as curcuminoids — exhibit anti-inflammatory, antioxidant, anticancer, anti-diabetic, neuroprotective, hepatoprotective, cardiovascular protective, and immune-regulating properties. Other phytochemicals include oregonin, cassumunarins, hirsutenone, and acrogenin M. (Rathore et al., 2020).

Traditionally, turmeric has been used in herbal medicine for unverified treatments of arthritis, uveitis, conjunctivitis, carcinoma, smallpox, chickenpox, wound healing, and urinary infections. Turmeric is also believed to support liver health, expel worms, regulate menstruation, dissolve gallstones, and promote general well-being (Sahoo et al., 2021).

## Challenges of curcumin in food processing

Although curcumin, a polyphenol, exhibits various health benefits, it has low stability and poor water solubility. Factors like temperature, light, oxygen, pH, and food components during food processing and storage can greatly influence its stability (Zaghary et al., 2019). For instance, curcumin degrades at temperatures above 120°C

(248°F) and is oxidized under UV or visible light and in the presence of oxygen. To minimize degradation of curcumin, it is essential to avoid high-temperature treatment, such as frying, and to use opaque or inert gas packaging to prevent oxidation.

Nonetheless, curcumin is more stable in acidic conditions (pH < 6) and suitable for acidic foods like beverages and sauces. Fat/oil-rich foods can also stabilize curcumin because of its lipid solubility. Proteins, antioxidants, and polyphenols in food matrices also protect curcumin by forming complexes and preventing oxidation.

In addition, curcumin has rapid metabolism and low bioavailability in the human body, which can be improved by piperine, an alkaloid in black pepper. Therefore, incorporating black pepper with turmeric in food products can maximize curcumin's health benefits.

### Safety of turmeric and curcuminoids

Turmeric and its curcuminoids are classified as GRAS

(Generally Recognized as Safe) by the U.S. Food & Drug Administration (FDA) when used as food ingredients, such as for spices and flavorings in cooking and food products. However, their safety at higher doses, such as in concentrated curcumin supplements, remains uncertain. The World Health Organization (WHO) and the Food & Agriculture Organization (FAO) have established an acceptable daily intake (ADI) for curcumin at 0–3 mg per kilogram of body weight, which is approximately less than 2 teaspoons per day of turmeric powder for an adult.

### Value-added turmeric products

In addition to being commonly used as a cooking spice, turmeric can be processed into various value-added food products to harness the health benefits of curcuminoids and other phytochemicals. These products include turmeric “golden milk,” teas, smoothies, beverages, breads, cakes, and candies. These products offer anti-inflammatory and antioxidant properties, contributing to overall health benefits.



Fresh turmeric can be processed into various value-added food products, including powder, to harness its health benefits.



Turmeric powder and the ingredients needed to make “golden milk,” a value-added turmeric product.



TURMERIC POWDER

Turmeric powder is a versatile ingredient used to make value-added products (Oc & Ic, 2024). With the instructions below, you can create high-quality turmeric powder for use in cooking, health remedies, or other applications. The nutrient composition of turmeric powder is listed in Table 1.

Table 1. Nutrition Facts: Turmeric Powder	
Nutrient	Content (g/100g)
Water	6-13
Carbohydrates	60-70
Protein	6-10
Fat	5-10
Minerals	3-7
Essential oil	3-7
Dietary fiber	21-23
Curcuminoids	1-6
Alkaloid	0.76
Saponin	0.45
Tannin	1.08
Sterol	0.03
Phytic acid	0.82
Flavonoid	0.40

Instructions: Turmeric Powder

Tools needed:

- gloves to avoid staining hands
  - peeler
  - knife or slicer
  - cutting board
  - food dehydrator
  - blender, spice grinder, coffee grinder, or food processor
  - airtight containers, jars, or Ziplock bags
1. Choose fresh, firm, and mold-free turmeric.
  2. Wash the turmeric thoroughly under running water to remove soil and impurities.
  3. Use a peeler or knife to remove the skin from the turmeric (optional).
  4. Use a slicer or knife to cut the rhizomes into thin slices (1-2 mm). Thin slices dry faster and more evenly.
  5. Place the sliced turmeric on dehydrator trays. Dry the slices in a food dehydrator at 57°C (135°F) for 6–12 hours until crispy and completely dry.
  6. Grind the dried turmeric into a fine powder using a blender, spice grinder, coffee grinder, or food processor.



Slicing and dehydrating turmeric before grinding it into a fine powder.

7. Package the turmeric powder into airtight containers or low-density polyethylene (LDPE) bags in an environment with a relative humidity of less than 60% to avoid moisture absorption.
8. Label and date your containers to keep track of storage time.
9. Store the powder in a refrigerator or a cool, dark, and dry place for up to six months to maintain its quality.

## TURMERIC GOLDEN MILK

Golden milk is a warm and soothing drink made with turmeric powder and other spices. The milk provides health benefits with anti-inflammatory and antioxidant properties. Use the recipe below to make turmeric golden milk (Idowu-Adebayo et al., 2022).

Table 2. Ingredients for Golden Milk	
Ingredient	Quantity
Dairy or nondairy milk (almond, coconut, or oat)	1 cup
Turmeric powder	½ teaspoon
Ground cinnamon	¼ teaspoon
Black pepper	1 pinch
Ground ginger (optional)	¼ teaspoon
Honey or maple syrup (optional)	1 teaspoon
Coconut oil or ghee (optional)	½ teaspoon

### Recipe: Turmeric Golden Milk

Servings: 1

#### Tools needed:

- saucepan
- stove
- measuring tools
- spoon or wire whisk
- cheesecloth or mesh strainer (optional)
- pitcher and cups

1. Pour milk into a small saucepan and gently heat it over medium-low heat.
2. Add turmeric powder, cinnamon, black pepper, and ground ginger to the milk, stirring thoroughly to combine.
3. Simmer the mixture for about 5 minutes, ensuring it does not boil. Stir occasionally to prevent sticking.
4. Sweeten with honey or maple syrup, and enhance creaminess with coconut oil or ghee (optional). Stir until fully incorporated.
5. Strain the golden milk through a cheesecloth or fine mesh strainer into a cup to remove any undissolved spices.
6. Serve and consume warm and enjoy your nourishing drink!



The steps of making turmeric golden milk.



## TURMERIC-GINGER CANDY

Turmeric and ginger candies can offer health benefits to reduce inflammation, provide antioxidant properties, support digestion, improve immune function, and alleviate pain. Use the recipe below to make fresh and delicious turmeric-ginger candy.

**Table 3. Ingredients for Turmeric-Ginger Candy**

<i>Ingredient</i>	<i>Quantity</i>
Fresh turmeric powder	1 Tablespoon
Fresh ginger powder	1 Tablespoon
Fresh calamansi juice	2 Tablespoon
Sugar (white granulated)	1 cup
Water	$\frac{3}{4}$ cup
Honey	$\frac{1}{4}$ cup
Cinnamon powder	$\frac{1}{2}$ teaspoon
Cornstarch	$\frac{1}{2}$ teaspoon

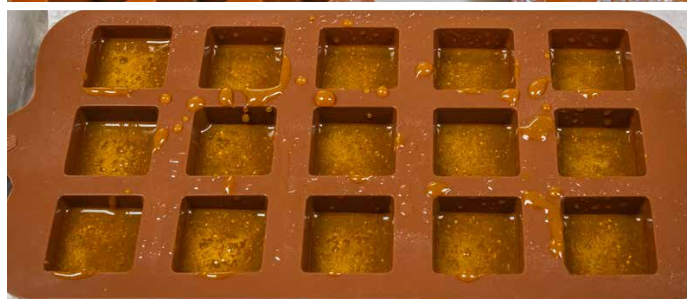
### Recipe: Turmeric-Ginger Candy

Servings: 60 pieces

Tools needed:

- candy molds or parchment paper
- non-stick cooking spray
- large pot
- measuring tools
- thermometer
- metal tablespoon
- gloves
- candy-wrapping paper
- jars, containers, or Ziplock bags

1. Grease candy molds or parchment paper with non-stick spray.
2. In a large pot, combine all ingredients except calamansi juice. Heat and stir until boiling.
3. At 101°C (215°F), add calamansi juice and continue stirring until the mixture boils again.
4. When the mixture turns translucent and reaches 107-149°C (222-300°F), perform the “ball test” by dropping a small amount into room-temperature water. If it forms a ball, it is ready.
5. Use a metal teaspoon to drop the mixture into molds or onto parchment paper.
6. Cool at room temperature overnight or refrigerate for two hours until solidified.
7. Sprinkle candies with cornstarch, then wrap individually with gloves.
8. Store in the refrigerator and consume within three months.



The steps of making turmeric-ginger candy.



## TURMERIC-GINGER MOCHI

Turmeric-ginger mochi can offer health benefits to reduce inflammation, provide antioxidant properties, support digestion, improve immune function, and alleviate pain. Use the recipe below to make turmeric-ginger mochi.

Table 4. Ingredients for Turmeric-Ginger Mochi	
Ingredient	Quantity
Fresh turmeric or fresh turmeric juice (100%)	180 g or ¼ cup
Fresh ginger or fresh ginger juice (100%)	180 g or ¼ cup
Sweet rice flour or Mochiko powder	¾ cup
Brown sugar	¾ cup
Water	2 Tablespoons
Grated coconut or coconut flakes	½ cup

### Recipe: Turmeric-Ginger Mochi

Servings: 40 pieces

Tools needed:

- knife and cutting board
- food processor or juicer
- cheesecloth
- saucepan
- whisk
- fine-mesh strainer
- 8-inch pan or mochi molds
- steamer

1. Wash and rinse fresh turmeric and ginger (no need to peel).
2. Cut turmeric and ginger into small pieces and grind them in a food processor until finely minced.
3. Place the minced turmeric and ginger in a double-layer cheesecloth and squeeze out the juice.
4. Add turmeric juice and ginger juice to sweet rice flour or Mochiko powder, and mix into dough. Cover for 15 minutes at room temperature.
5. In a saucepan, heat brown sugar and water, stirring until the sugar dissolves.
6. Add the melted sugar to the dough and whisk until the mixture becomes a runny batter.
7. Strain the batter through a fine mesh strainer to remove solids.
8. Pour the mochi batter into a greased pan or mochi molds.
9. Steam the pan or molds for 40 minutes or until



The steps for making turmeric-ginger mochi.

- the mochi becomes translucent.
10. Remove them from the steamer and cool at room temperature or refrigerate.
11. Once cooled, cut into strips or desired shapes and coat them with shredded coconut flakes.
12. Wrap the coated mochi and store it in the refrigerator. Consume within one week.

## Food safety tips

To prepare wholesome and safe value-added turmeric products, please apply the following food safety tips:

- **Practice good hygiene:** Wash hands thoroughly with soap and warm water before handling food. Cover any cuts or burns on your hands with clean bandages.
- **Prevent cross-contamination:** Use separate cutting boards and utensils for raw and cooked ingredients.
- **Clean and sanitize:** Regularly clean and sanitize all equipment and utensils. Air dry them before the use.
- **Use fresh ingredients:** Ensure all ingredients are clean, fresh, and of high quality before use.
- **Inspect stored products:** Discard any items that appear moldy, smell spoiled, or look unpleasant during storage. Perishable foods or ingredients should be stored at 4°C (40°F) or below.

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