

Study of the Knowledge of Turmeric (*Curcuma longa*) and Ginger (*Zingiber officinale*) in the Region of Daloa (Côte D'Ivoire)

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Abstract

Ginger and turmeric are two plants of the Zingiberaceae family. They are used as spices and in the treatment of many diseases. Despite their importance, data on their knowledge and their uses are scarce. The objective of this work was to assess the knowledge and different uses of ginger and turmeric. A survey was carried out among saleswomen and consumers. The survey reveals that 100% of those surveyed knew about ginger, but fewer people (17.5%) knew about turmeric. The survey identified that ginger tastes more pungent (82.65%) than bitter (17.35%), whilst turmeric's taste is bitterer (53.47%) rather than pungent (46.53%). Consumption differed between the two rhizomes, with ginger consumed fresh (90.22%) and turmeric dry (84.25%). Differences were also noted in their medicinal (40.66% for ginger and 32.15% for turmeric), nutritional (50.82% for ginger and 11.65% for turmeric) and cosmetic (8.63% properties for ginger and 56.2% for turmeric) uses. The vernacular names of the two rhizomes varied from one ethnic group to another.

Keywords

Turmeric, Ginger, *Zingiber officinale*, *Curcuma longa*, Spice

1. Introduction

Ginger (*Zingiber officinale*) is a plant of the Zingiberaceae family [1] whose rhizome is widely used in groceries, popular medicine and food, particularly in the

production of juice [2]. Ginger is of major economic importance across the world [3]. It also has compounds with high antioxidant activity [4]. In Cote d'Ivoire, ginger is commonly referred to as "gnanmankou" [5] and widely distributed in markets and streets. Much of the Ivorian ginger production is used for the manufacture of juice and is also used in the pharmacopoeia. Although this activity is not popularized, it is presented as an important source of income. The price of a kilogram of ginger can vary from 320 to 500 CFA francs. It is sold in all forms (fresh, dried, processed) [6] [3]. Similar to ginger, turmeric (*Curcuma longa*) is a perennial plant that belongs to the Zingiberaceae family. The most widely used part, the rhizome, serves as a food spice, a preservative, and is used as a colorant in foods and textiles [7] [8]. It has also been used for centuries in traditional medicine to treat asthma, allergies, liver disorders such as jaundice, anorexia, rheumatism, colds and sinusitis [9] [10]. It also serves as a natural dye [11]. These two spices contain many active ingredients that are widely used in therapy, such as antioxidant, anti-tumor, anti-apoptotic, hypoglycemic, antimicrobial and anti-inflammatory [12] preventive agents. In Côte d'Ivoire, ginger is widely available and consumed, unlike turmeric, which is still unknown to the population. Knowledge of these two spices could add value to these currently under valued products.

The objective of this study is therefore to assess the knowledge and the different uses of ginger (*Zingiber officinale*) and turmeric (*Curcuma longa*) by collecting information from consumers.

2. Materiel and Methods

2.1. Materiel

Study Zone

The district of Daloa is located in the high Sassandra region in the center west of Côte d'Ivoire between 6° and 7° North latitude and 7° and 8° West longitude and at an altitude of 262 m relative to sea level. The district of Daloa covers an area of 15,205 km² with a population estimated at 1,430,960 inhabitants. It is bounded by the departments of Vavoua to the north, Issia to the south, Zuénoula and Bouaflé to the east and Zoukoubgeu to the west. The district of Daloa includes the sub-prefectures of Gboguhé, Zaibo, Gonaté, Bédiala, Zoukougbeu, and Gadouan (Figure 1).

2.2. Methods

Survey

1) Determining the size or number of people to be surveyed

The survey was carried out in the town of Daloa (capital of high Sassandra) given its cosmopolitan population and the cultural diversity of the peoples. For this survey, four hundred (400) people were investigated in the town of Daloa using an established method [13], Equation (1) from across the major ethnic groups of Côte d'Ivoire; the Akan (Baoulé, Agni, Attié, etc.), the Bété and the Guéré (Krous),

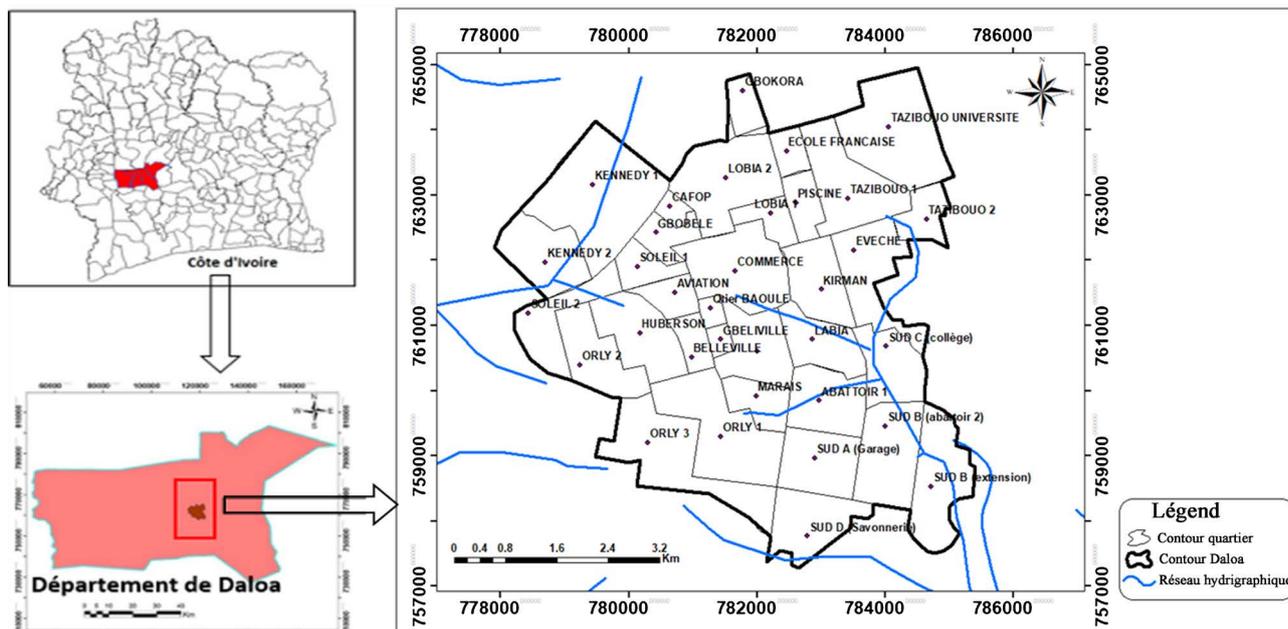


Figure 1. Presentation of the study area.

the Sénoufo (Gours), the Yacouba and the Gouro (Mandé) including non-nationals (Voltaics, Guineans, Malians, Togolese).

$$n = \frac{t^2 p(1-p)}{e^2} \tag{1}$$

n: Sample size,

t: Margin coefficient (1.96),

e: Margin of error (0.05),

p: Proportion of elements of the mother population (*p* = 0.5).

2) Investigation procedure

A questionnaire was developed for the survey procedure, which made it possible to collect in the town of Daloa, information on several parameters, namely, knowledge of plants, different forms of use, the method of preparation and the method of conservation, shelf life and various virtues. The investigations were carried out at random in the districts of Lobia, Tazibouo, Gbokora, Orly and Fadiga. These districts were chosen mainly for their easy access and for their population, with a view to better coverage of the surroundings. To this end, the procedure adopted is a one-pass directive interview aimed at and carried out amongst traders of ginger and turmeric in large markets, households and traditional healers. The survey took place from September 2020 to November 2020. Respondents whose minimum age requirement was 20 years old were made up without distinction of socio-professional strata, ethnicity and gender.

3) Statistical analysis

The data collected was entered and processed using Microsoft Excel 2016 and Statistica 7.1 software (Statsoft Inc, Tulsa-USA Headquarters).

3. Results

3.1. Knowledge of the Roots of *Zingiber officinale* and *Curcuma longa*

The investigation carried out in various districts of the city of Daloa revealed that the roots of *Zingiber officinale* and *Curcuma longa* are of many uses.

3.1.1. Age of Respondents and Knowledge of Ginger and Turmeric

The knowledge and use survey carried out among the populations revealed that ginger is well known to those interviewed (**Figure 2**). Indeed, 100% of the people investigated know ginger. Regarding turmeric, the analysis shows that it is less known to the people questioned with a knowledge rate of 17.5% against 82.5% of people who do not know it. The age of those surveyed varies from 20 to 50 years and over, with a majority between 30 and 40 years for both roots. Indeed, 47.5 and 65.15% of the people surveyed, respectively, for ginger and turmeric are between 30 and 40 years old, while 17.3% (for ginger) and 13% (for turmeric) of those questioned are between 20 and 30 years old, 20% (for ginger) and 11.5% (for turmeric) of those questioned are between 40 and 50 years old, and 15.2% (for ginger) and 10.35% (for turmeric) of the respondents are over 50 years old.

3.1.2. Form of Consumption, Taste and Method of Preparation of Ginger and Turmeric

Method of preparation, taste and form of consumption were included in the survey (**Figure 3**). Extraction was the most widely used preparation method for both rhizomes, with a percentage of 91.33% (for ginger) and 84.9% (for turmeric). In terms of taste, ginger had a more pungent (82.65%) and slightly bitter (17.35%) taste. However, turmeric tasted bitterer (53.47%) rather than pungent (46.53%). As for the form of consumption, the major part of the people questioned (90.22%) consumed fresh ginger with 9.78% consuming it dry. Unlike ginger, turmeric was favored for consumption drier (84.25%) over fresh (15.75%).

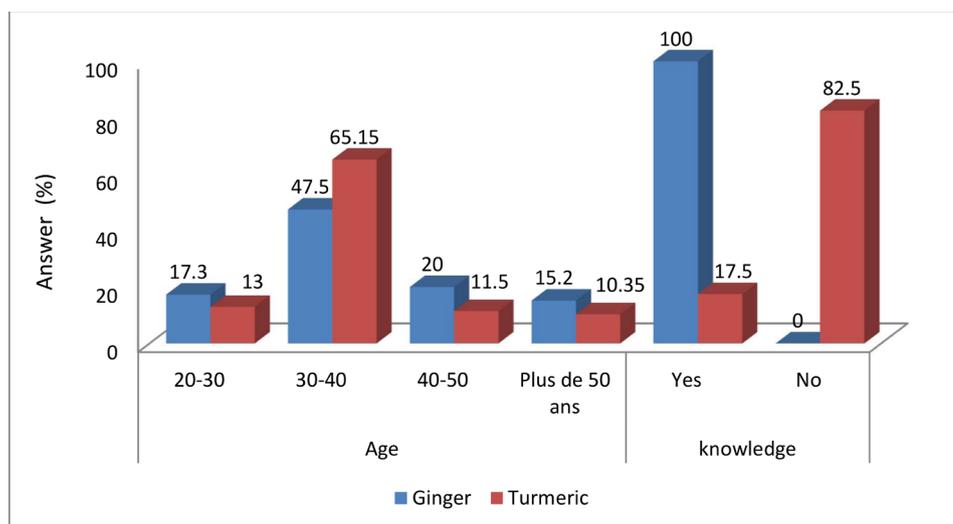


Figure 2. Age of respondents and knowledge of ginger and turmeric.

3.1.3. Shelf Life and How to Store Ginger and Turmeric

The survey showed that the most popular preservation method for both roots is drying (in the sun and in the open air) (Figure 4). Indeed, the majority of the populations surveyed kept different roots that were either brought or harvested in the open air (60.5%) for ginger and after solar drying (56.24%) for turmeric. It also emerged from this survey that the majority of people questioned (67.61%) kept ginger for three weeks and over half of the respondents (56.24%) keep turmeric for a year.

3.1.4. Benefits of Ginger and Turmeric

The two roots are generally consumed for two properties at the same time according to the populations surveyed. Consumption for both medicinal (40.66% for ginger and 32.15% for turmeric) and nutritional properties (50.82% for ginger and 11.65% for turmeric) were reported. (Figure 5) In addition to the aforementioned

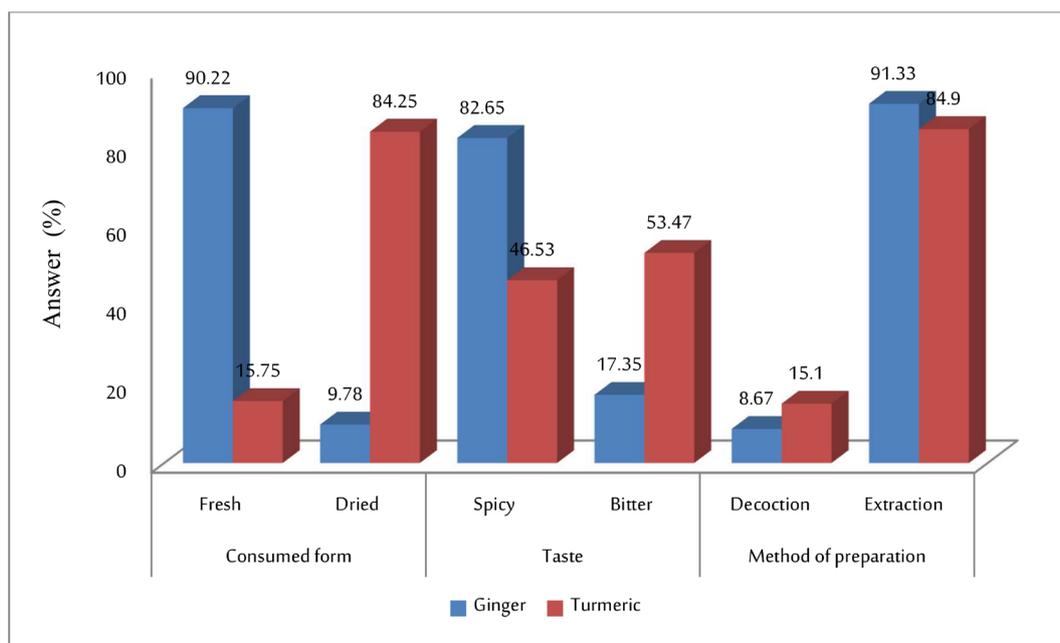


Figure 3. Consumption form, taste and method of preparation of ginger and turmeric.

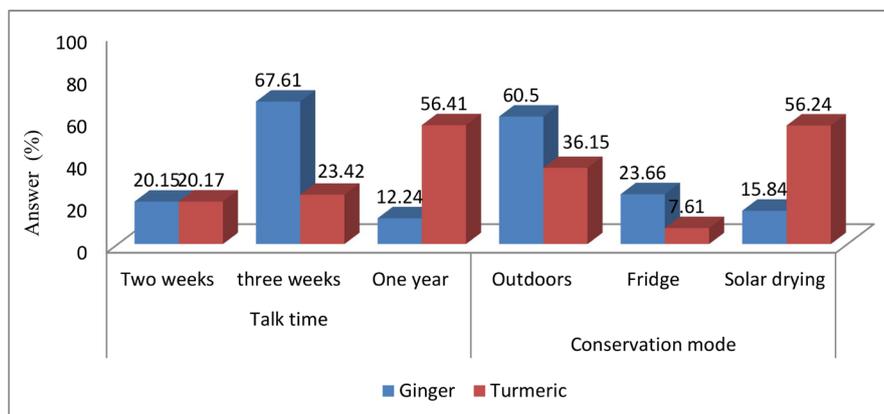


Figure 4. Shelf life and method of storage of ginger and turmeric.

virtues, the two roots had cosmetic virtues for ginger (8.63%) and turmeric (56.2%).

3.1.5. Vernacular Names and Uses of Ginger (*Zingiber officinale*) and Turmeric (*Curcuma longa*)

Table 1 shows the vernacular names of ginger and turmeric listed by the populations surveyed and the variation in use depending on the method of preparation. The analysis shows that the vernacular names of ginger and turmeric differ from one ethnic group to another. In addition, for each preparation mode, a use is assigned. In addition, different roots are sometimes combined with other plants to treat certain diseases such as Rheumatism, wounds, cough, weight loss, reducing fever, facilitated digestion, relieves painful periods. In addition to these

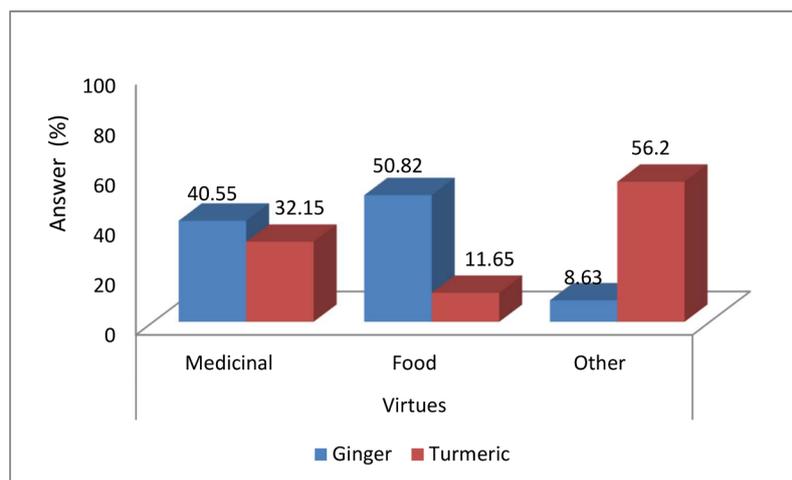


Figure 5. Benefits of ginger and turmeric.

Table 1. Vernacular names and therapeutic use of ginger (*Zingiber officinale*) and turmeric (*Curcuma longa*).

Species	Vernacular name	Nutritional Use	Medicinal use	Other use
Ginger	Abbey (brofièssa), Baoulé (saha), Agni (essah), Lobi (cacadrou) Senoufo (gnangbanne) Attié (assanin cornin) Tagbanan (taa gnabi) Djimini (tagbessé) Senoufo (gnangbanne)	Beverage (tea, liqueur) Juice, ginger pastilles, spice for dishes	Rheumatism, wounds, tonsillitis, cough, weight loss, fever, stimulates appetite, facilitates digestion, relieves painful periods, vomiting	Essential oil, aroma, Ointment (to strip the skin)
Turmeric	Adjoukrou (konnin), Baoulé (saha oclé)	Beverage (tea), aroma, spice seasoning		Essential oil, soap, ointment (to strip the skin), face mask, teeth whitening

different uses, there are other uses (cosmetics, etc.).

4. Discussion

A consumer survey was carried out on the plants of *Zingiber officinale* and *Curcuma longa* that revealed the plants of *Zingiber officinale* are better known by the population than those of *Curcuma longa*. This could be explained by the fact that the *Zingiber officinale* plant is cultivated and/or marketed in the locality of Daloa. Indeed, ginger is a very popular spice commonly sold in the city's markets and it is very well known in Ivorian “gnamankoudji” drinks [5].

This plant is also involved in traditional Ivorian medicine for the treatment of many ailments [14]. Unlike ginger, turmeric is less well known to the majority of the population. This could be linked to the fact that turmeric does not fit into the culinary and medicinal habits of most of the population and it is a very rare product in the markets. However, this rhizome is a well-known spice in Chinese food and medicine [10]. In terms of consumption mode, ginger was consumed more in its fresh form, possibly due to its use in “gnamankoudji” [5], whereas for turmeric, was consumed dry. This could be due to turmeric's use as a spice, colorant, and application in beauty products for the body and face [15].

For taste, ginger tastes more pungent than turmeric. However turmeric shows a more bitter taste than ginger. The bitter and pungent taste of the two rhizomes would be attributed to the presence of secondary metabolites in different proportions [16]. Indeed, the spicy flavor of ginger is due to the presence of gingerols, shogaols and zingerone [17] [18]. The most common storage method for ginger is air-drying (at room temperature) and drying for three weeks.

However, for turmeric, the most popular storage method is sun drying with a shelf life of one year. These different methods and durations of conservation can be linked to the culinary habits and the different uses of the people questioned for these two products. The names of ginger and turmeric are not the same in all ethnicities. Indeed, the vernacular name of each species varies from one ethnic group to another. This assertion is consistent with those of [19].

For these authors, the name of a plant is linked to the region and to the ethnicity. This variability of the vernacular name, it is certainly the proof that each group discovered it at some point in its environment and adopted it. However, the survey found that turmeric was less well known to respondents. Because rare are those who know the name of their ethnic group. Perhaps this is a proof that these ethnic groups were not discovered in their environment and adopted it.

Ginger and turmeric have medicinal and nutritional properties. Indeed, ginger or *Zingiber officinale* is one of the most popular spices worldwide because of its aromatic character widely used in Asian cuisine for its qualities both taste and facilitate digestion. Ginger is also a medicinal spice with multiple properties [20] [5]. Moreover according to [21], ginger is used by the majority of the population in various dishes and against gastrointestinal ailments in Nigeria. It is also considered an important ingredient in herbal medicine for the treatment of various

diseases. The results of the survey also showed that ginger or *Zingiber officinale* is used to treat rheumatism, wounds, cough, weight loss, reduce fever, aid digestion, relieve painful periods, illnesses due to stress and nausea and vomiting induced by pregnancy [18]. Ginger is an antioxidant, natural anti-inflammatory, anti-cancer, it helps fight against oral bacteria, stimulates the brain, lowers cholesterol, reduces blood sugar levels and cardiovascular disease risks [22]. In addition to the aforementioned virtues, ginger, because of its starch is used as a thickening, stabilizing and gelling agent in various products for industrial non-food purposes [23].

As for turmeric, a food spice prized by Asians to enhance the flavor and color of food is also used in traditional Indian and Chinese medicine [10]. The results of the survey also showed that *Curcuma longa* is used to treat fever, colds, cough, painful periods, stress, stomach aches, pain, digestion problems and wound. In addition to nutritional and medicinal virtues, it is used as a dye for textiles and is applied in beauty products for the body and face

5. Conclusion

The present study was carried out in order to evaluate the knowledge and the different uses (therapeutic, nutritional and cosmetic) of the two species of rhizomes which are: *Zingiber officinale* (ginger) and *Curcuma longa* (turmeric) with a view to their nutritional valuation in food and the Ivorian pharmacopoeia. Surveys carried out among the population in the locality of Daloa on ginger and turmeric have made it possible to know the vernacular name of these two roots, which varies from one ethnic group to another. The rhizomes of ginger and turmeric are used in dried and fresh form. Turmeric and ginger can be stored for one year and three weeks, respectively. The two rhizomes (ginger and turmeric) have medicinal, nutritional and cosmetic virtues. However, turmeric is less well known to respondents.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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