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# Impacts of the transition from family farming to monoculture farming on the eating habits of two cities in the Valle de Tenza, Boyacá—Colombia

Jennifer Lorena Avendaño Zambrano<sup>1\*</sup> , Denise Dias da Cruz<sup>1,2</sup>  and Flavia de Oliveira Paulino<sup>3</sup> 

## Abstract

The Valle de Tenza region, located in the Department of Boyacá—Colombia, shows a transition situation from the family farming of various food crops to coffee farming following an agribusiness model. From this perspective, in order to understand the current scenario of food sovereignty in Guateque and Guayatá, two cities of the Valle de Tenza, this study evaluated socioeconomic, environmental, and cultural aspects based on questionnaires and semi-structured interviews applied to peasant families that practice family farming and/or coffee farming. Moreover, these same aspects were also evaluated among urban food consumers. These evaluations aimed to assess the perception of the interviewees about the availability of regional food crops and current eating habits in relation to those from a decade or more ago, in addition to investigating their knowledge about the traditional cuisine of the region. The cultivation of regional food crops used to prepare local and regional traditional dishes such as *piquete*, *sancocho*, and different *amasijos* based on corn and *sagú* (*Maranta arundinacea*) has been significantly reduced. The investigation revealed changes in the eating habits of the Valle de Tenza inhabitants due to the consumption of processed foods and the reduced cultivation of local traditional food crops. As a consequence of this transition to coffee production, the most representative traditional foods are being replaced by more profitable crops, including coffee and some fruits not traditionally grown in the Valle de Tenza and with more local and regional acceptance. This reduction can affect food availability and change the gastronomic and cultural identity of the Valle de Tenza population, among other aspects related to food sovereignty.

**Keywords:** Farmers, Coffee, Consumers, Traditional cuisine, Perception, Food sovereignty

## Introduction

Worldwide hunger situation affects around 820 million people [1], of which approximately 2.4 million are Colombians [2]. Different strategies can be used to reduce hunger; however, it is always important to invest in local traditional options, that usually can be associated

with a job opportunity to the community, and also can improve health and environmental conditions [3], and are cheaper and easier to be found. The importance of rescuing and preserving ancestral foods has been studied in countries like Bolivia, where traditional ingredients such as tubers are the principal ones used in the food habits, and quinoa, cañahua and other grains, when stored for long periods, guarantee the food security of the population [4]. Studies developed in Turkey correlate food with the identity of the communities, allowing to infer that the

\*Correspondence: lorena.avendano87@gmail.com

<sup>1</sup> Programa de Pós-Graduação em Desenvolvimento e Meio Ambiente, PRODEMA, Universidade Federal da Paraíba, João Pessoa, PB 58051-900, Brazil  
Full list of author information is available at the end of the article



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absence of traditional foods can affect the cultural configuration [5].

Public policies are important to define ways, limits and strategies to promote food sovereignty and security; however, it is not always efficient all over the country [6] or consider all the stakeholders involved [7]. Since a wide country, like Canada [6], to a small territorial country, like Ecuador [8], it is possible to struggle problems in implementing a national policy that guarantees practices of social justice, ethical foods and cultural diversity, though local/ regional successful examples can be observed, also supported by no-political participants (civil society mobilization) [6, 8].

In Colombia, the Policy on Food and Nutritional Security—PSAN CONPES 113 of 2017—was implemented following the blueprint of the second Sustainable Development Goal, “Zero Hunger,” formulated in 2008 [9]. However, this policy seems to lack objectives beyond food security, whose concept is based solely on the availability of a sufficient amount of food while omitting social and cultural aspects. Therefore, the way how agricultural production has been conducted in the country usually does not consider more comprehensive production models based on the guarantee of farmer rights and more sustainable production methods.

Following the establishment of Food Security Policy in Colombia, the Policy on Food and Nutritional Security has to be formulated at the departmental level [9]. The Department of Boyacá has developed its policy; however, among the municipalities of the Department, Guateque and Guayatá, in the Oriente Province, lack public policies to promote food security and sovereignty [10]. Moreover, programs related to these aspects are scarce since information is not easily accessed. On the other hand, it seems that agriculture incentives in these two cities have not been entirely focused on polyculture production systems, especially because, for the Municipal Administration of Guateque, for example, the Administration Development Plan of 2016–2019 does not sufficiently or adequately identify which food crops are grown there [11]. However, there are significant incentives for coffee farming, which may have influenced the conversion of this crop into one of the most outstanding products of the Department, which has even presided the National Coffee Sector Board.

Such a transition from a polyculture family farming model to coffee farming and other non-native and/or regional food crops can contribute to transforming the eating habits of the Valle de Tenza population, whose diet, as in the entire Department of Boyacá, is historically based on traditional and ancestral foods such as corn, *cubios* (*Tropaeolum tuberosum*), *rubas* (*Ullucus tuberosus*), turnip, faba beans, potato, cassava, *arracacha*

(*Arracacia xanthorrhiza*), and others [12]. The presence of a monoculture can affect social habits and the environment, as observed to oil palm cultivation in Malaysia [13] and pineapple production in Costa Rica [14], where both increased inequality, losses in human rights, land concentration and food insecurity to local communities, especially small farms. Considering the environmental impacts, coffee crop contributes to high greenhouse gas (GHG) emissions, soil erosion, and regional climate changes (high water and median carbon footprint) [15], and sustainable techniques should be incentivized in this production [16].

The limited and reduced production and the consequent low availability of ancestral and other food crops traditionally grown in the region, although not endemic, could impact the food culture of the Valle de Tenza population and, therefore, food sovereignty in the region. This transformation of eating habits resulting in the loss of traditional foods and cultural identity has also been observed in indigenous communities [17], groups of people that have moved from rural to urban areas in Tanzania [18], and rural towns of Bolivia [19], among others. In this scenario, the relevance of this study emerges given that traditional cuisine is a non-tangible cultural heritage that represents the identity of a people, transmitted from one generation to another, and referring to the cultural wealth of communities and the indisputable need for their preservation [20].

The concept of food sovereignty emerged contrary to mass food production, which does not consider the whole production process in sociocultural terms. Thus, based on the rights and welfare of the peasantry, the International Peasant Movement defined food sovereignty as “the right of peoples, their countries, or unions of States to define their agricultural and food policies without having to sell to third-party countries,” in addition to preserving food culture by encouraging the production of culturally appropriate foods [21]. Also, the concept of food sovereignty has been transformed and complemented over the years, also involving the dignification and appreciation of peasant labor, stressing the importance of sustainable production and environmental conservation, and respecting the local culture [22].

This interdisciplinary investigation is of general interest since it addresses themes related to food sovereignty, as is the case of the local or regional food culture, thus permeating the economic, social, environmental, and cultural areas, among others. From this perspective, our investigation objectives were (1) to analyze the access to regional foods traditionally grown in the region; (2) to evaluate whether the eating habits of peasants and other inhabitants of the investigated cities have been transformed; and (3) to investigate the risks to the food

sovereignty of coffee-producing populations. Thus, this study is based on the hypothesis that the displacement of regional and traditional food crops grown in polyculture could cause risks to food sovereignty and impact the regional food culture, which is mainly based on the consumption of agricultural products, ancestral foods, and traditional regional dishes. This article addresses the transformation of eating habits in the Valle de Tenza, a region of the Department of Boyacá in Colombia, with high agricultural potential, low crop diversification, and probably affected by the increased local cultivation of coffee, which is considered unique due to its grain quality. This discussion is essential since Boyacá and particularly the Valle de Tenza have been addressed in only a few studies involving these aspects.

**Methods**

**Study area**

The Department of Boyacá is located in the Región Andina of Colombia and is crossed by an eastern mountain range, providing the region with particular geomorphological features, all thermal gradients, varied climates, and a diverse vegetation [23]. In turn, the Valle de Tenza occupies part of the Provinces of Oriente and Neira (Fig. 1).

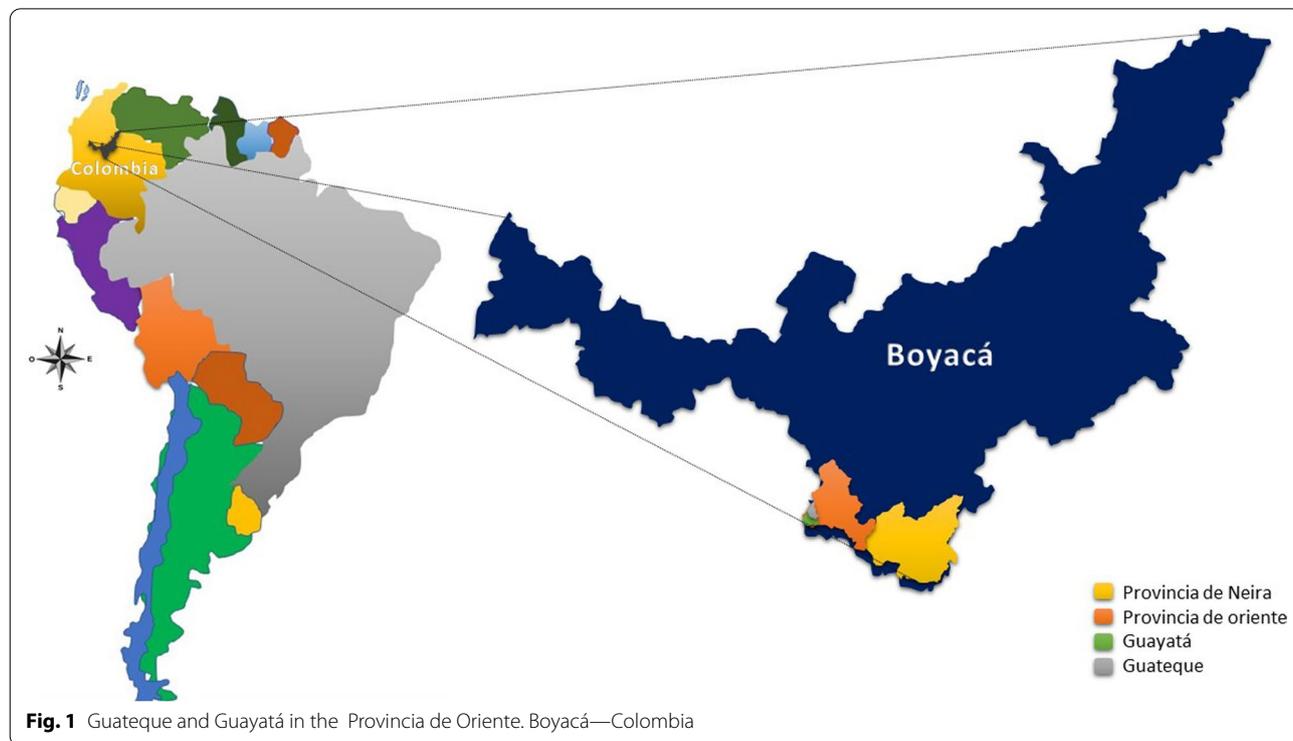
Two municipalities were chosen for this investigation: Guayatá and Guateque. Guayatá (47°57' N 73°29' E, elevation: 1767 m.a.s.l.) has an approximate area of 112

km<sup>2</sup> [24] and was chosen due to its role as a traditional coffee-growing location using family farming practices [25]. Guateque (5°00'15" N 73°28'23" E, elevation: 1815 m.a.s.l.) has an approximate area of 37 km<sup>2</sup> (5) and was chosen as a municipality that has encouraged the cultivation of specialty coffee and where grain production has increased significantly in the last few years [25].

**Definition of the methods and sampling**

The sample was defined by a non-probabilistic method, a non-judgmental sampling without preestablished conditions [26] that allows adjusting the sample throughout the investigation. Moreover, the snowball technique was applied to select coffee-producing leaders in the two municipalities [27].

Since there are no clear data on the number of peasant farmers in the two cities, this information was obtained from associations and city halls in Guateque and Guayatá. From this perspective, the *Comité de Productores de Café de Guayatá* reported 320 associates, whereas the *Asociación de Productores de Café de Guateque – Cafeguatoc* reported 22 associates. Moreover, the city hall of Guateque verbally reported that 506 peasants were registered, according to the census conducted in 2017. On the other hand, the Rural Development Office of the Guayatá city hall had no up-to-date census or reliable record of peasant farmers in the municipality. However, the official



**Fig. 1** Guateque and Guayatá in the Provincia de Oriente. Boyacá—Colombia

from that office estimated that approximately 800 farmers must perform this activity on a small scale.

Moreover, data from ongoing projects conducted by the AES CHIVOR company and the CORPOCHIVOR Environmental Corporation were also considered to complement the information obtained. These data allowed identifying some of the leaders among coffee producers in the Provinces of Oriente and Neira, initially highlighting the existence of three leaders in Guateque and fifteen in Guayatá. Additionally, according to a document provided by the Presidential Agency for International Cooperation and other entities, there are approximately 600 coffee-growing families in the Valle de Tenza.

*Four categories were then determined based on this scenario:*

- Peasant leaders who are family farmers of various food crops and coffee and helped identify other coffee-growing peasants in Guateque and Guayatá and also large-scale coffee growers;
- Peasant family farmers who cultivate food crops, not including coffee;
- Urban food consumers from the two municipalities;
- Officers from the Rural Development Office and the city halls of Guateque and Guayatá.

With regard to the peasant families interviewed, the following selection criteria were considered: age (over 18 years), length of stay in the territory (minimum time of 10 years), and knowledge about family eating habits. Additionally, all interviewees were family farmers of various food crops and/or coffee growers. Therefore, in addition to interviewing peasant farmers, the rural area was also searched for families that were invited to answer the survey, although not all of them accepted to participate. Finally, 40 surveys were obtained with peasant families, 20 from each municipality. All participants are traditional farmers, familiar or not and not related to indigenous communities. All the farmers are from the rural area of Guateque and Guayatá, Boyacá Department.

Socioeconomic impacts were characterized and evaluated by interviewing male and female peasant farmers. Urban consumer families and peasant families were interviewed to assess their perception of food consumption and availability and the impact of coffee farming on food sovereignty in the region. Finally, city hall officers were interviewed to survey the functions and actions developed by the rural sector concerning family farming and coffee growing.

Urban food consumers were interviewed by considering the population of the municipalities according to data from the Government of Boyacá for 2017, totaling

approximately 7176 urban inhabitants in Guateque and 1302 in Guayatá.

The urban area of the two municipalities was searched by visiting households and local businesses to interview food consumers, who had to be Valle de Tenza residents for at least 10 years, over 18 years of age, and know the eating habits of their family members as well as regional foods and their availability. Thus, 80 families were interviewed in each municipality. However, in some cases, there were refusals to participate in the survey.

Colombia has no legal requirements for the approval and authorization of projects involving traditional communities. However, since the data obtained correspond to a postgraduate project that would belong to a Postgraduate Program of a Brazilian Institution, we followed the guidelines and legal demands of Brazil by submitting the project to the Research Ethics Committee of the University Hospital of the Federal University of Paraíba, thus meeting the demands of Resolution No. 466/12. As a result, the document was approved under No. 3.062.631. Accordingly, all participants were previously informed about the project and accepted to participate by signing a free and informed consent form.

#### **Sampling techniques and analyzes**

The data were obtained using three main techniques: questionnaires with an exact order and wording, semi-structured interviews with a question guide and without an exact order and wording [28] and participant observation [29].

Overall, the questionnaires applied to the peasants evaluated the following aspects: the food crops grown in the Valle de Tenza whose production has decreased or have completely disappeared from local production in the last 10 years, the reasons why their production has decreased, their perception of the availability of food crops grown in the region, the migration from diversified cultivation to coffee farming, eating habits of peasant families, and knowledge about local and regional traditional dishes.

On the other hand, the questionnaires applied to urban food consumers from Guateque and Guayatá evaluated aspects related to their preference for a specific purchase place, their knowledge about the origin of consumed foods, their perception of the agricultural production in the Valle de Tenza in the last decade, the availability of foods traditionally grown in the region, family eating habits, and knowledge about regional and local traditional dishes.

The participant observation was conducted in rural family properties to determine which production processes were present and which food crops were grown. Moreover, weekly visits were made to municipal markets

by considering that each municipality has one sale day per week. In this scenario, the participant observation surveyed the purchase practices and preferences of consumers and investigated food availability.

Subsequently, the data obtained were systematized and processed using descriptive statistics and semantic analysis tools. The word cloud was constructed based on values assigned to each word according to the number of repetitions observed during the application of the questionnaires. The word clouds were processed with the Infogram tool.

The scientific names were confirmed by consulting the database available on the Web site of the National University of Colombia (<http://www.biovirtual.unal.edu.co/nombrescomunes/es>).

Finally, the qui-square test was used to examine differences in the perception of food availability, quality and quantity of crop in the market and the preparation of traditional foods between males and females. The analysis was performed to the farmers' perception and to the consumers' perception. All analyses were performed using RStudio [30].

**Results**

The peasants interviewed in Guateque and Guayatá ranged from adults to the elderly (Table 1), reflecting the general aging situation of rural Colombia.

With regard to food consumers, although both men and women were present at the interview moments (Table 1), the responsibility for answering the questionnaire and the interview was usually assigned to the women as the family member with the most knowledge about food purchase, eating habits, traditional dishes,

and food preparations. Therefore, the two municipalities had a higher participation of women in urban area interviews.

**Food crops grown in Guateque and Guayatá**

With regard to the food crops currently grown in the region, according to the information provided by the interviewees, the main crop grown in Guateque is corn, followed by different varieties of plantain, potato, beans, and peas, in addition to some fruits and tubers (Table 2). The main food crop grown in Guayatá is coffee, followed by traditional crops such as plantain, corn, beans, fruits, vegetables, and tubers (Table 2). Although the Guayatá region has an outstanding coffee production, its peasants grow a greater variety of food crops compared to Guateque.

**Food crops whose production has decreased or are not currently grown**

According to 70% of the peasants interviewed, the highest reduction in the last 10 years was perceived for cherimoya (*Annona cherimola*) (Fig. 2a). They also claimed to have stopped growing this species during the same period and even before that. Cherimoya was identified by both male and female peasants as the most representative fruit of the region in previous times. In most cases, the interviewees claimed that the construction of the Chivor Hydroelectric Plant changed the climate and brought fruit flies, resulting in the loss of the trees that produced this fruit. Although some peasants still grow the plant, its production is now low or null, and, on some occasions, its fruits are not harvested as they are instinctively thought to have poor quality.

Although cherimoya stands out in this reduction scenario, other fruits, such as orange and tomato, were

**Table 1** Profile of the peasants (N=40) and food consumers (N=80) interviewed in Guateque and Guayatá, Boyacá—Colombia

	Peasant families				Food consumers			
	N Guateque	%	N Guayatá	%	N Guateque	%	N Guayatá	%
Gender								
Female	11	55	6	30	38	95	24	60
Male	9	45	14	70	2	5	16	40
Age								
18–30	1	5	1	5	8	20	10	25
31–40	1	5	1	5	14	35	6	15
41–50	6	30	3	15	10	25	5	12.5
51–60	3	15	7	35	7	17.5	5	12.5
61–70	6	30	5	25	1	2.5	8	20
+ 70	3	15	3	15	–	–	6	15

**Table 2** Peasant references concerning the main food crops grown in Guateque and Guayatá, Boyacá—Colombia (N = 40)

Guayatá	N	Guateque	N
Coffee—Café ( <i>Coffea</i> )	16	Corn—maíz ( <i>Zea mays</i> )	13
Plantain—Plátano ( <i>Musa paradisiaca</i> )	16	Plantain—Plátano ( <i>Musa paradisiaca</i> )	10
Corn—maíz ( <i>Zea mays</i> )	13	Potato—papa ( <i>Solanum tuberosum</i> )	10
Beans—frijol ( <i>Phaseolus vulgaris</i> )	7	Beans—frijol ( <i>Phaseolus vulgaris</i> )	9
Lemon—limón ( <i>Citrus latifolia</i> , <i>Citrus limon</i> )	6	Peas—arveja ( <i>Pisum sativum</i> )	8
Tangerine—mandarina ( <i>Citrus reticulata</i> )	5	Coffee—café ( <i>Coffea</i> )	7
Avocado—aguacate ( <i>Persea americana</i> )	5	Tangerine—mandarina ( <i>Citrus reticulata</i> )	5
Pumpkin—ahuyama ( <i>Cucurbita maxima</i> )	5	Sugarcane—caña de azúcar ( <i>Saccharum officinarum</i> )	4
Orange—naranja ( <i>Citrus X sinensis</i> )	5	Lemon—limón ( <i>Citrus latifolia</i> , <i>Citrus limon</i> )	4
Sugarcane—caña de azúcar ( <i>Saccharum officinarum</i> )	3	Arracacha ( <i>Arracacia xanthorrhiza</i> )	4
Mango—( <i>Mangifera indica</i> )	3	Avocado—aguacate ( <i>Persea americana</i> )	4
Peas—arveja ( <i>Pisum sativum</i> )	2	Cassava—yuca ( <i>Manihot esculenta</i> )	3
Potato—papa ( <i>Solanum tuberosum</i> )	2	Faba beans—habas - vicia faba	2
Lettuce—lechuga ( <i>Lactuca sativa</i> )	2	Tomato—tomate ( <i>Solanum lycopersicum</i> )	2
Cassava—yuca ( <i>Manihot esculenta</i> )	1	Beans—frijol ( <i>Phaseolus vulgaris</i> )	1
Arracacha—( <i>Arracacia xanthorrhiza</i> )	1	Zucchini—( <i>Cucurbita pepo</i> )	1
Zucchini—( <i>Cucurbita pepo</i> )	1	Chayote—guatila ( <i>Sechium edule</i> )	1
Tomato—tomate ( <i>Solanum lycopersicum</i> )	1		
Onion—cebolla ( <i>Allium cepa</i> )	1		
Chard—acelga ( <i>Beta vulgaris</i> var. <i>cicla</i> )	1		
Spinach—espinaca ( <i>Spinacia oleracea</i> )	1		

also mentioned in the interviews (Fig. 2a). The peasants also directly associated the reduction in orange production (*Citrus x aurantium*) with humidity changes caused by the construction of the Chivor Hydroelectric Plant. According to 45% of the interviewees, tomato farming was a significant activity in the region in past years. However, it has been reduced due to the economic losses caused by monoculture, pests, and soil impoverishment.

The availability of important tubers in the region, such as faba beans—habas (*Vicia faba*), rubas (*Ullucus tuberosus*), and nabos (*Brassica rapa* subsp. *rapa*), has also been reduced (Fig. 2a). These tubers are important due to their use in traditional regional dishes, as explained further below.

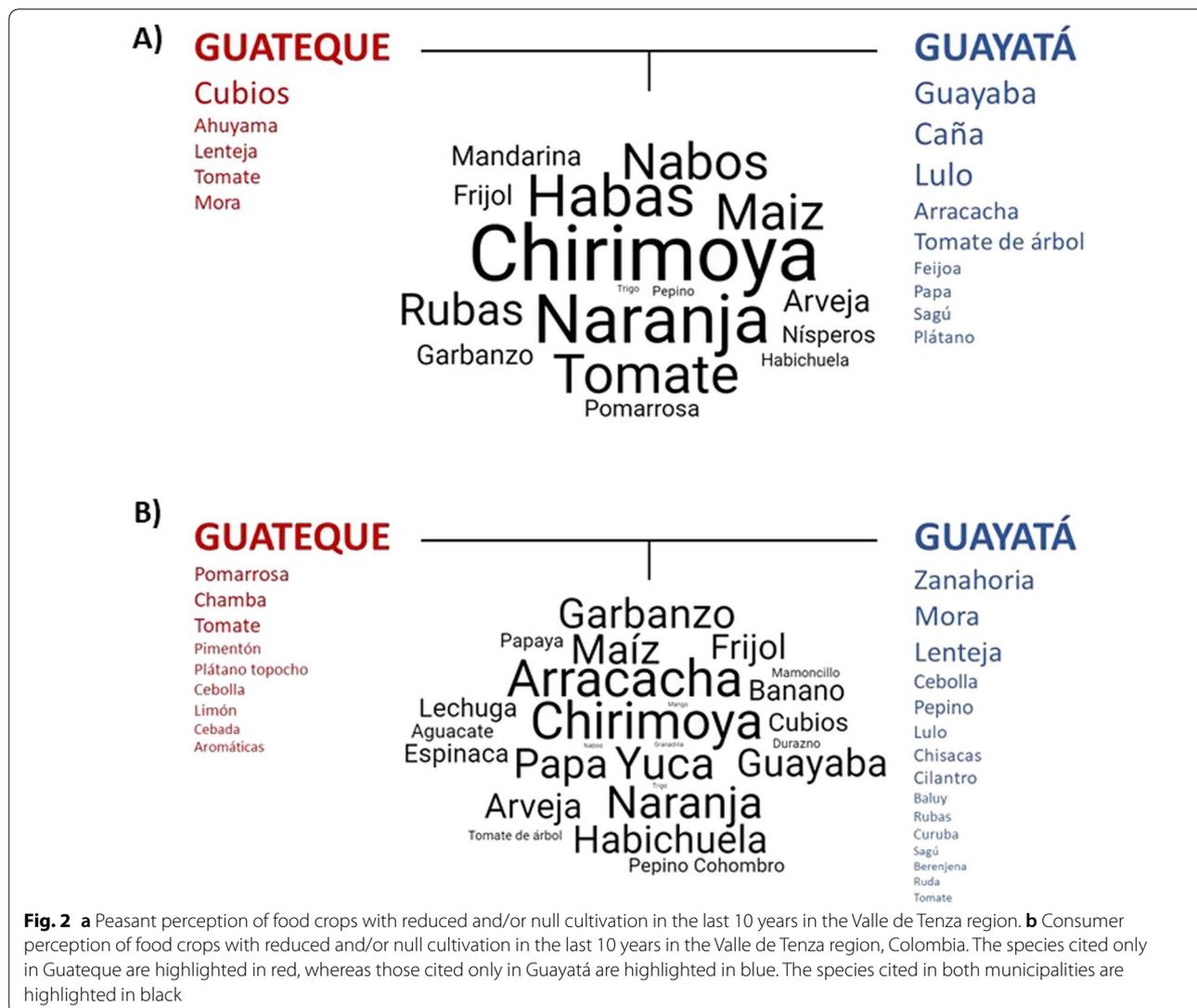
A detailed analysis of the responses per municipality revealed that the peasants from Guateque mentioned the loss of *cubios* (*Tropaeolum tuberosum*), a culturally important local tuber. On the other hand, Guayatá stands out due to the loss of sugarcane (*Saccharum officinarum*), guava—guayaba (*Psidium guajava*), and lulo (*Solanum marginatum*).

The peasants claimed that the reduced production might be due to various reasons, including unfair prices established by sales intermediaries, lack of technical assistance, and lack of public policies for the peasantry.

On the other hand, the rural areas of the investigated cities have been shown to preserve native and landrace seeds. Most peasants (75%) preserve seeds on their own initiative as a tradition passed down through generations. The seeds reported during the interviews include corn, beans, plantain and banana, cassava, arracacha, and fruits such as orange, lemon, guava, and others.

Among the interviewees, 38% reported belonging to some association that encouraged using landrace or native seeds. However, there is no seed bank in the region.

With regard to the perception of food consumers in relation to the current availability of food crops in the region, the main loss-related species coincide in the two cities, and both consumers and peasants highly emphasize cherimoya. This species is well remembered by the Valle de Tenza population as the region was the largest national cherimoya producer in previous years. Despite the coincidences, the food consumers interviewed identified more foods with reduced consumption (Fig. 2b). Other loss-related species cited by consumers were arracacha (*Arracacia xanthorrhiza*), orange, and cassava (*Manihot esculenta*). Urban interviewees also mentioned the reduced production of native and ancestral food crops such as beans, *cubios*, *nabos*, *rubas*, and faba beans, among others (Fig. 2b).



Consumers from Guateque (55%) and Guayatá (35%) believe that this reduction is due to soil impoverishment caused by agrochemicals, consequently reducing the production capacity. Also, 17.5% in Guateque and 20% in Guayatá believe that this reduction is due to the lack of peasant labor.

It is noteworthy that peasants and consumers perceive differences in the variety of food supply, quality, quantity and changes in perception patterns. The variety of food for the rural population decreased over 10 years, as well as the quality and quantity of food produced in Guateque and Guayatá. Participants also reported important changes in eating patterns. From the point of view of food sovereignty, these data are not desirable, as some farmers reported the disappearance of some crops and, those that remained in the last 10 years ago, suffered differences. These perceptions can be reinforced with some speeches

of some interviewees in the rural areas in Guateque and Guayatá:

*“Sumercé, yo ya la verdad no sé. Antiguamente los papás de uno y los abuelos sembraban bastante, pero ya los suelos no producen y a todo hay que echarle veneno. De pronto también el clima ha cambiado y por eso ahora se siembran cosas que antes no. Por ejemplo ya no hay casi producción de cosas para el almuerzo campesino que es como uno le conoce y la yuca tampoco, ni la arracacha ni nada.”[sic] E18, peasant, Guateque, Valle de Tenza, Colombia.*

*“Le digo una cosa, uno en la niñez veía cosas muy diferentes, porque el mercado era otra cosa. Todavía aquí traen cositas en el día de mercado, pero ahora casi todo lo traen de otros pueblos*

y de Bogotá o Tunja, los intermediarios son los que hacen que lleguen la mayoría de los alimentos. El clima aquí es diferente de como era antes, siempre ha sido calientico, pero ahora es extremo caliente o extremo frío y vea esas épocas de lluvia que inundan los cultivos. Por eso es que la gente ya no trabajamos la tierra. Yo por ahí siembro pero de verdad que uno a veces no quiere saber más porque es poco agradecido el trabajo del campo y los jornales que uno paga son muy caros. Yo pago en la época de cosecha del café porque el resto del tiempo hago todo yo solo y a veces la familia que ayuda.”[sic] E13, peasants, Guayatá, Valle de Tenza, Colombia.

Both peasants and consumers noticed a difference about the quality and quantity of food offered in the region in the last 10 years. It indicates changes, that usually occurs first in the countryside, can already be perceived in the city as well, and may be an indicator of a food transition that has actually already occurred. Some speeches by consumers in the cities were transcribed:

“Me parece que hay menos personas en el campo porque es muy caro producir, además antes que se producía la chirimoya era la fruta más conocida de la región, pero el clima cambió cuando hicieron la represa, ahora el clima es más húmedo. También puede ser porque ahora las personas prefieren tener ganado porque ya no les conviene sembrar.”[sic] E1, consumer, Guateque, Valle de Tenza, Colombia.

“Ahora no se siembra casi y todo lo traen de afuera, y hay frutas que antes no se conseguían. También uno sabe que este planeta está muy mal y el cambio climático y todo eso tiene que ver. Ya casi no hay agua y la tierra tampoco produce, entonces difícil así. Yo me acuerdo cuando mi tía iba y cogía todo de la huerta para el caldo, eso ya no se ve.” [sic] E27, consumer, Guateque, Valle de Tenza, Colombia.

“Yo no vivía aquí cuando joven, llegamos porque mi papá vino a trabajar en un banco. Pero llevo aquí muchos años, mis hijos si nacieron aquí. Le cuento que eso de la baja producción no es solo por esta región, eso es en todas partes. Si uno se pone a ver las personas ahora prefieren comprar ya de paquetes y todo eso que es más fácil. Pero si me imagino que los poquitos campesinos que quedan han dejado de sembrar porque también el clima es diferente y por ejemplo aquí que no es tan frío ya no se siembran algunas cosas. Si usted ve la guayaba aquí dicen que se daña por lo de la mosca que apareció cuando hicieron la represa.” [sic] E5, consumer, Guayatá, Valle de Tenza, Colombia.

“Hay muchas razones, por ejemplo la poca mano

de obra, el costo de los insumos que es muy alto, y pues... en la universidad hicimos una investigación en el área rural y uno se da cuenta del impacto tan grande que ha tenido el cambio climático en las regiones, yo creo que no sólo es el desplazamiento de los campesinos a las ciudades sino que ya la producción no es la misma porque la temperatura varía y eso afecta.” [sic] E15, consumer, Guayatá, Valle de Tenza, Colombia.

According to these transcripts, what the consumers said in relation to the probable substitution of agriculture for livestock, the construction and the presence of the hydroelectric plant and the arrival of new pests in the rural environment, the migration of peasants to the cities, the inputs price and the preference for packaged processed foods are relevant and should be analyzed. However, the perception of climate change in the region and its impacts on agriculture and food produced cited by consumers in the two cities, deserve relevance.

This information shows that the consumers who participated in the interviews, although they reside in urban areas, they are aware of changes in the region’s climate and know that these changes can directly affect the food supply in the region.

Despite the changes perceived by peasants and consumers, there were no difference between women and man perceptions, neither in among farmers nor consumers considering all the parameters analyzed (Table 3). The similarity of perception could reflect the constant presence of both gender in activities related to the family feeding. This parity may also be indicative of a greater male participation in the food of rural families. However, as mentioned in this study, generally the responsibility for preparing food, falls on women.

**Table 3** Qui-square of the perception of changes in food production and quality between man and women (peasants and consumers) in the cities of Guateque and Guayacá, Colombia

	$\chi^2$	p
Perception of peasants		
Change in food production in the last 10 years	1.60	0.2058
Change in the quality of the products	2.264	0.2024
Change in the quantity of the products	3.3283	0.145
Change in preparation of traditional foods	1.4129	0.234
Perception of consumers		
Change in food production in the last 10 years	0.003	1
Change in the quality of the products	Same citations	
Change in the quantity of the products	Same citations	
Change in preparation of traditional foods	0.3515	0.5532

**Peasant and consumer perception about traditional regional dishes and eating habits**

In order to investigate the gastronomy and culinary of the region with regard to the current dynamics of agriculture and the availability of native and/or traditional regional foods, the interviewees were asked about traditional eating habits and traditional dishes of the Valle de Tenza. Thus, it was possible to relate food culture conditions, the local and regional cuisine, and changes in the diet of the Valle de Tenza population over the last decade.

Twenty-five traditional foods or dishes of the region were cited in the interviews. The most important and recognized dish by both peasants and urban inhabitants was the *sancocho* (Fig. 3 and 4). In addition, the peasants also mentioned preparations such as *gallina campesina* and some dishes whose main ingredient is corn: *sopa de maíz*, *tamal*, and *sopa de mute* (a type of corn), among others (Figs. 3a and 5).

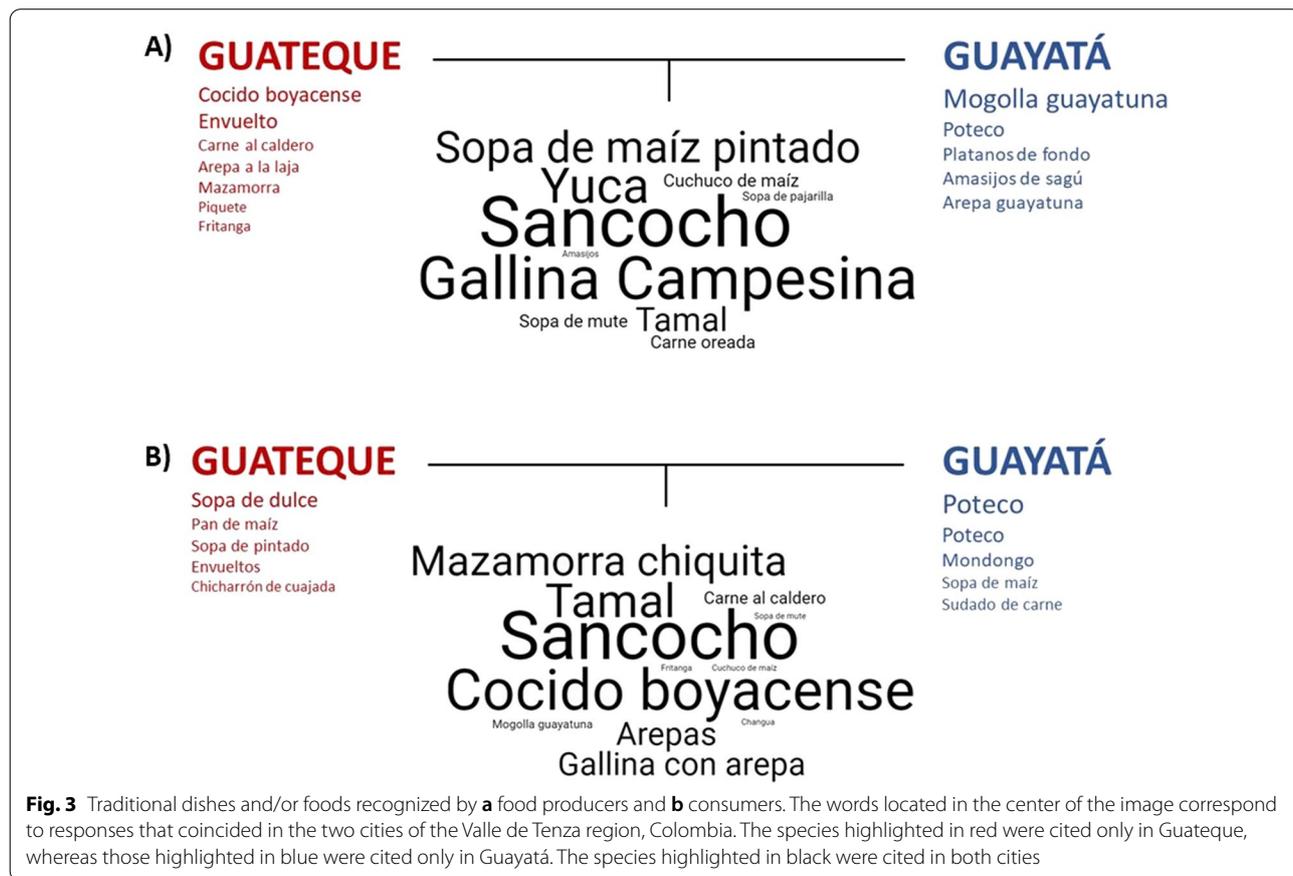
The *sancocho* occupied the first place among consumer responses, followed by the *cocido boyacense* (Figs. 3b and 4), and, in third place, by recipes whose main ingredient is corn (Figs. 3b and 4). The *cocido boyacense* was also cited by peasants from Guateque (Fig. 3a) and deserves full attention as a traditional dish prepared with

ingredients whose production is low in the region, such as *cubios*, faba beans, *rubas*, and *nabos*. The *cocido boyacense* (Fig. 4a and b) is a traditional dish of the Department of Boyacá and, therefore, the Valle de Tenza region. This dish was present in the daily lunches of Valle de Tenza families in previous times, as claimed by the interviewees throughout the conversations. According to them, the *poteco* or *piquete*, a regional adaptation of the *cocido boyacense* made with tubers and different meat types (beef, chicken, and pork), is often prepared and was cited by both peasants and consumers from Guayatá.

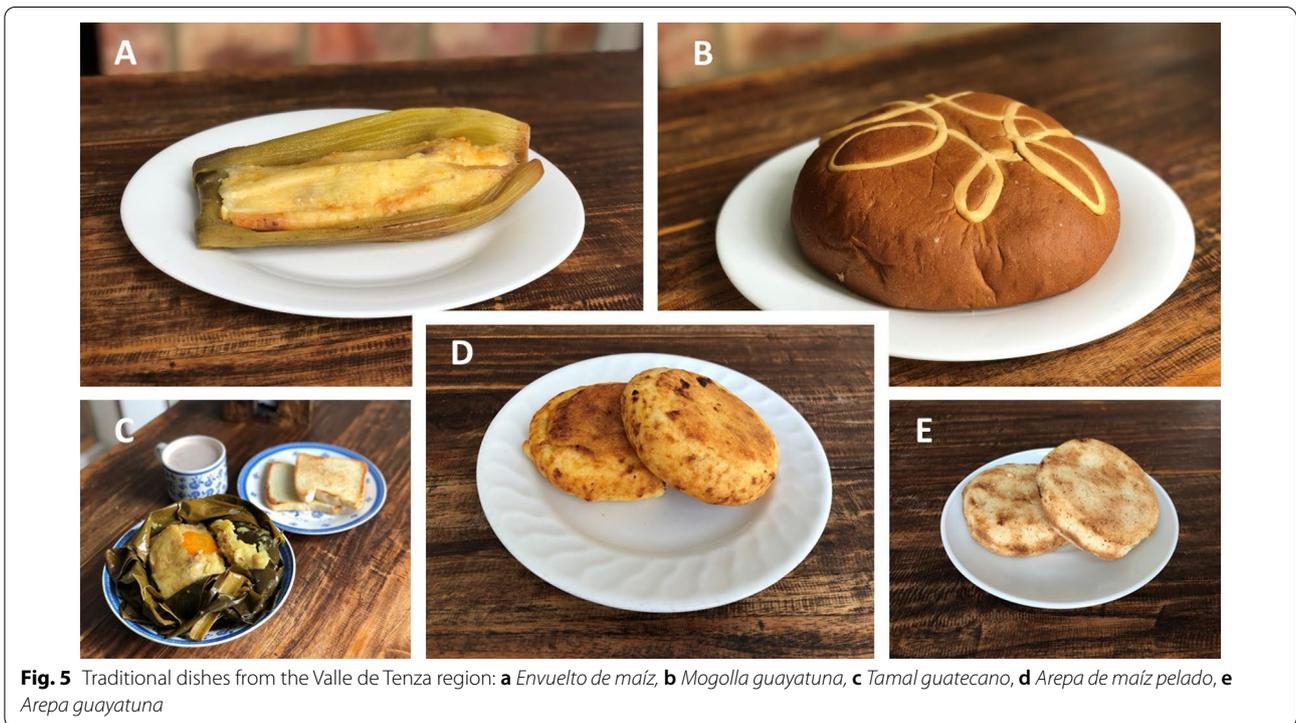
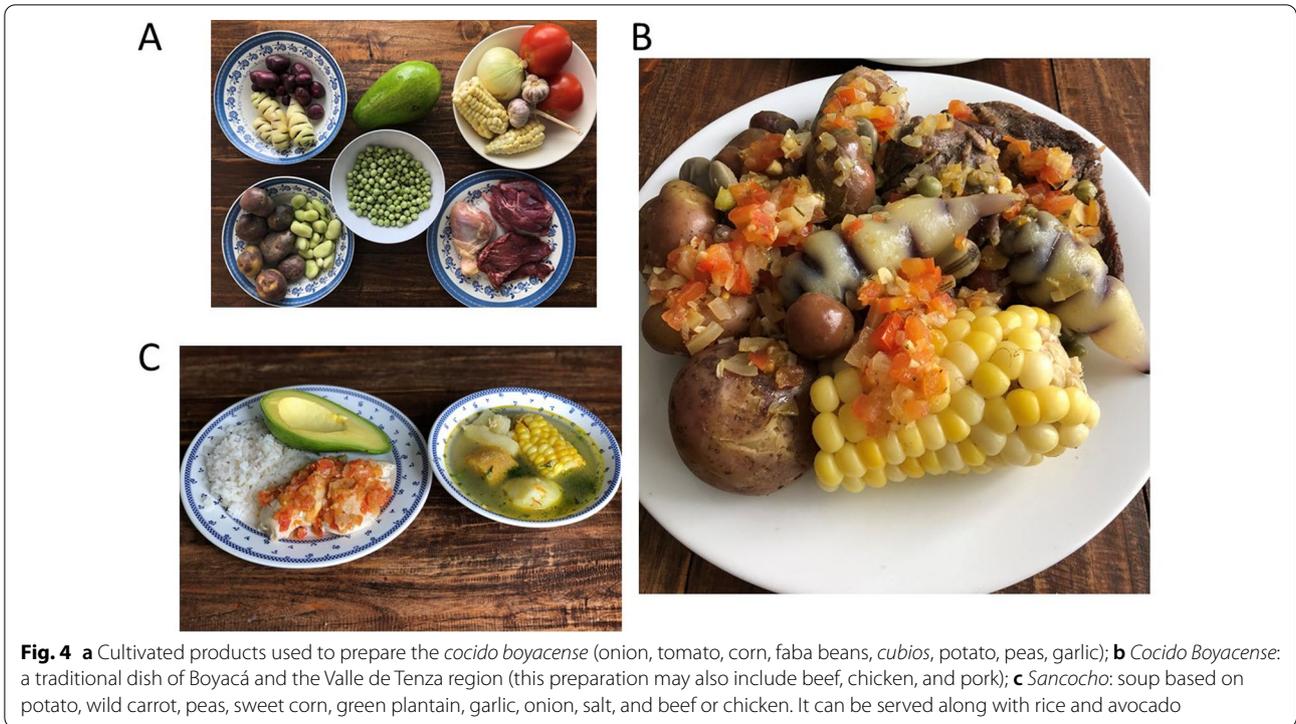
Although 25 traditional foods or dishes were cited, some dishes mentioned by the interviewees are not from the region, such as *carne al caldero*, a dish from the Llanos Orientales in the Orinoquia region of Colombia also mentioned by consumers (Fig. 3b).

Among other foods that are still prepared in the region (Fig. 3) and even sold in marketplaces, the participant observation allowed identifying the following foods both in peasant and consumer homes and commercial sites: *arepa de maíz pelado*, *arepa guayatuna*, *mogolla guayatuna*, *tamales*, and *envueltos de maíz* (Fig. 5).

Another significant finding observed in Guateque and Guayatá was the interest to preserve regional food



**Fig. 3** Traditional dishes and/or foods recognized by **a** food producers and **b** consumers. The words located in the center of the image correspond to responses that coincided in the two cities of the Valle de Tenza region, Colombia. The species highlighted in red were cited only in Guateque, whereas those highlighted in blue were cited only in Guayatá. The species highlighted in black were cited in both cities



traditions. Guayatá annually celebrates the *Festival de la mogolla, la arepa guayatuna y el café*, in which different doughs and traditional dishes of the region and the

municipality are exposed for sale, such as the *mogolla guayatuna*, the *arepa guayatuna*, and the specialty coffee of the region under different local brands.

Likewise, Guateque has recently organized a working group formed by young people and entrepreneurs with the purpose of recovering ancestral and traditional knowledge about regional and local food. The group organized the *Primer Festival de Saberes y Sabores de Guateque* (First Festival of Knowledge and Flavors of Guateque) in June 2019, a festival whose purpose is to recover the culinary roots of previous generations. Although the group is not formally constituted, its members seek to be recognized as the *Colectivo Guatecanos de Corazón*.

With regard to the consumption of processed and ultra-processed foods, although almost all interviewees (97.5%) claimed that their diets were based on cultivated products (fruits, vegetables, and others), the observations throughout the interviews revealed a significant consumption of processed foods as 70% of the interviewees in Guateque and 57.5% in Guayatá claimed to consume processed products such as bread, cereals, industrial yogurts, sausages, ham, potato chips, and biscuits, among others.

On the other hand, 85% in Guateque and 82% in Guayatá consider that their eating habits were good in terms of frequency, access to foods, and food quality. However, it should be noted that these responses correspond to an independent and subjective perception since, as mentioned before, there is a significant consumption of processed foods in the two municipalities.

According to our observations, the eating habits of the populations from Guateque and Guayatá have also been modified by changes in the diet resulting from the influence and recommendations of health professionals. Both urban (47.5%) and rural (32.5%) interviewees stressed that some traditional foods and dishes include high contents of carbohydrates and fats, which could be unfit for a balanced and/or healthy diet.

However, one of the most evident reasons for changes in the diet is related to the consumption of processed and ultra-processed foods and the preference for preparations based on the fast food model.

## Discussion

Urban consumers from Guateque and Guayatá have continuously modified their eating habits in the last 10 years. However, despite their apparent preference for fresh products such as fruits, vegetables, tubers, and farmed products in general, our investigation identified the significant presence of processed foods in their diets, possibly related to market globalization, as recently observed in Mexican communities [31] and the changes in local production. Moreover, the new eating habits of recent generations have also been influenced by digital media,

becoming one of the leading processed food markets [32].

Furthermore, these eating habits are modified by the different conditions lived by each individual with regard to their rhythm of life, activities developed, time used to prepare and consume the three main meals of the day, financial situation, and even their level of education and access to information related to food and nutritional education [33]. In Spain, a higher consumption of processed foods is associated with a higher mortality rate in adults between 46 and 50 years [34]. Meanwhile, in a study with a representative sample in the USA, it was found that the consumption of ultra-processed foods is directly related to excess in weight and abdominal obesity and its effect being more relevant in women [35]. Despite the common use of processed food in big cities, traditional communities are also impacted by these products, such as observed in First Nations Peoples in Canada, where the diet is 55% dependent of processed food [36]. Our study shows that small cities, as Guateque and Guayatá, are also susceptible to changes in food habitat and reducing the quality and the consume of local foods.

The contradiction between the responses of the interviewees and the reality about their diet concerning the consumption of cultivated products as opposed to processed foods could also be explained by their subjective perception of the natural characteristics of consumed foods. Scholars have evaluated this situation when analyzing more than one thousand studies involving food consumers from 32 countries [37]. Based on this analysis, the authors concluded that the perception of what “natural” food is might vary from one country and region to another, also observing that labels that claim natural conditions in processed foods also influence the purchase intention, encouraging a perception of consumption of healthy products based on label claims.

Boyacá is the department where the cities Guateque and Guayatá are located, and according to this research it is a department of contrasts. On the one hand, it has good education indicators and is considered one of the most competitive departments, and on the other hand, it has a declining productive system and poverty indicators that do not show a very outstanding performance in the country.

One of the reasons that corroborate the perception of changes in the quality and quantity of food for consumers and farmers may be the expansion of agriculture based on monocultures, as in the case of other regions in Colombia where palm crops have been increased.

The Banco de la República de Colombia report—2019, confirmed that until the end of 2018, regional agricultural activity had annual growth, even with a slowdown. The

agricultural sector grew due to the good performance both in the production of palm fruits in the country and in food supply. However, the food supply grew at a slower rate, which confirms the perception of some farmers and consumers in the region of this research. Similarly, there was an increase in livestock production, increasing in 2018 the slaughter of livestock and milk production.

The milk production in Boyacá, for example, increased 16.3% compared to 2017. The situation of migration from agriculture to livestock was pointed out by one of the interviewees from the urban area of Guateque, as one of the reasons that leads to the reduced food supply in the region.

It is also worth mentioned that, in the search for greater profitability, it is common in the region to substitute one production (agriculture) for another (livestock). The consortiums between agriculture and livestock are scarcely observed and very restricted. In this way, they want an increase in the production of meat and milk, but the land that previously produced regional food, with a diversity of crops, now have a livestock production, more profitable, but which leads to the loss of agricultural diversity and worse environmental impacts.

Due to the changes in the eating habits among individuals from Guateque and Guayatá, which could be a general behavior in the entire Valle de Tenza region, it could be inferred that ancestral foods and those considered native and traditional in the region are at risk of disappearing due to their low consumption. Moreover, it should be noted that some of them are in this situation due to current supply and demand conditions. Although the soils of the region are fit for production, these crops are grown merely as a peasant cultural practice instead of an economically profitable activity [38].

In addition, although the literature highlights some traditional dishes or foods from Boyacá and the Valle de Tenza, such as the *Gran Libro de la Cocina Colombiana* (The Great Book of Colombian Cuisine) [39], produced by the Ministry of Culture of Colombia, the recompilation of traditional regional recipes is limited to traditional foods from the Valle de Tenza. The conservations of the traditional crop practices and species are essential to guarantee local production and costumes. In Sibiu County, Romania, part of the small local producers use more seeds of local varieties, that are more resistant to dry conditions and are important to keep genetic variation and the local tradition—they associated the religious fests calendar with agricultural practices calendar and 93% of them use the production to personal consumption [40]. This example shows the strong relationship among local production and traditional culture heritage. In this perspective, a significant

finding of our investigation is that popular knowledge shows a higher diversity of information about local and regional cuisine, which is translated into a large diversity of traditional dishes and foods recognized by the interviewees. However, if local seeds varieties will be lost in the transition to coffee culture (how our data already indicate), the region will be more vulnerable to food insecurity and traditional knowledge losses. That is a very important point that should be considered in local policies and, even, in national level.

On the other hand, although in the Valle de Tenza coffee crops have directions to implement production with low-impact methodologies, such as shade growing and agroforestry, this does not guarantee that their growth will lead to greater negative impacts (there is no studies evaluating the process). Comparative studies in Vietnam (second coffee-producing country) show that the certifications of sustainable processes do not guarantee completely controlled crops and also do not guarantee that they have few environmental impacts [41]. Despite the orientation to environment sustainability in the Valle de Tenza, there is no policies to reduce social impacts, which can affect de quality of life and local food security, how observed in Vietnam, where coffee crops increase social inequity and social conflicts between migrants and the indigenous tribes [42].

With regard to consumer perception about available foods, although faba beans, *rubas*, *cubios*, and other ancestral foods have been mentioned, these cases were not recurrent in the interviews, which may be due to a loss of cultural memory among younger generations as the population interviewed does not recognize these items due to their absence from the markets [43]. This theory is reinforced by the fact that most countries in the region show losses in the consumption of traditional foods, including grains, cereals, and vegetables, in addition to independent foods that have been replaced by other food products [44].

On the other hand, the reasons identified by consumers for the reduced cultivation of some food crops in the Valle de Tenza are contrary to those exposed by peasants who cultivate them. The peasants stressed that this reduction is mainly due to changes in agricultural practices and crop replacement, highlighting a biased vision of peasant life by the urban population that does not relate to the reality of the countryside, where rural inhabitants face challenges unknown and unrecognized by urban inhabitants.

This poor knowledge about peasant reality by part of the urban population increases the gap between city and rural areas [45] since the peasantry is seen as a representation of poverty instead of the keystone of a life-sustaining system through food production. The fact that the

peasantry is still not valued, although playing a key role in the worldwide eradication of hunger, is one of the most severe problems and one of the sustainable development goals that most concerns the governments of the world.

In this context, the impact of public policies related to food security issues is evident and relevant, especially those that affect farmers who have a fundamental role in the perpetuation of eating habits, through the planting of traditional crops of the region where this research was carried out. Without the support of public authorities, there is a fear that, over time, fewer and fewer people from the countryside will dedicate themselves to traditional crops and this will generate negative impacts not only for the region, but also for the country, because Boyacá and the Valle de Tenza region supply food to other regions of Colombia, including the capital Bogotá.

This aspect is common in other places of the world geography. For example, for poor households in Malawi, it was suggested that social support in terms of cash transfers and other interventions to increase household income have great potential to improve food diversity in the household, particularly at times of low food harvest and high prices [46].

Related to the perception of the impact generated by the growth of coffee crops in the Tenza Valley, the interviewees cited some environmental concerns; however, they are unaware of the impacts that this type of crop can generate. In the Tenza Valley, a still traditional process is carried out in the coffee processing chain, which includes the use of a high quantity of water for washing the grain, this practice being a relevant part of the carbon and water footprint of the coffee cycle, according to studies developed in the production of coffee in Costa Rica [47].

With regard to seed conservation in the region, there is no training available for the rural population by the local entities, resulting in the use of commercial and transgenic seeds and the poor preservation of the cultural and historical value of native seeds [48], as seen in the shortage of traditional regional food crops. The scenario is worsened by the preference of food consumers for better-looking foods produced from genetically modified seeds [49].

Food appearance can also be related to better food quality and, therefore, influence a subjective perception of its nutritional characteristics in favor of a healthier diet. In the past, families consumed less balanced dishes, with abundant tubers, cereals, and few vegetables. Nowadays, family diets seem to be more in accordance with medical recommendations, consuming more fruits and vegetables instead of high contents of fats and carbohydrates, as promoted by documents such as food guides for the Colombian population [50]. Despite this, as already mentioned, the results show that there is a high

consumption of processed foods in the region, so we can infer that for interviewees, the recommendations on healthier diets are not fully taken into account.

In a globalized world with a loss of identity due to changes in diet [51], there are communities that conserve traditional plants and preserve ancestral practices under a premise of resistance, in order to maintain cultural identity through food [52], as we could observe in the Valle de Tenza Region, where people are trying to recover some traditions through culinary and cultural festivals.

Despite their reduced cultivation, potato and corn are still produced in the region. Preserving their cultivation as well as other ancestral tubers is a priority since they represent part of the cultural memory of the Valle de Tenza as the heritage of indigenous peoples that lived in this region of the country [12].

The undervalued knowledge about the local and regional cuisine and its consequent poor transmission can compromise the food culture of the Valle de Tenza since its eating habits differ from other regions of Colombia. Moreover, the possibility of identifying the food characteristics of a region could be used to formulate public policies and food and nutritional programs to improve the health and quality of life of a population, as already demonstrated in other countries [53]. A recent study conducted in a region of Ecuador with similar biodiversity characteristics as Colombia analyzed the diversity of plants and animals consumed by an indigenous people and confirmed the importance of sowing in polyculture models to preserve traditional food species and improve the sustainability conditions of the food system [54]. This finding demonstrates that the issues addressed by our study are not limited to a geographic region but are likely present in the whole world due to different factors that modify the production of cultivated products and, consequently, the eating habits of communities.

Although the knowledge about traditional and ancestral foods is not sufficiently transmitted to younger generations, there is a growing interest in the Valle de Tenza community for recovering food traditions and preparations of traditional dishes and foods. This interest was observed in the two studied municipalities by the presence of gastronomic festivals, which has been an almost generalized concern throughout Latin America, with a direct relationship with tourism-encouraging strategies, as verified in Latin America [55] and some European countries [56].

## Conclusions

This study is important since the knowledge about culinary traditions in the Valle de Tenza region should be preserved as a regional cultural heritage.

This investigation highlighted the growing cultivation of coffee and non-traditional food crops fueled by their high acceptance among consumers. However, these practices compromise native and ancestral regional food crops used to prepare traditional foods and dishes that represent the culture of the Valle de Tenza region.

The production of native and ancestral foods represents an important but fragile feature of the food culture in the region as part of the indigenous heritage. Therefore, it is essential to generate alternatives and formulate public policies, plans, and programs to encourage the cultivation of regional food crops, thus ensuring the transmission of traditional knowledge, with regard to both food cultivation and consumption.

The authors of this article consider that the strategies to recover traditional and ancestral foods and preserve the food culture of the Valle de Tenza region in Colombia should include the awareness and political mobilization of younger generations. There should be a closer relationship between rural and peasant youth in the region and those in the cities/municipalities of the Valle de Tenza in order to share common interests related to the preservation of the local food culture.

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#### Author contributions

JLA conducted the literature review and the general writing of the manuscript. DDC and FOP made adjustments and commentaries to correct and construct the manuscript. All authors read and approved the final manuscript.

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#### Declarations

#### Competing interests

The authors declare that there is no conflict of interest regarding the publication of this article.

#### Author details

<sup>1</sup>Programa de Pós-Graduação em Desenvolvimento e Meio Ambiente, PRODEMA, Universidade Federal da Paraíba, João Pessoa, PB 58051-900, Brazil.

<sup>2</sup>Departamento de Sistemática e Ecologia, Centro de Ciências Exatas e da Natureza, Universidade Federal da Paraíba, João Pessoa, PB 58051-900, Brazil.

<sup>3</sup>Departamento de Biotecnologia, Centro de Biotecnologia, Universidade Federal da Paraíba, João Pessoa, Paraíba CEP: 58051-900, Brazil.

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