



Study of Cauje (*Pouteria caimito*) as a gastronomic nutritional food in school children from 6 to 12 years of age at the "León de Febres Cordero" school in the city of Guayaquil

Estudio del Cauje (Pouteria caimito) como alimento gastronómico nutricional en escolares de 6 a 12 años de la escuela "León de Febres Cordero" en la Ciudad de Guayaquil

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Abstract

The present work is a compilation of information about caimito pouteria, and its subsequent introduction in the daily diet of schoolchildren between 6 and 12 years of a fiscal school located in the city of Guayaquil, in our city there are high indicators of malnutrition or obesity whose origin begins with poor diet which is generated by excessive consumption of fats and carbohydrates mainly in children 9 to 11 years of age, while malnutrition is especially due to lack of intake of micronutrients and is more common in younger children 5 years. Ecuador is a country with a diversity of fruits with a high nutritional potential which unfortunately is unknown to many Ecuadorian families, among them we have the channel (*Pouteria caimito*) that contains a great variety of vitamins that contribute a lot to the immune system in addition to a high presence Calcium, Phosphorus and Lysine which is one of the 10 essential amino acids for humans, in addition to its consumption stimulates growth hormone and mental development, taking into account all the nutritional benefits that the fruit contains, I conduct a research study which includes the realization of gastronomic proposals to be included in the daily school diet of children of the "Leon de Febres Cordero" School, carrying out periodic monitoring of their evolution in height and weight. For 2 months, the records are attached and the change obtained in the infants can be evidenced.

key words

Cauje, Nutrition, Obesity, Gastronomy, Guayaquil

Resumen

El presente trabajo es una recopilación de información acerca del *Pouteria caimito*, y su posterior introducción en la dieta diaria de escolares entre 6 a 12 años de una escuela fiscal ubicada en la ciudad de Guayaquil, en nuestra ciudad existen altos indicadores de desnutrición u obesidad cuyo origen empieza por la mala alimentación el cual se genera por un consumo excesivo de grasas y carbohidratos principalmente en niños de 9 a 11 años de edad, mientras que la desnutrición se da especialmente por la falta de ingesta de micronutrientes y es más común en niños menores de 5 años. Ecuador es país con una diversidad de frutas con un alto potencial nutritivo el cual lastimosamente resulta desconocido para muchas familias ecuatorianas, entre ellas tenemos el cauje (*Pouteria caimito*) que contiene una gran variedad de vitaminas que aportan mucho al sistema inmunológico además de una alta presencia de Calcio, Fósforo y Lisina el cual es uno de los 10 aminoácidos esenciales para el ser humano, además de que su consumo estimula la hormona del crecimiento y el desarrollo mental, teniendo en cuenta todos los beneficios nutricionales que contiene la fruta realizo un estudio investigativo que incluye la realización de propuestas gastronómicas para ser incluidas en la dieta escolar diaria de niños de la Escuela "León de Febres Cordero" realizando un monitoreo periódico acerca de su evolución en talla y peso. Durante de 2 meses, se adjuntan los registros se puede evidenciar el cambio que se obtuvo en los infantes.

Palabras clave

Cauje, Nutrición, Obesidad, Gastronomía, Guayaquil

1. Introduction

his paper is a compilation of information about *Pouteria caimito* and its subsequent introduction into the daily diet of schoolchildren aged 6 to 12 in a public school located in the city of Guayaquil. According to [1] Ecuador currently has malnutrition rates of one in every four children under five years old, while the obesity rate rises to six in every ten adults. This represents an indicator that the dietary habits consumed in our country are not adequate. Additionally, it indicates that the average cost of a typical diet for a family of five is nearly \$9.00. Considering that cauje (*Pouteria caimito*) contains a wide variety of vitamins that contribute significantly to the immune system, along with a high presence of calcium, phosphorus, and lysine (one of the 10 essential amino acids for humans), and that its consumption stimulates

growth hormone and mental development, we have decided to carry out a project in which cauje will be introduced into the daily diet of schoolchildren aged 6 to 12 in a public school located in the city of Guayaquil, in different preparations, utilizing all of its macro and micronutrients [2].

Cauje (*Pouteria caimito*) is a fruit that is not widely consumed along the coasts of the city; however, it is well-known in other countries such as Brazil and Peru, where it is used in various fields, including as natural medicine. It is noted that the fruit originates along the banks of the Amazon River in Peru, Colombia, Ecuador, Venezuela, and parts of Brazil. Small commercial orchards are occasionally found in northern Peru, Ecuador, Brazil, Colombia, and Venezuela. There is a

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significant variety in the shape, size, and quality of the fruits when compared from one plant to another, as while some plants produce fruit with a pleasant taste, others produce fruit with a bland taste. This fruit is highly consumed and appreciated in the province of Los Ríos, specifically in the Babahoyo canton, where the consumption of this fruit is more common.

1.2 Cauje

Cauje (*Pouteria caimito*) is a fruit that belongs to the Sapotaceae family and the *Pouteria* genus. In other parts of the world, it is known as Luminancia or Cauje in Ecuador; Temare in Venezuela; Abiu, Abi, Abio, Abieiro, or Caimito in Brazil. In the Brazilian Amazon, we find a large variety of cauje trees, which have grown both wild and cultivated by various indigenous communities. It is estimated that the origin of this fruit plant is Peruvian, specifically from the Amazon region. Currently, it is considered one of the five exotic species with high economic potential in Brazil, where a series of phenological and productivity studies are being conducted, aiding in agricultural management planning for the planting and marketing of cauje. [3]

The fruit is oval-shaped and yellow in color, containing 1 to 4 dark seeds. The skin is shiny, and each tree produces between one hundred to one thousand fruits. Until the fruit is fully ripe, it is impregnated with latex, which is very astringent and gummy. The fruits are seasonal, appearing between March and April. The fruit is very common in these countries, although it is unknown in others; however, it is considered one of the most valuable in the sapotaceae family. In our country, the fruit is very common in the province of Guayas, where it is enjoyed in large quantities [4].

According to [5] cauje is native to the Amazon rainforest, growing wild on the lower slopes of the eastern Andes from southwestern Venezuela to Peru. It is often cultivated around Iquitos, Peru. In Ecuador, it is common in the province of Guayas, where its fruits are sold in the markets of Guayaquil. It grows abundantly around Pará, Brazil; less frequently near Rio de Janeiro, and in small quantities in Bahia. In Colombia, it is very common in the regions of Caquetá, Meta, and Vaupés, and it abounds in areas near the Amazon, also in Venezuela. Plant explorers Dorsett, Shamel, and Popenoe brought seeds collected in Bahia to the United States Department of Agriculture in 1914 and 1915. This species has been planted on several occasions at the Agricultural Research Center in Homestead, Florida, although most plants have not survived due to the harsh winter cold; however, some trees planted in 1953 bore fruit in 1962.

1.3 Geographical Distribution

According to [6] cauje is distributed throughout Latin America, primarily in Brazil, Colombia, Peru, and Ecuador, specifically in the provinces of Los Ríos and Guayas. In the Guayas province, it can be found in the cantons of Baquerizo Moreno and Urdaneta, where the consumption of the fruit is high, despite its utilization being negligible, as it is basically consumed as fresh fruit.

1.4 Climate

Cauje is of tropical origin, although it can also develop in non-tropical environments. However, it thrives better in a humid and warm environment, though it can grow in cooler areas. In Peru, it has not been found above 2000 feet (650 m), although in Colombia it can be cultivated up to an altitude of 6000 feet (1900 m). The tree adapts especially well to fertile and moist soil. The fruits are seasonal, appearing in March and April in Ecuador. They are sold in some markets in Brazil from April to September, although in Bahia, they can be found sporadically in some places during February and March, at a much higher cost than would normally be found in a local market. However, in Florida, the fruits mature in October. Cauje can be harvested while still firm and immature for transportation to markets. [7]

1.5 Propagation

The seeds are washed and dried in the shade and then planted in groups of 2 or 3 at a depth of 5 cm in enriched soil. They will germinate in 15 to 20 days, and when the seedlings are 4 inches (10 cm) tall, the weaker plants in each group are removed. The strongest plant in the group is allowed to grow to 12 to 16 inches (30-40 cm) in height before being transplanted to the field. The spacing is 17 x 20 feet (6 x 5 m). One year later, the lower branches are pruned. The fruits will begin to appear in 3 years and reach substantial productivity at 5. [8]

1.6 Fruit Characteristics



Fig. 1. Characteristics of Cauje

According to [8] the fruit is usually round to oval in shape, greenish-yellow in color, and its crystalline pulp has a sweet taste. The fruit has a sticky latex in its pulp, which can cause discomfort on the lips; however, this can be avoided by applying a bit of fat on the lips before consuming it, as this latex tends to coagulate when exposed to air. Gastronomes typically do not use this fruit in their recipes due to its subtle flavor and the latex it possesses, so people opt to consume it directly; although in some areas, cauje ice cream can be found.

The fruit measures 4 to 10 cm long and has a diameter of 8 cm, weighing between 50 to 80 grams. It contains a range of vitamins such as A, C, and B3, carbohydrates, along with calcium, dietary fiber, and phosphorus. Its pulp has a high percentage of sugar and a small amount of gum; in some small communities, this gum has been used to treat pulmonary conditions. The pulp has a gelatinous consistency, transitioning from a white or yellowish color, is slightly sweet, and contains 1 to 5 seeds that are smooth, slightly shiny, and black. [3]

1.7 Tree Characteristics



Fig. 2. Cauje Tree

Cauje or Abiu is a monoecious tree that reaches a height of between 4 to 10 meters. It exhibits inflorescences in axillary fascicles with small unisexual flowers of a greenish-yellow color. The cauje can produce between 300 to 500 fruits, each weighing approximately 200 to 250 grams. According to numerous researchers, the tree reaches its peak fruit production in its eighth year. In the Amazon and certain areas of Brazil and northern South America, it is cultivated in gardens and backyards of homes. It is a seasonal tree; the first flowering occurs between March and May, mainly during the rainy season. A second flowering occurs between June and August. [9]

1.8 Varieties

According to [10] The fruit comes in two varieties or races, according to the color of its skin: purple or green. Apparently, the purple one (*Chrisophillum caimito*) has more flavor and is richer in sugar, while the green one (*Pouteria caimito*) has more aroma. In the Petén region, where these two varieties are found, there is a preference for consuming the purple variety. Aside from the two basic color types, there is little evidence of pronounced variations that have encouraged producers to make efforts to select and propagate superior clones. William Whitman from Miami observed a well-formed, high-yielding tree with high-quality fruit in Port-au-Prince, Haiti, which produced from late January to late June. He brought cuttings to Florida in 1953, and both grafted and air-layered trees produced very well there, even before reaching 3 m in height. This introduction, called the "Haitian Star Apple," is commercially propagated and sold in nurseries for planting in backyards.

1.9 Soil Types

To achieve good production of caimito, it is necessary to have Alfisols, Ultisols, and Oxisols, characterized by a high clay content, good structure and drainage, low fertility, and a pH around 4 – 4.5. For this reason, caimito develops perfectly in soils with low fertility levels, primarily in phosphorus, calcium, and magnesium, with a high aluminum saturation of 80% and acidity. Furthermore, the tree grows easily in any type of soil on the firm land of the Amazon and withstands periodic but short flooding. In commercial plantations, however, soil characteristics must be carefully analyzed to seek the highest tree yields. Deep, well-structured, well-drained, and fertile soils are recommended. As for texture, clay soils are preferred, as they have a higher capacity for water and nutrient retention, which directly reflects in fruit production. The land slope should be gentle (less than 2.5%) to prevent soil erosion and nutrient percolation. [8]

1.10 Plantations

Generally, planting is done at a final density. In pure fruit plantations, ample space is left, with recommendations of 10x10 m or 12x12 m. In demonstration plots of Terminalia amazonia with fruit trees, planting has been done at a distance of 4x4 m, arranged in three rows of T. amazonia (468 trees/ha) and one row of fruit trees (157 trees/ha). It is important to keep in mind that to achieve better productive results in a crop, we must provide the species with everything it needs to satisfactorily express its potential, such as adequate soil fertilization. In the case of caimito, despite the limited information on the most suitable management of the species, it is possible to significantly increase its production by following some basic recommendations. However, caimito is a



somewhat hardy species, adapted to the adverse conditions of the humid tropics, and responds favorably to all treatments in the field, except in areas prone to flooding, unlike various fruit species. [6]

1.11 Plant Management of the Cauje

During the first six months, the trees should be watered weekly. Once this stage is over, the frequency of watering can be reduced, except during the flowering period, when heavy watering will be a determining factor for increasing the quantity of fruit [11]. Like most fruit trees, initial formative pruning and annual weeding (mainly during the rainy season) are required. Normally, they are planted at final density, so thinning is not necessary. The use of fertilizers in tropical America and the West Indies is minimal. However, the use of a balanced fertilizer is recommended, as this will improve the yield in calcareous soils and other infertile soils [12].

Regarding harvesting, the fruits do not fall from the tree when they are ripe; instead, they must be collected by hand by cutting them from the branch. Special care should be taken to ensure they are completely ripe. Otherwise, the fruits will have a rubbery consistency and will taste bitter and inedible. When ripe, the skin loses its shine, takes on a slightly wrinkled appearance, and the fruit becomes slightly soft. Ripe fruits can be kept in good condition for three weeks at 3-6°C and 90% relative humidity. [3].

1.11 Benefits

Among the multiple benefits that the fruit offers, we can list the following: it strengthens the immune system, improves vision, and due to its high vitamin C content, it provides a sour taste and stimulates antioxidant action, thereby preventing degenerative processes in cells that can lead to diseases such as cancer. In Brazil, due to the mucilaginous nature of the pulp, it is used to relieve coughs, pulmonary bronchitis, and some other ailments. The latex is consumed as a type of natural purgative and is also widely used by young people for abscesses. Elderly people use the leaves of the tree to prepare infusions that are used to treat diabetes. [7]

In northern Nicaragua, in addition to being a fruit tree, it is used for firewood. It is also used as an ornamental plant due to its shiny leaves on the upper side and golden color on the underside, due to a hair of this color. The leaves are astringent. The pulp of the fruit is mucilaginous and has pectoral properties. It is said that the seeds are diuretic. For wounds, the underside of the leaf is grated and applied as a compress. The fruit is used for hemorrhages and boiled for fever. The drink made from the decoction of the leaf is used for hypoglycemia.

However, the problem we observe in this research is that in Ecuador, no one has cared to continue cultivating this exotic fruit, especially considering all its nutritional values and what it could contribute to our lives [13].

2. Materiales y métodos

All the materials and ingredients used in the preparation and cooking of our dishes are listed below.

- Oven
- Bowls
- Ladles
- Cans
- Knife
- Cutting boards
- Scales
- Thermometers
- Blenders

2.1 Ingredients

The following utensils and equipment used during the research are described:

- Cauje
- Red fruits
- Butter
- Sugar
- Agave honey
- Salt
- Cheese
- Whole grain bread
- Sesame seeds
- Oats
- Almonds
- Flaxseed
- Plums
- Mango
- Granola
- Water

3. Results

We will proceed to prepare different recipes using cauje as the main raw material. Once the different recipes are established, a series of anthropometric records will be taken for the students of the “León de Febres Cordero” School to create registration forms documenting the conditions in which the students entered the program. Subsequently, daily snacks will be provided for two months. After this period, an anthropometric measurement will be taken again to assess the condition in which the students leave the project.

3.1 Recipes Based on Cauje

3.1.1 Cereal Bar with Cauje and Nuts.



Table 1.
Energy Bar Recipe

UNIVERSITY OF GUAYAQUIL						
COSTED STANDARD RECIPE						
Recipe Name:		Cereal Bar with Dried Fruits and Cauje				
Category:						
Number of Servings:		5				
Cost per Serving:		\$0,37				
Ingredients	Quantity	Weight	Observations	Unit Cost	Weight	Total Cost
Sesame seeds	140	g	Toasted	\$3.00	300	\$1.40
Oats	910	g		\$0.69	500	\$1.26
Almonds	140	g	Chopped	\$3.99	150	\$3.72
Flaxseed	210	g	Toasted	\$3.00	500	\$1.26
Plums	280	g	Chopped	\$1.99	250	\$2.23
Cauje	560	g	Dehydrated and chopped	\$3.00	1000	\$1.68
Red fruits	140	g	Dehydrated and chopped	\$4.49	200	\$3.14
Butter	420	g		\$1.19	100	\$5.00
Sugar	490	g		\$1.89	2000	\$0.46
Agave honey	280	g		\$9.00	210	\$12.00
Salt	0.07	g		\$0.79	1000	\$0.00
Preparation:				Subtotal	\$32,15	
1. Toast the sesame seeds and flaxseed, and set aside.				Margin of Error	\$3,22	
2. Cut the plums, almonds, and cauje into small cubes.				Total	\$35,37	
3. Melt the butter and add the sugar, salt, and honey.				Cost per serving	\$0,37	
4. Mix all the ingredients and place them in a tray, spreading the mixture evenly in the tray.				Selling price	\$1,00	
5. Bake for 15 minutes at 350 °F.				Suggested retail price	\$1,50	
6. Cut into bars measuring 2 cm wide by 5 cm long.						

3.1.2 Triple Yogurt with Granola, Cauje, and Mango

Table 2.
Triple Yogurt Recipe

UNIVERSITY OF GUAYAQUIL						
COSTED STANDARD RECIPE						
Recipe Name:		Triple Yogurt with Granola, Cauje, and Mango				
Category:						
Number of Servings:		5				
Cost per Serving:		\$0,37				
Ingredients	Quantity	Weight	Observations	Unit Cost	Weight	Total Cost
Yogurt	250	g	Greek	\$4.00	750	\$1.33
Granola	80	g		\$3.00	500	\$0.48
Mango	100	g		\$2.00	1000	\$0.20
Cauje	100	g	Chopped	\$3.00	1000	\$0.30
Preparation:				Subtotal	\$2,31	
1. Place a layer of yogurt in individual cups				Margin of Error	\$0,23	
2. Cut the mango and cauje into small cubes and add them on top of the yogurt.				Total	\$2,54	
3. Add another layer of yogurt.				Cost per serving	\$0,03	
4. Add another layer of chopped fruit.				Selling price	\$1,00	
5. Place a tablespoon of granola on top.				Suggested retail price	\$1,50	
6. Drizzle 7 lines of agave honey over the top.						

3.1.3 Cauje and Orange Jam

Table 3.
Receta de mermelada

UNIVERSITY OF GUAYAQUIL						
COSTED STANDARD RECIPE						
Recipe Name:		Mermelada de cauje				
Category:						
Number of Servings:		1				
Cost per Serving:						
Ingredients	Quantity	Weight	Observations	Unit Cost	Weight	Total Cost
Cauje	1000	G		\$3,00	1000	\$3,00
Oranje	200	G		\$1,00	500	\$0,40
Sugar	600	G		\$1,89	2000	\$0,57



Orange peels	15	G	\$0,50	1000	\$0,01	
Preparation:					Subtotal	\$3,97
1. Sanitize and peel the oranges, keeping the peels (do not discard).					Margin of Error	\$0,40
2. Cut the orange peels into very small pieces.					Total	\$4,37
3. Cut the orange and cauje, mix them, and bring to a simmer.					Cost per serving	\$0,05
4. Let it cook for 30 minutes and add the sugar.					Selling price	\$1,00
5. Let it cook for another 15 minutes, then allow to cool.					Suggested retail price	\$1,50

3.2 Description of Critical Control Points in Product Preparation

3.2.1 Reception and Selection of Raw Materials

During this stage, great caution must be exercised, as it is essential to identify critical control points. Failing to do so may result in the presence of microorganisms or foreign materials during product delivery.

3.2.2 Preparation and Cooling

In this stage of the process, it is important to adhere to specific times and temperatures. Once the cooking process of the products is completed, a thermal shock cooling will be performed, ensuring that hot products are not exposed to the danger zone, as the reproduction of pathogenic microorganisms can be very high during this stage.

3.2.3 Packing and Transportation

In this stage, the control point is during the transportation of the different products, as they will be transported while maintaining the cold chain, especially for products that require refrigeration, primarily in the case of dairy products.

3.3 Complementary Diet

Training was provided to the representatives of the students regarding the complementary diet, which is distributed as follows: breakfast accounts for 25%, lunch for 35%, the second snack for 12.5%, and the evening snack for 15% of the daily food intake. Our work focuses on the first snack, which constitutes 12.5% of the diet. This way, we aim to close the cycle with the necessary care at home, allowing students to grow and develop normally, both physically and intellectually. This diet was formulated based on growth factors, physical activity in school, and social interactions. Therefore, this training establishes the commitment that the school

lunchbox will include nutritious foods that will be selected and prepared with proper hygiene.

4. Conclusions

The nutritional values of Cauje (*Pouteria caimito*) were theoretically highlighted, which is why it was used in different preparations together with dried fruits to create an energy bar included in the school snack provided to the children of the “León de Febres Cordero” school.

During the survey conducted with the parents of the students from the educational unit, it was found that 73% of respondents are not familiar with Cauje, and 80% are unaware that consuming Cauje strengthens the immune system due to its high vitamin C content. Regarding nutrition, it was determined that 35% of respondents send their children to school without breakfast, and as a replacement, they provide a reinforced lunch, which mostly consists of snacks and sugary drinks that do not contribute nutrients to the school diet.

Over a period of two months, we worked with the children of the “León de Febres Cordero” school, where it was determined that the initial general average weight was 35.2 ± 4.0323 . The records show that by the end of the project, the average weight decreased to 28 ± 2.710687383 .

References.

- [1] Agencia EFE, «El Comercio,» 04 10 2018. [En línea]. Available: <https://www.elcomercio.com/actualidad/ninos-desnutricion-alimentacion-dieta-ecuador.html>.
- [2] E. Samón Ruesga, O. Goulet Mosqueda y L. Díaz Molina, «Alimentación y nutrición en personas con VIH. Guía nutricional,» *Información Científica*, vol. 94, n° 6, pp. 1381-13952, 2015.
- [3] M. d. A. Falcao y C. Clement, «Acta Amazonica,» Marzo 1999. [En línea]. Available: <http://www.scielo.br/pdf/aa/v29n1/1809-4392-aa-29-1-0003.pdf>.
- [4] D. Zulueta Torres, M. C. Romero Iglesias, E. Toledo Borrero y N. Ferrer Zulueta, «Patrones de alimentación y evaluación nutricional en niños deshabilitados,» *Salud Pública*, vol. 29, n° 2, pp. 111-116, 2003.
- [5] F. Geilfus, «El Arbol al servicio del consumidor,» de *El Arbol al servicio del consumidor*, Costa Rica, Enda-Caribe, 1994, p. 339.
- [6] O. Rosa y V. Lázaro, «Agroindustrial Science,» 12 Junio 2016. [En línea]. Available: <https://dialnet.unirioja.es/descarga/articulo/6583408.pdf>.
- [7] Diario la Hora, «Diario la Hora,» 17 Noviembre 2012. [En línea]. Available: <https://lahora.com.ec/noticia/1101424169/el-cauje-fruta-tropical>.

- [8] D. Ramírez, «Gastronomía,» 5 Abril 2018. [En línea]. Available: <https://ecuador.gastronomia.com/noticia/7926/cauje-tropical>.
- [9] A. Ramirez y F. Mieles, 2015. [En línea]. Available: <http://repositorio.ug.edu.ec/bitstream/redug/12622/1/PROCESAMIENTO%20DE%20LA%20PULPA%20DE%20pouteria%20caimito%20%28CAUJE%29%20CONTRIBUYENDO%20A%20SU%20APROVECHAMIENTO.pdf>.
- [10] M. F. Timpe Jacome, «EL ESTUDIO INVESTIGATIVO DE LA FRUTA DEL CAIMITO Y SU DIVERSA APLICACIÓN A LA GASTRONOMÍA,» Universidad Tecnológica Equinoccial, Escuela de Gastronomía, Guayaquil, 2015.
- [11] FAO, «Especies Forestales productoras de frutas y otros alimentos,» 2016. [En línea]. Available: <http://www.fao.org/3/a-an785s.pdf>.
- [12] L. M. Rivera Muñoz y G. A. Nazar Carter, «Prácticas de alimentación infantil de cuidadores principales, conducta alimentaria y estado nutricional de preescolares en Chile,» *Revista mexicana de trastornos alimentarios*, vol. 10, n° 4, pp. 332-343, 2020.
- [13] D. Acurio Páez, «Pensando una epidemiología para la alimentación: Una genealogía de los estudios nutricionales en Ecuador,» *Salud colectiva*, vol. 14, n° 3, pp. 607-622, 2018.

5. Annexes.



Fig. 3. Sagittal section of the Cauje



Fig. 4. Leaf of the Cauje tree



Fig. 5. Panoramic view of an immature tree