

# Use of Plants for Production of Herbal Teas using ICT<sup>1</sup>

## Uso de Plantas para la elaboración de Bebidas Aromáticas mediante las TIC

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**Abstract--** The purpose of this project was to study the use of plants to manufacture herbal teas through ICT. The methodology was qualitative, based on active research, with a descriptive and exploratory design. The research techniques included observation and use of a field journal. The participants were one hundred and sixty (160) students from the Armando Estrada Flores School, from preschool to ninth grade. As a result, the different types of aromatic plants and the relevant characteristics which make them suitable for manufacturing herbal teas were identified. The conclusion is that ICT can be used to describe the characteristics of the most common aromatic plants in the Riofrio rural district of Magdalena, such as Lemon Balm, Basil, Spearmint, Peppermint and Oregano; as well as identifying which beverages are suitable for drinking.

**Keywords--** plants, aromatic drinks, TIC.

**Resumen--** El estudio tuvo como propósito conocer el uso de plantas para la elaboración de bebidas aromáticas mediante las TIC. La metodología fue cualitativa, desde la investigación acción, con diseño descriptivo, exploratorio. Se utilizaron técnicas como, observación y diario de campo. Se contó con ciento sesenta (160) estudiantes de la IED Armando Estrada Flores en los grados de preescolar a noveno de básica secundaria. Como resultado se identificaron los diferentes tipos de plantas aromáticas existentes y sus características pertinentes para la elaboración de bebidas aromáticas. Concluyendo que a partir de las TIC se pueden detallar características de las plantas aromáticas más comunes en el corregimiento de Riofrio - Magdalena como son el Toronjil, la Albahaca, la Hierbabuena, la Menta y el Orégano; además de identificar cuáles son las bebidas adecuadas para el consumo.

**Palabras clave--** plantas, bebidas aromáticas, TIC.

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I. INTRODUCTION

Since ancient times mankind has used plants as natural medicine to relieve certain illnesses, a practice that continues to the present, despite all the progress made by modern medicine, the pharmaceutical industry and science in general. The old folks used to say that the forests were their drugstore, and using plants or parts of them was very common. This is the general rule not only in our country, but also in rural areas of less developed countries in the region and the world. The cost of medicine and medical assistance is a limiting factor for low-income people, who find that a less costly and more accessible alternative is to plant medicinal plants in their own back yards, or to go to the forest and pick them, or simply buy them at low-cost local marketplaces.

Colombia is one of the most bio-diverse countries in South America thanks to its complex geology and multiple climates, which offer a wide variety of conditions for the coexistence of numerous plant and animal species. Over time, this has also enabled the diversification of many types of plants throughout the territory and its coastal regions. But insufficient training on the identification, preservation and sustainable use of certain plant species has become an obstacle for the implementation of the measures for diversification recommended by the Convention on Biological Diversity (CBD) [1].

In general, the plants that belong to the medicinal and aromatic category are those whose chemical particularities make them useful for purposes other than nutrition in numerous fields, including medicine, perfumes, cosmetics, spices or even agricultural uses, among other industries. According to a study by [2], plants can be classified into the following groups, depending on their use:

- a. Medicinal plants, which are those that offer pharmacological properties that make them useful as medicine or as part of manufactured medications
- b. Essence plants, which are those whose active ingredients are made up fully or partially by essences. Essence oils are volatile and fragrant substances that are extracted through distillation.
- c. Plants for spices, which are aromatic plants whose organoleptic properties transmit certain fragrances, colors and tastes to foods or beverages [2].

Since ancient times, mankind has used both medicinal and aromatic plants to treat different types of diseases. Over time, such practices have changed, and people no longer value plants as much as they used to [3]. Until the last century, practically all medical treatments involved natural methods based on plants. Only towards the end of the last century did the pharmaceutical industry begin to use the current medication production methods. Around

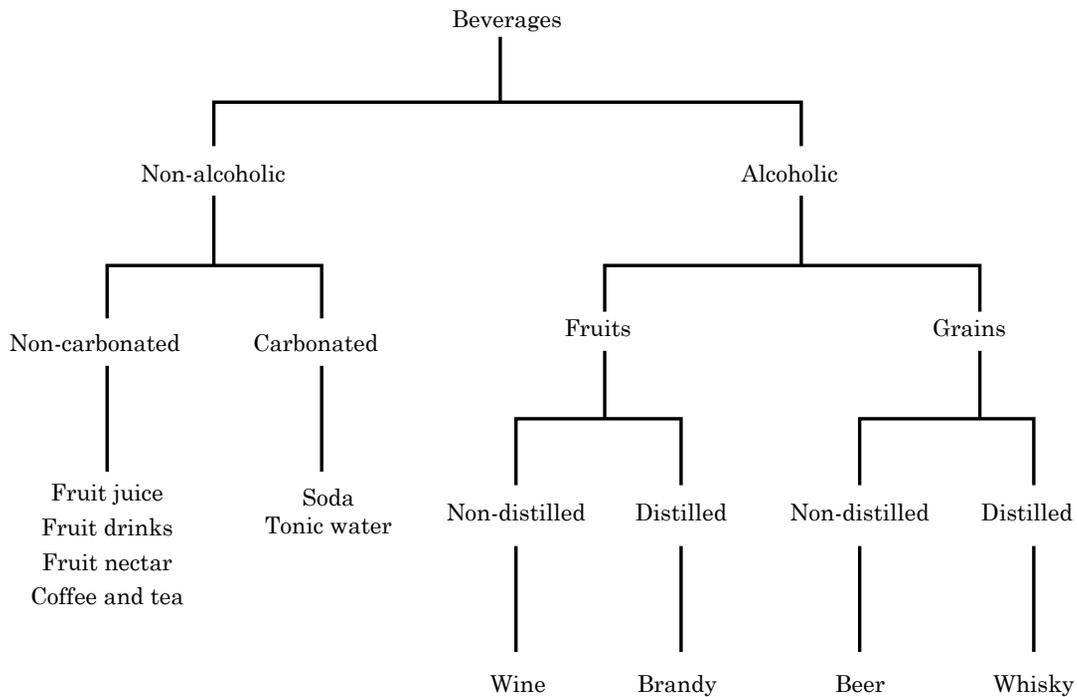


Fig.1. Classification of beverages  
Source: [7]

25% of medications sold contain plant-based products; synthetic and semi-synthetic medications are developed based on patterns provided by plants [4].

Currently, the use of medicinal plants has been declining, though at the same time consumption of beverages made from aromatic plants has been increasing, resulting in large part from the knowledge acquired during the scientific revolution, which has enhanced the cultural legacy and the natural resources that are used. This is the result of diverse socioeconomic and cultural causes that affect the continuity of traditional knowledge. It is estimated that some of the causes for the cultural loss of traditional knowledge is the low value placed on the use of plants, the loss of influence of traditional authorities in community decisions, and more extensive use of land for single crops. [5]

The field of knowledge that studies the use of aromatic and medicinal plants is ethno-botany, defined as the study of the interrelationship between human groups and plants, and which because of its subject matter incorporates various disciplines, including botany, chemistry, medicine, pharmacology, toxicology, nutrition, agronomy, ecology, sociology, anthropology, linguistics, history and archaeology, which gives room to a wide variety of approaches and approaches [6]

There are different procedures that may be used in order to make use of the active ingredients of aromatic or medicinal plants to make beverages. Depending on the type of plant and the use to be given to it, each preparation contributes special characteristics that need to be taken into consideration in order to obtain the greatest benefit from them. The following is a form of classifying beverages, following the guidelines of the food codex. [7].

The non-alcoholic section includes beverages made from fruit pulp, such as fruit juices, fruit drinks and nectars; some contain added sugar, water and preservatives, such as soft drinks. The last group is made up of beverages made from certain plants, such as herbal teas, coffee and tea.

Herbal and medicinal teas are prepared as infusions made from plants, many of them of household use originating in Mediterranean cooking because of their pharmaceutical and condiment properties. They can be grown in plots of any size and are easily accessible (Hyssop, Lavender, Oregano and Thyme, among others) and generally require low amounts of water to grow. Others such as Peppermint, Parsley, Spearmint and Lemon Balm require more moisture. [8]

The infusions are obtained from the leaves, flowers, roots, bark, fruits or seeds of certain herbs and plants, which may or may not be aromatic. They are made through very simple and natural processes such as boiling, macerating or other chemical processes involving cooking parts of the plants such as leaves, stems or roots, either fresh or dry. One of

the most common preparations is to boil the leaves of a plant for a short time so as not to alter its natural characteristics. The following are the processes:

The infusion is the best known and most widely used method for preparing these beverages. The infusion is a highly effective method for obtaining the medicinal ingredients from certain plants, especially in the case of leaves, flowers and stems. Water is brought to a boil, it is removed from the fire and the plant is added, covering the pot and letting it sit for about 10 minutes. In the case of plants rich in nutrients, it is best to let it sit for only 40 seconds, because some of the nutrients may be lost and the infusion may taste bitter.

The infusion process can be done with either dry or fresh plants, though dry plants are more concentrated than fresh ones (fresh plants contain large amounts of water). One spoonful of dry plant is approximately equivalent to 3 spoonfuls of fresh plant [9]. Cooking is another method to obtain the properties or non-aromatic or hard parts of a plant, such as roots, bark, stems, fruits, etc. To this end, a chopped part of the plant is placed into a pot with water, brought to a boil, and letting it boil for between 10 and 20 minutes, at low heat. The low heat is very important to ensure that the resulting liquid contains the maximum amount of medicinal properties.

On its part, a tincture is a concentrate that uses alcohol as a solvent to extract the medicinal elements of some plants, by "trapping" the active ingredients in alcohol. This at the same time significantly lengthens the preservation time of the product in a natural manner. Even though professional formulations can be made with specific measurements of plant ingredients, there are certain common factors that can be established to enable us to make home remedies in a natural manner.

To make a tincture, mix about 120 grams of the desired dried plant, and add 500 milliliters of vodka or wine in a glass container. Let it sit with some alcohol outdoors under the shade for about two weeks. Then strain the solids and leave only the liquid, storing it in a dark glass container away from the sunlight and heat. The liquid can be directly taken in drops (usually between 2 and 4 milliliters, 3 times a day), or it can be dissolved in water, or added to an infusion. Lastly, the best option for processing plants with strong or unpleasant taste is by making syrup, which is a sweet product containing the active ingredients of the original plant. Syrups are made by mixing the plant with honey and vinegar, and boiling until the desired syrup texture is obtained.

Though ICT facilitates access to information, not everything you find through ICT is strictly knowledge. It is necessary to use certain strategies in order to sort out scientific information that enables an individual to develop his/her own knowledge by

reviewing the theory. This may be a challenge because traditional education has prioritized memorization and repetition of predefined phrases. In the case of ICT, it is possible to cut and paste information, and it is necessary to guide the student in finding information of reference, and in interpreting it in such a manner that it has meaning for him/herself, making it his/her own, thereby strengthening the process of reading, comprehension and interpretation of texts and writing. [10]

One of the purposes of education is to teach the students to understand, create and participate in the construction of their knowledge. To this end the teacher must take on the role of guide or coach, who through pedagogical strategies motivates the student to achieve the proposed goals. Including ICT in such strategies serves as a technical tool that shows a different way of organizing, representing and codifying reality. These are also tools that enable some level of application of the acquired knowledge. Learning technologies represents a renovating force in learning systems and are a key element for the development of education and training. [11]

Currently, new information and communications technologies (ICT) are increasingly being incorporated in the educational context, producing big changes in the teaching process. These revolve around three basic media: information technology, microelectronics and telecommunications, all inter-actively interconnected, which enables new communication realities, with a positive impact on schools [12]. However, the use of ICT does not imply the implementation of a teaching/learning strategy. In some cases, educational processes take place that integrate ICT by following a traditional methodology, which emphasizes the teaching process where the student receives information from the teacher. However, it is possible to promote integration in order to guide the educational process through collaborative learning and learning through discovery by using ICT based on the various resources and services offered through internet. [12]

Also, ICT has become an innovative tool in the educational context by creating an unavoidable relationship that can be applied to any pedagogical model to be developed and to include it as a cross-cutting pedagogical tool [13]. Technology is a tool that promotes and increases opportunities in developing countries through knowledge. This has taken on force at educational institutions, because the combination of information, context and experience enables achieving the objectives of the various fields of study, as a means for obtaining and managing the knowledge required by the students. [14]. Consequently, the use of information and communications technology (ICT) has an important role in the development of educational and social competencies, as predictive factors of the academic performance of students in basic primary school.[15]

#### IV. METHODOLOGY

A qualitative study was carried out using the active research model, based on a descriptive and exploratory design. Qualitative research seeks to interpret the reality of the participants through their own experiences, providing subjective information on the phenomena being studied [16]. The active research model is aimed at the production of knowledge based on reflections made by the participants, with teachers actively participation in the educational process, providing technical assistance and guiding the students in the research process, to generate new knowledge about a given reality in a collaborative learning process.

Studies with a descriptive design are aimed at specifying the characteristics of the studied population or phenomena. It is an exploratory study because no previous studies of this type have been performed at the school [16]. The population is comprised by (160) students from the Armando Estrada Flórez School, Los Ceibales La Holleta Campus, located in the rural district (*corregimiento*) of Rio Frio in the municipality of Zona Bananera, Magdalena. The students' ages are between 4 and 18, from preschool to 9th grade of basic secondary school.

The data was collected through participant observation and a field journal, which are qualitative data gathering techniques. These imply that the teacher takes on an active role in the research process, not only as a spectator of the implementation process, but also as a participant, recording each observed element related to the study variable. The field diary is used to record and systematize the elements obtained during participant observation, where contact with the people in the context modulates the reflections and conclusions to be extracted.

The research project's methodology covered the steps of inquiry, based on the integration of IEP in the classroom, in coordination with the curriculum, thereby including environmental education in a cross-cutting manner in the various courses, all aimed at generating social and educational transformation through contextual learning, involving the interests, motivations and realities of the students to generate scientific knowledge.

#### V. RESULTS

Based on the results obtained and the analysis of the techniques and instruments used in the project, it was found that evidently ICT played a major role in the process of teaching and student learning of botany through research as a pedagogical strategy for the collection of information on plants and beverages made from them.

The most common and suitable plants for making beverages, soft drinks, teas and infusions in the rural district of Riofrio, Magdalena are the Lemon

Balm, Basil, Spearmint, Peppermint and Oregano, among others. The most suitable way of preparing them is as infusions by boiling their leaves, flowers, roots, bark, fruits and in some cases seeds.

The community itself has provided all the knowledge (empirical) about aromatic plants acquired from life itself and transmitted through example, now updated, systematized and made available through

new research strategies, combined with new technologies as strategies to qualify the work performed inside and outside the school.

Based on the field work (outings and internet searches), information was gathered on the different aromatic plants available in the environment of the institution and the municipality in Magdalena (see table I).

TABLE I. DIVERSITY OF AROMATIC PLANTS

Common name	Scientific name	Form	Habitat	Properties
Lemon balm	<i>Melissa officinalis</i>	A medicinal plant with numerous branches, which grows to a height of between 30 and 70 cm. It displays opposing leaves and a stem with a square cross-section. Its flowers are yellow and sometimes pure white in some varieties.	Plant originally from the eastern Mediterranean basin and Asia Minor. In Europe it is widely grown in gardens and may grow wild in sunny areas at altitudes of up to 1000 meters.	Infusions improve food digestion. Beverages made from its flowers and leaves also calm stomach aches and intestinal cramps of nervous origin. It is recommended for vomiting caused by gastric nerves, presence of gases that cause a swelling stomach and treatment of uterus cramps.
Basil	<i>Ocimum basilicum</i>	This plant has juicy, finely dented and oval-shaped leaves. Its stem is upright and branchy, and can measure up to 50 cm. In its lower section it has white flowers, though some purple flowers may also be present.	This plant is originally from South Asia, Indonesia and India. It can be planted in flower pots, maintaining it semi-shaded and watering abundantly. It reproduces from cuttings (as shown in the image) or seeds. Plant in well-drained earth, fertilize regularly, highly sensitive to cold, it can be grown indoors.	Juiced leaves relieve bronchitis, fever, coughs, swollen throat and digestive problems. It is used as a spice thanks to its smell and soft aromatic flavor. It fights flatulency and gases, and is anti-spasmodic. An infusion of fresh leaves and drops of lemon relieves stomach aches and intestinal cramps. An infusion of leaves is diuretic, stimulant, digestive and relaxing; juiced leaves with honey relieve fever. Basil teas help breastfeeding mothers produce more milk. Cold tea is good for eye problems, both for soaking and drinking. Basil is a great regulator of the nervous system. It is mostly used to fight weariness and depression, because it helps activate the immune system.
Spearmint	<i>Mentha spicata</i>	It is a 30-cm aromatic plant very similar to peppermint with a wide variety of uses, including infusions. Its color is lilac, pink or white, very glandular, up to 3 mm long. It has abundant and invasive roots.	Planting spearmint is very easy. It adapts well to a variety of climate conditions and only needs light and high humidity.	An infusion is useful for treating cases of diarrhea and to relieve stomach cramps. It has carminative properties by helping eliminate accumulated gases in the digestive tract, and is useful for treating cases of meteorism and flatulence. It has anti-dysmenorrhic properties and is highly advisable for treating excessively painful menstruations. Spearmint is also a mild sedative, which makes it very good for treating cases of stress, anxiety and sleeping difficulties.
Peppermint	<i>Mentha piperita</i>	Vivacious herb of intense green color and refreshing smell, a spearmint hybrid, tonic and stimulating for the stomach. It grows to a height of up to approximately 120 cm. Its leaves are arranged on opposite sides, simple with an elongated and lance-like shape, often with serrated sides.	It does not require much care, grows in semi-shade, resists cold weather, shade, scarce water and it adapts to soils low in nutrients. It is therefore easy to grow in fertile soil and abundant water.	An infusion is excellent for digestion, treating colds and relieving hiccups. It also helps relieve headaches, migraines and pain caused by contusion. An infusion of leaves is used against insomnia.
Oregano	<i>Origanum vulgare</i>	Aromatic perennial plant with stems up to 90 cm long, erect or decumbent, with a quadrangular cross-section, hairy and branches on opposite sides. The leaves are of 10 - 40 x 4 - 25 mm, oval-shaped, fully or slightly dented - serrated, glabrous or hairy glandulous, upper side of stems greener than back side.	It grows in grasslands, shrubbery, stony areas, bordering oak groves, in dry and sunny areas, usually in limey areas near nitrogen-rich sources. It propagates quickly and grows well in flower pots.	Infusions are used to lose weight, improve digestion, to treat sinus infections, tooth aches. It is anti-bacterial, anti-oxidant, anti-fungi, anti-inflammatory, anti-histamine (to help treat allergies). It relieves skin illnesses, fights respiratory diseases, and is used to treat nasal and lung congestion. It relieves muscle pains, menstrual cramps, stomach ache and is an immunological stimulant. Tea relieves coughing, indigestion, muscle cramps and headaches, and is anti-fungal.

Source: Authors.

Additionally, activities were carried out using ICT as pedagogical tools in activities focused on researching the topic of aromatic plants for beverages, such as:

- a. YouTube videos on the importance and benefits of plants
- b. YouTube videos focusing on medicinal plants that can be grown at home and their uses
- c. Outings around the municipality to gather images of the various types of plants in neighboring farms.
- d. Educational talks aimed at the community on the use of the plants according to the diagnosis.
- e. The students research the types of plants and their uses, benefits, planting and treatment in the community through tools such as Google in digital media.

## VI. CONCLUSIONS

Based on the pedagogical strategies used for this study and using ICT we may conclude that all parts of aromatic plants can be used: roots, flowers, stems, leaves, and fruits, which can be consumed two or three times a day, after having boiled the water, and drinking it cold or hot in adequate quantities depending on age.

After exhaustive searches in digital media and exploration in the school surroundings, it was concluded that the beverages can be made using materials available at the school to prepare infusions, are primarily:

Lemon Balm has beneficial properties for the circulatory system and for brain irrigation, which improves memory. Basil improves kidney functions, prevents abdominal swelling and stimulates gastric metabolism, and because it is a plant it contains fiber, which helps eliminate toxins.

Spearmint is one of many mint species and is one of the most refreshing aromatic plants. It has relaxing and invigorating effects and medicinal properties to relieve stomach aches, and it helps fight bad breath and mouth problems because of its delicious flavor.

It is now known that peppermint is rich in vitamins C and A, minerals (manganese, iron, potassium) and tryptophan, among other nutrients. For this reason it continues to be used to make infusions, and is also used to relieve nausea, stomach ache, indigestion, colds and even to mitigate irritable colon syndrome.

An oregano infusion helps regulate digestive processes because it stimulates the liver function. Because of its sedative properties, it is appropriate to treat cases of anxiety and stress. It is good for blood circulation and to relieve coughing.

If the government invests in training projects on the preparation of beverages made from aromatic

plants to implement them at schools and equip them with the required tools, it would substantially improve the quality of education, especially in these rural districts.

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