# The climatic and terrestrial characterization and the evaluation of morphologic indicators of the extruded organs of (Gentianalutea L) in Albania

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## Abstract

Sanza is a rare, limited-surface medicinal plant. Its chemical [1]composition makes it curative to relieve gastric pain, stimulate digestion, and so on. The roots of the sanza are used for the production of various medicines but also to drink as a "fërnet" and "shweps" [9]. The study of sanza in Albania has not been carried out in depth, both morphologically, biologically, technologically and in terms of chemical composition and processing. In 2009 it was planted [3,4,5,6] in Shishtavec of the Kukes district to evaluate morphological [8] indicators according to the age of the plant, from the second to the seventh year, which is the year of harvest.Measurements were made on the number of leaves per plant, the length of the stalk, the number of stems in the stalk, the leaf surface of the plant, and the leaf surface index.

**KEYWORDS:** Sanza, leaf, stalk, leaves surface, index and medicinal.

## Introduction

The aromatic and medicinal plants are a very wide field of science in Albania [2]. They are represented by two hundred and thirty plants of curative value. The most important part of aromatic and medicinal herbs are ninety-five of them. For their own importance and role in hiring people in rural areas and the profit they bring, there are organized some collection and trading companies of these plants. The processing technology is now advancing to their distillation. Among these plants an important place occupies sanza. It is widespread in subalpine and alpine territories, in meadows and pastures. Due to the lack of technical criteria during harvesting, it is included in the red list of plants, ie plants that are at risk of disappearing. After 2009, projects have been undertaken for its cultivation in areas where it grows in natural conditions with the aim of increasing its production to meet the needs of the international market. One of the most suitable points is Shishtaveci in Kukës, which extends up to 1326 m and with coordinates 41$^{o}$59 'and 20$^{o}$36', while the sanza planting is carried out at a height of 1280 m.

Sanza fits very well in serpentine lands [7]. In this article will be presented the climatic [10] and terrestrial characterization and data and their interpretation of the morphologic indicators [8] of extruded organs for planting of 2009 and harvested in 2016, ie at the age of seven years.

## Material and method

**The aim of study:**To study the climatic and terrestrial conditions where sanza is grown naturally, to evaluate the sanza plant for the morphologic indicators of the plant

organs.**Objectives:**1. To describe the elements of the Shishtavec climate where sanza is grown better in natural conditions. To conduct the soil analysis according to the horizons for the physical properties of the soil and the chemical composition of all the elements that affect the normal growth of the plant.

2. To determine the morphological indicators of the plant organs of sanza: the number of leaves / plants, the height of the stalk, the number of stems on the stalk, the leaf surface and the leaf surface index. Four replications of 10 (ten) plants were made on which biometric measurements of indicators were made: number of leaves / plants, stalk height, number of stems in the stalk, leaf surface and leaf surface index.

For the determination of the leaf surface, it is used the weighing method (P1) of the leaves with measured surface (S1) and weight (P2) for leaves with ungrounded surface and the following formula:

$$S2 = \frac{P2 \times S1}{P1}$$

The leaves are harvested in four hands: First: June 20 are collected the lower leaves that are yellowed. Second: July 10, by collecting yellow leaves that do not perform any function. Third: on 30 July. Fourth: collecting on August 20 by taking all the leaves that have completed the photosynthetic processes.

**II. Results and their interpretation**

Fifty years of climatic data and its elements have been taken to characterize the climate suitable for the sanzagrowing. Meanwhile, samples of soil have been analyzed in an accredited laboratory, defining a series of agrochemical indicators that show the appropriate soil conditions for the sanza.

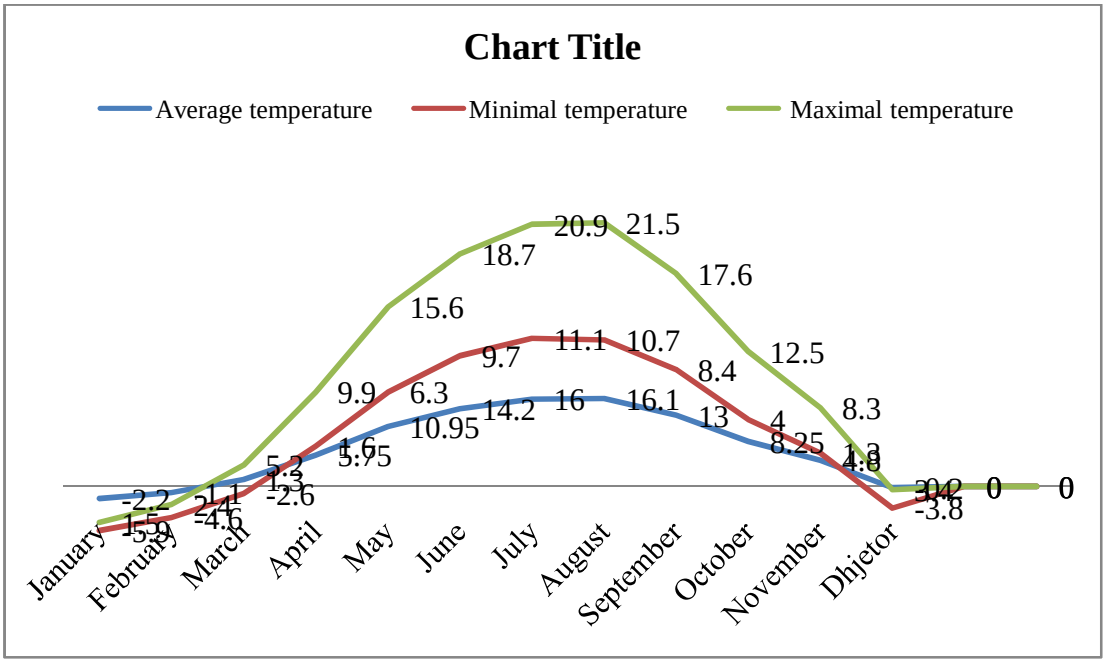


**Figure 1.The performance of the average of the maximum, minimum and medium temperature in Shishtavec (fifty year average).**

The climate is characterized by a minimum temperature of -2,3$^{o}$C in January and 14,23$^{o}$C in July, while the maximum mean temperatures fluctuate from 3,83$^{o}$C in January and 23,9$^{o}$C in July. From the studies conducted, it results that the air temperature decreases on average by 0.55$^{o}$ C for every 100 m altitude above sea level.The precipitation regime in this area has a Mediterranean character.The largest amount of precipitation falls during the colder period (November to February and less in July, falling by 900 to 1300 mm / year. There are observed about 90 days with snowfalls that often reaches 0,8 m and rarely up to 2 m height

**Table 1. Analysis of nutrient elements**

| No | Parameter | Measurement Unit. | Value | Evaluation |
|---|---|---|---|---|
| 1 | Total nitrogen (N) | % | 0,182 | Medium |
| 2 | Assimilable Phosphorus(P) | ppm | 12,8 | Medium |
| 3 | Calcium interchangeable(Ca) | ppm | 641 | Low |
| 4 | Magnesium interchangeable(Mg) | ppm | 42,8 | Low |
| 5 | Potassiuminterchangeable(K) | ppm | 101,5 | Medium |
| 6 | Boro soluble(B) | ppm | 0,24 | Low |
| 7 | Assimilable zinc(Zn) | ppm | 1,02 | Medium |
| 8 | Assimilable lead(Pb) | ppm | 6,0 | |
| 9 | Assimilable iron( Fe) | ppm | 122,4 | Medium |
| 10 | Assimilable Manganese(Mn) | ppm | 144,0 | High |
| 11 | Assimilable copper( Cu) | ppm | 1,7 | Medium |

| | | | | |
|---|---|---|---|---|
| 12 | Assimilable nickel (Ni) | ppm | 0,53 | |

The soils in which sanzais grown are on average content of nitrogen, potassium and phosphorus, low content of calcium magnesium, and high content of manganese, but with many elements not found in other soils

A B

**Photo 1. A.The appearance of leaves at the stage before the end of the vegetation.**

**B. The view of the root in the fourth year of development of the sanza**

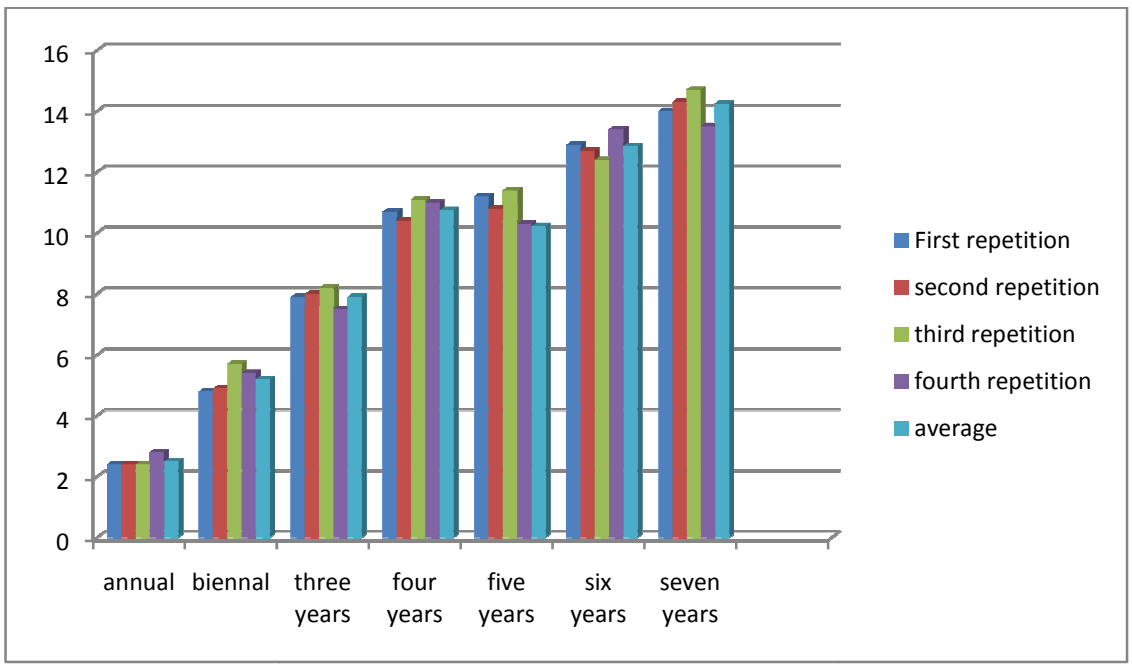


**Figure 2. Number of leaves / plants by age of the plant.**

The sanza plant has sluggish growth in the first year and forms a little leaves.In the second and third year, the growth is faster compared with the first year by increasing the number of leaves in the fourth and fifth year there are no major changes in growth and the number of leaves per plant, which coincides with the extraction of fructification organs and the roots growth. In the sixth and seventh plant growth reaches the highest level and has the maximum number of leaves and leaf / plant surface.

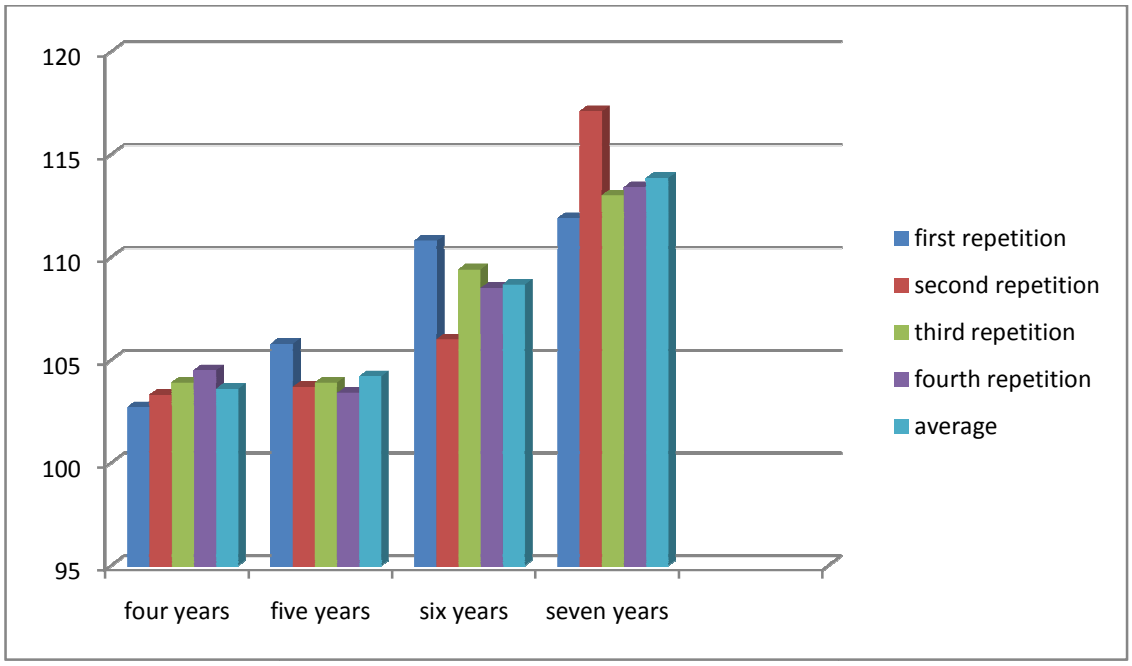


**Figure 3. The height of the stem of the plant according to age.**

The plant of the sanza forms the flower stalk and the organs of fruiting in the fourth year of its life.As the age of the plant grows, the height of the stem increases, reaching the maximum in the seventh year.

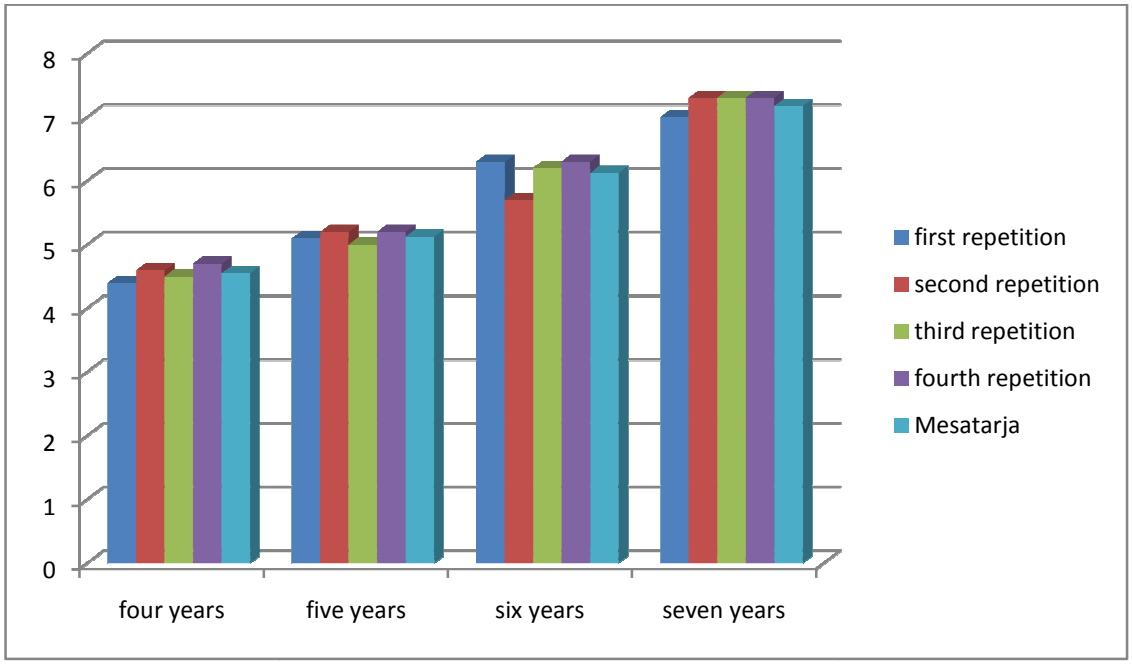


**Figure 4. Number of flower floorson the stalk.**

The height of the stem is closely related to the number of flowers floorson the stalk.In the fourth and fifth year there are lower number of flower and fruit plants, while in the sixth and seventh there are a higher number of flowers and fruits in the stalk.The plant overload with fruits and seeds produces weaker seeds with a low weight of 1,000 seeds and low germination power.This requires the intervention of cutting the tip of the stalk and cleans the end of the stalk leaving three to four floors in the stalk. In order to obtain seeds with high germination power, the plants of the sixth and seventh year should be used.

**Table 2. Data on foliar surface indicators by plant age for 60 000 and 80 000 plants / ha.**

| No | The plant age | Surface of a leaf ($cm^2$) | Number of leaves / plants | Leaf Surface / Plant ($cm^2$) | Plant number/ ha | Foliage surface / ha ($m^2$/ha) | Foliage surface index |
|---|---|---|---|---|---|---|---|
| 1 | Annual | 10.2 | 3.4 | 34.68 | 60 000 | 208.08 | 0.0208 |
| | | | | | 80 000 | 277.44 | 0.0277 |
| 2 | Biennial | 28.6 | 5.2 | 148.72 | 60 000 | 888.0 | 0.0888 |
| | | | | | 80 000 | 1119.76 | 0.119 |
| 3 | Three- year | 102.2 | 8.09 | 826.798 | 60 000 | 4960.384 | 0.496 |
| | | | | | 80 000 | 6614.384 | 0.66 |
| 4 | Four- years | 251.5 | 10.8 | 2716.2 | 60 000 | 16297.2 | 1.63 |
| | | | | | 80 000 | 21729.6 | 2.173 |
| 5 | Five-years | 274.2 | 11.2 | 3071.04 | 60 000 | 18426.24 | 1.843 |
| | | | | | 80 000 | 24568.32 | 2.457 |
| 6 | Six-years | 284.8 | 12.9 | 3673.92 | 60 000 | 22043.52 | 2.204 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | 80 000 | 29391.36 | 2.939 |
| 7 | Seven-years | 296.4 | 14.8 | 4386.72 | 60 000 | 26330.32 | 2.633 |
| | | | | | 80 000 | 35093.76 | 3.509 |

From the table it is clearly seen that the leaf and leaf surface indicators increase significantly with the growth of the plant's age, reaching the maximum in the sixth and seventh year.The leaf surface index should be increasing from the fourth year up to the seventh year, concretely 2.6 to 3.5.

**Conclusions**

The growth dynamics of sanza is higher in the fourth year until the sixth and seventh.The plant of sanza appears the flower stalk in the fourth year and rarely in the fifth year. In order to obtain good seeds, with high germination power, it should be used the plants of the sixth and seventh year, with plants number of 60,000 plants per hectare and leaving 3-4floors of fruit organs/plants.It must be provided 60000-80000 plants / ha to obtain the highest roots production with better quality.

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