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## Caracterización de especie de *Cyphomandra betacea* Cav. en la comunidad de Mazahuacán, Lolotla, Hidalgo

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### Abstract

The information presented is intended to contribute to the conservation of *Cyphomandra betacea* Cav., One of many organisms that belong to the Mesophilous Mountain Forest; This work implies the knowledge its distribution and state of health of the species; To achieve this, a tour of the entire community of Mazahuacán, belonging to the municipality of Lolotla in Hidalgo, it was chosen because people are already beginning their commercialization, finding a great acceptance in the market as a natural therapeutic, thanks to its nutritional properties, so to increase its distribution and cultivation within the same space where it lives without altering its habitat, is a way to sustainably conserve the Mesophilous Mountain Forest. Being a plant of Andean origin, it likes the humidity and spaces with light, but having low temperatures at least during the night, if it was direct light it dries the leaf making it vulnerable to multiple opportunists, from insects that eat leaves, even fungi due to the great humidity that presents; The shade of trees and the warm temperatures are the best conditions to grow the plant healthy, since the direct light dehydrates the plant because of the increase of the evapotranspiration due to the size of the leaves, the distribution reflected in the present summary, is a Attempt to increase its cultivation in the community of Mazahuacán, starting with knowing where it is currently and the conditions that favor it in its growth.

*Cyphomandra betacea*, Mesophilous Mountain Forest, Mazahuacán, distribution, Lolotla

### Resumen

La información presentada está dirigida a contribuir en la conservación de *Cyphomandra betacea* Cav., una de las plantas organismos propios del Bosque Mesófilo de Montaña; implica conocer su distribución y estado sanitario de la especie; para lograrlo se realizó un estudio en toda la comunidad de Mazahuacán, perteneciente al municipio de Lolotla en Hidalgo, escogido porque la gente ya inicia su comercialización, encontrando una gran aceptación en el mercado como terapéutico natural, gracias a sus propiedades nutrimentales, por lo que incrementar su distribución y cultivo dentro del mismo espacio donde vive sin alterar su hábitat, es una forma de conservar sustentablemente el Bosque Mesófilo de Montaña. Siendo una planta de origen andino, le gusta la humedad, espacios con luz pero que tengan bajas temperaturas al menos durante la noche, la luz directa seca la hoja haciéndola vulnerable a múltiples oportunistas, desde insectos que comen hojas, hasta hongos por la gran humedad; la sombra de árboles y las temperaturas templadas son las mejores condiciones para hacer crecer saludablemente la planta, ya que la luz directa deshidrata la planta por el aumento de la evapotranspiración debido al tamaño de las hojas, la distribución reflejada en el presente resumen, es un intento por acrecentar su cultivo en la comunidad de Mazahuacán, iniciando por conocer donde se encuentra actualmente y las condiciones que le favorecen en su crecimiento.

*Cyphomandra betacea*, Bosque Mesófilo de Montaña, Mazahuacán, distribución, Lolotla

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## Introduction

This memory is an attempt to contribute in the description of the distribution of *Cyphomandra betacea* Cav., Whose presence in the Mountain Mesophilic Forest (BMM), has been previously reported in Lolotla flora studies. The forest has decreased notably in recent years, SEMARNAT through CONABIO, reports that of the territory of the country, less than 1% of BMM are extended by 18,534 km<sup>2</sup>; perform a sustainable management is an alternative to conservation and use.

To achieve this advantage it is necessary to know what is and where it is found, in this case *Cyphomandra betacea* Cav., Organisms with economic potential and that at the same time is not invasive to the already balanced Mesophilic habitat, they can be an alternative of sustainable production, the study reveals that there is *Cyphomandra betacea* Cav. in different spaces, including pastures of the community of Mazahuacán, of the municipality of Lolotla, state of Hidalgo, so the map that was generated, will be very useful to promote the cultivation of the plant creating a production, that in the short term, can be introduced as another food in the diet of the people of the sierra for its excellent nutritional level and in the long term there is a production that activates the economy in the Hidalguense mountains.

Therefore an estimation of abundance and distribution of the population of *Cyphomandra betacea* Cav. in the community of Mazahuacán; considering that the population of this plant is influenced by abiotic and biotic resources and that the influence of parameters such as temperature, humidity, height, among others, may be data, considered in this work, which will serve to establish the best productive conditions of the fruit to future.

Finally, it has been concluded that, knowing the distribution of *Cyphomandra betacea* Cav. and the conditions where it grows, it is only the beginning of the different works that must be done on the plant, these could make the difference in its commercial value, since it can be food for local consumption or a natural therapeutic fruit, considered by Europeans that they are the main market, interested in consuming foods whose natural properties without chemicals are the alternative of having a healthy, healthy and above all full of flavors of the countryside.

## General Objective

Monitor the population distribution of *Cyphomandra betacea* Cav. in the community of Mazahuacán in the municipality of Lolotla, State of Hidalgo.

## Particular Objective

- a. Characterize *Cyphomandra betacea* Cav. for identification and monitoring in the field.
- b. Make a map of population distribution of *Cyphomandra betacea* Cav. in the community of Mazahuacán of the municipality of Lolotla, State of Hidalgo, using Geographic Information Systems.
- c. Record physical parameters related to the life cycle of *Cyphomandra betacea* Cav. that help in the development of the plant.

## Theoretical Framework

The Organization for Agriculture and Food (FAO) for its acronym in English; of the United Nations, in collaboration with the Botanical Garden of Córdoba (Spain), as a contribution to the development of the "Ethnobotany 92" program, makes a compendium of plant species that, at other times or under other conditions, played a fundamental role in the agriculture and food of indigenous peoples and local communities. The marginalization that these species have reached has been, in many cases, the consequence of the deliberate suppression of self-sufficient ways of life that characterized traditional cultures. (León & Hernández Bermejo, 1992).

The human being has been fed different animals and plants throughout its history, many of them have ceased to be consumed product of a selective domestication, derived from an agriculture emanating from dominant cultures, considering social, political and economic aspects, leaving behind ecological aspects, increasing the vulnerability of habitats to invade with species of cosmopolitan growth that displace native species. Return to feed on the multiple plant species that were consumed in communities for many years, whose growth is not invasive, allows to increase the required nutritional variability and at the same time contribute to the diversification in food sources, conserving the habitats where they have grown organisms and have establishing a balance with their environment.

The wild pomegranate, is an exotic fruit native to the eastern slope of the Andes, specifically Peru, Ecuador and Colombia, belongs to the Solanaceae family and is known by this name in Colombia, Peru, Ecuador and Mexico; mountain tomato, wild tomato, monte cucumber and gallinazo panga in Bolivia; tomato chimango, tomateiro da serra in Brazil; "Tree tomato" in English speaking countries. At commercial level it has been known by different names in different regions, until around 1970 in New Zealand it was assigned the name "tamarillo", positioning itself as the generalized commercial designation for the tree tomato in the world market.

The soils where the tree tomato is grown in good conditions should be loose, as far as possible, sandy-loam or clay-loam, since in these there is a better growth and development of the root system; with very good drainage to avoid puddles. The pH values should be between 5.5 - 6.5 for an adequate development of the crop and for a better absorption of nutrients, a condition that is found where the leaf of deciduous trees accumulates. The cation exchange capacity (CIC) must be between 25 and 30 meq / 100 grams of soil. The content of organic matter should be in cold weather greater than 10% and in temperate climate greater than 5%. (Leon F., Viteri D., & Cevallos A., 2004)

## Methodology

The academic body of Natural Resources in the Sierra Alta Hidalguense, of the Technological University of the Sierra Hidalguense, is engaged in different projects so presenting the work proposal is the first option, where the monitoring of the population of *Cyphomandra betacea* was selected (Cav.),

A species of Andean origin but that has existed for a long time in the Mountain Mesophilic Forest; this is demonstrated by the works on floristics of this environment carried out by (Luna Vega & Alcantara, floristic analysis of two areas with mesophilic bosque of Mountain, in the state of Hidalgo, Mexico, 2001) and (Luna Vega, Ponce Vargas, & Ruíz Jiménez, Floristry of the Mountain Mesophilic Forest of Monte Grande, Lolotla, Hidalgo, Mexico, 2006). The first step to know its distribution is to characterize *Cyphomandra betacea* (Cav) in its life cycle for identification and monitoring in the field.

For the monitoring, the coverage will be used, it is the variable most used to quantify the abundance of plant species, it relates the proportion of the surface sampled covered by the vertical projection of the vegetation, since the studied species does not present a homogeneous distribution and the The sampled lands have been modified for use as paddocks, so a probabilistic analysis would skew the population count, which is why the specimens were counted and, although it does not allow any inference about the surrounding population, the knowledge of the location of each plant for its completion of other studies is feasible.

## Characterization of *Cyphomandra betacea* (Cav)

It is an arboreal shrub of 2.0 to 4.0 m in height, although it can reach more height, grayish bark, with an erect stem and few branches; Semi-woody or soft woody stems which makes it fragile, with thick, dense and minutely puberulent marrow, fine hairs of 0.1 mm long; It presents aromatic foliage, slightly stinking, leaves generally in pairs (Img.01), cardiform ovate between 15-30 cm long and 8-20 cm wide, stout petiole 4-8 cm long, densely hairy, alternating growth a of 1 / 3-1 / 2 the size of the other, but similarly, densely puberulent in the bundle (at least when young), the apex acuminate, the base deeply carded, the lobes generally superimposed, the nerve is marked and outstanding, less intense color.



**Figure 1** Foliage of *Cyphomandra betacea* (Cav)  
Source: Self Made

Cauliflower inflorescences, usually 1 cm above and next to a pair of leaves or in the dichotomies, are small flowers (Fig. 02) of white-rosy color, arranged in small, slightly fragrant terminal clusters with five petals and an equal number of petals yellow stamens, the anthers forming a cone, with dehiscence through apical pores.

The inflorescences can be formed by more than five flowers each in caulinarian form, flowers between May and June. Pendulous fruits (Fig. 03), from 1 to 9 by infructescence, ovoid, 6 cm long, 3.5 cm in diameter, acute at both ends, with longitudinal marks, wax, glabrous, presents three colors (varieties) orange, orange -morado, purple.



**Figure 2** Flower of *Cyphomandra betacea* (Cavanilla)  
Source: Self Made



**Figure 3** Immature fruit  
Source: Self Made

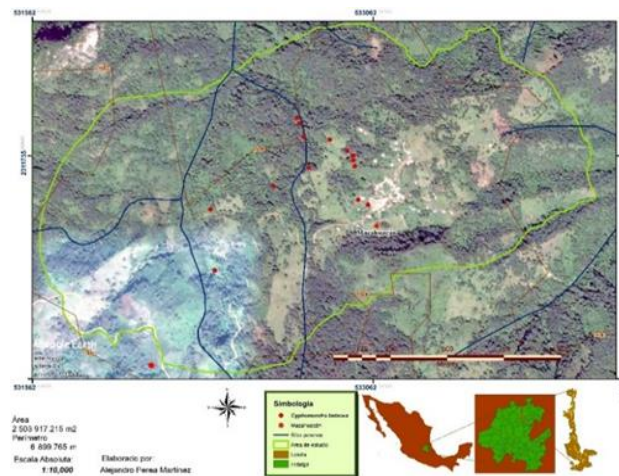
### Location map of *Cyphomandra betacea* (Cav)

Having the elements to be able to identify the species in the field, once obtained the authorization of the owners to access the land, we proceeded to carry out a survey, the sampling was carried out in the community of Mazahuacán (Fig. 04) belonging to the municipality of Lolotla, State of Hidalgo, using a Garmin GPS with a margin of error of 4.0 m.

The plants whose fruits are present are georeferenced, because it is from them where the physical parameters are recorded to delimit the optimum conditions of production; helping us with Geographic Information Systems with the ArcMap 10.3 software, an image of the site where *Cyphomandra betacea* Cav. was found is located. (Img.05).



**Figure 4** Mazahuacán, Municipality of Lolotla, Edo. from  
Source: Self Made



**Figure 5** Distribution of *Cyphomandra betacea* in the community of Mazahuacán  
Source: Self Made

To monitor the development of the fruits found and the development of the plant, identification tags were made, in order to establish a continuous monitoring, especially of those specimens found in paddocks where deterioration is most likely due to the presence of cattle.

Once labeled and identified the location of the plants, we proceeded to look for the conditions of the plant, color of leaves, surrounding plants, arthropods or any other potential organism with which it could generate some kind of beneficial or harmful symbiosis.

The plants with better characteristics were found under the shade of trees, however there is no specific species of preference for that shade, in terms of herbaceous, some compete for space with the species studied, not identifying any particular; As for the animals, looking for associated arthropods, no one was found that harms the degree of plague, but the presence of grasshoppers, snails eating the leaf and vines, indicates that the plant needs to be cared for if cultivated; Several specimens were found inside the paddocks, and although the cows do not eat the shoots or the mature plant, if they represent a threat to occupy them as scrapers and because their stem is fragile because they do not have a woody body, they deteriorate or throw away the plant.

Its growth is associated with the limits of the paddocks, where the animals do not step and the shade is present, not being found in the open spaces where the grass that the animals consume prevents the growth of some other plant.

Regarding the specimens found under the shade and found in good condition, the plants already had inflorescences and some with fruits in different stages of maturation, which indicates that the harvest can be carried out at different times, giving opportunity to selling the product is fresh since the shelf life is unknown.

### Physical Parameters

To record physical parameters related to the life cycle of *Cyphomandra betacea* (Cav), the characteristics of the region were first considered, data obtained from government official pages, specifically those of INEGI and CONABIO, serving as a starting point to establish the requirements of the plant, maintaining its characteristics (Contreras, 2011).

Conditions such as the high rainfall in Mazahuacán, the continuous presence of fog, as well as the slopes that allow an adequate drainage avoiding puddling that rot the plant, are conditions mentioned by (Revelo M., Pérez A., & Maila A., 2003 ) that helped in the search for the plants.

At least two specimens that were in a land enclosed by having discharges of sewage, have excellent characteristics, leaves of an intense green, with inflorescences and infrutescences, of low height and little ramification, which indicates that it has not been pruned of the apices, its presence under the shade of a *Quercus sp.* and the flow of water makes the temperature drop a couple of degrees with respect to the surroundings and that its good health is due to the large amount of nutrients provided by the sewage sludge.

### Analysis and interpretation of results

By capturing the location of *Cyphomandra betacea* Cav. On a map occupying the Geographic Information Systems (GIS) inserted with a background image of Google Earth it was noted that the plants are located in the limits where the forest starts and the paddocks end, noting that in places where vegetation is very dense its existence is almost nil; In the places where the shade is scarce due to the lack of trees, the specimen studied is not present; during the second and third week of June a wave of heat appeared affecting the foliage of the plants found, possibly due to the increase in evapotranspiration due to the size of the leaf; the plants that were found prostrate, it was noted that they make a branch and the generation of a new axis of growth (Img 6a and 6b), ratifying the position that its reproduction by means of cuttings is feasible, only one plant has evidence of use, finds in the middle of a corn crop and neighbors report that the owner sells the fruit in the local market.



**Figure 6a** *Cyphomandra betacea* prostrada con nuevos ejes de crecimiento  
Source: Self Made



**Figure 6 b** *Cyphomandra betacea* prostrate with axes of growth, crushed by heat  
Source: Self Made

The largest number of plants that were found in the different farms of Mazahuacán, are plants in development, which implies that the propagation is just beginning.

### Contributions and Conclusions

#### *Cyphomandra betacea* Cav.

It presents serious problems due to the damage caused in its natural habitat, being a species that does not tolerate the direct exposure of sunlight, its fruit ripening is prolonged and presents flower even when mature fruits already exist, allowing multiple harvests. The wild pomegranate is harvested by hand, starting the pedicel in the abscission zone that forms 3.5-5 cm from the base of the fruit, its introduction in the community of Mazahuacán is as therapeutic because it has a high nutritional value, recommends continuity with the project in a second stage to define and identify pests and / or diseases that the species presents, a specific pollinator if there is one, an annual monitoring cycle to quantify the development progress of the seedlings found (FAO, 2011).

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