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MORFO-ANATOMIC-CHEMICAL STUDY OF MEDICINAL PLANTS: *CISSUS SICYOIDES* AND *MOMORDICA CHARANTIA*, AMAZON PLANTS WITH HIPOGLICEMIC EFFECT

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ABSTRACT

Objectives: This study analyzes the morphological, anatomical and chemical characteristics of the plant species Cissus sicyoides and Momordica charantia.

Theoretical Framework: These plants are empirically used by folk medicine to treat diabetes, a disease with high prevalence in Brazil. WHO data indicate a 7.6% prevalence of diabetes in Brazil, compared to 3 to 10% in the United States and Europe. In the Amazon, the prevalence is 3.3%. Diabetes mellitus is a metabolic disease characterized by hyperglycemia, and is either type 1 or 2. The therapy proposed by traditional medicine for type 1 is insulin, and for type 2, oral hypoglycemic agents, such as sulfonylureas and biguanides. However, in folk medicine, many plants are used to control hyperglycemia, with the same species being used in different countries, which indicates a high probability of drug efficacy.

Method: Macroscopic and microscopic evaluation of plant structures. Using the analytical method of atomic absorption and emission, the leaves presented higher concentrations of inorganic compounds (chemical micro and macro elements).

Results and Discussion: Based on these data, this research investigated the use of these plant species from the Amazonian biodiversity. It was observed, macroscopically, that both are climbing plants and have tendrils. Microscopically, Momordica charantia presents tector hairs and a centralized vascular bundle, while in Cissus sicyoides, its upper epidermis is composed of polyhedral cells with straight walls and six vascular bundles dispersed throughout the fundamental parenchyma. In contrast, the stomata in both are of the anomocytic type. Using the analytical method of atomic absorption and emission, the leaves presented higher concentrations of inorganic compounds (chemical micro and macro elements), in the order of 75% compared to the other plant structures, highlighting that, chemically, Cissus sicyoides has greater hypoglycemic relevance when compared to Momordica charantia.

Research Implications: The implications of this investigation cover several areas, such as: pharmacy, biology, botany, biotechnology and medicine. Plants that can improve diabetes and they can be used as compounds for new medicines, highlighting the need to integrate approaches to preserving the Amazon rainforest with the production of new biotechnological products that will generate financial resources to keep the forest standing, bringing a new possibility of preserving this very important ecosystem for the entire planet.

Originality/Value: This study contributes to the literature by analyzing innovative approaches for the integration of biotechnology, preservation of the Amazon rainforest and medicine. Its value lies in the need to develop projects that break the monotony of medicine using only synthetic compounds, promoting the possibility of new medicines from medicinal plants that can truly bring improvements in the socioeconomic conditions of the Amazonians who live and live in the forest. Experiences that enable them to preserve and work with it and not just deforest.

Keywords: Diabetes, Cipó-pucá, São Caetano Melon.

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ESTUDO MORFO-ANATÔMICO-QUÍMICO DE PLANTAS MEDICINAIS *CISSUS SICYOIDES E MOMORDICA CHARANTIA*, PLANTAS AMAZÔNICAS COM EFEITO HIPOGLICEMIANTE

RESUMO

Objetivos: Este trabalho analisa morfológica, anatômica e quimicamente as espécies vegetais *Cissus sicyoides* e *Momordica charantia*.

Quadro Teórico: Estas plantas são empiricamente aplicadas pela medicina popular no tratamento de diabetes, patologia esta com grande prevalência no território nacional. Dados da OMS apontam 7,6% de prevalência de diabetes no Brasil contra 3 à 10 % nos Estados Unidos e na Europa. No Amazonas a prevalência é de 3,3%. A Diabetes mellitus é uma doença metabólica caracterizada por hiperglicemia, sendo tipo 1 ou 2. A terapia, proposta pela medicina tradicional, para o tipo 1 é feita com insulina e no tipo 2 com hipoglicemiantes orais, como sulfonilureas e biguanidas. Na medicina popular, entretanto, muitas plantas são utilizadas no controle da hiperglicemia, sendo uma mesma espécie usada por diferentes países, o que indica a alta probabilidade da eficácia medicamentosa.

Método: Avaliação macro e microscópica das estruturas das plantas. E utilização do método analítico de absorção e emissão atômica, as folhas apresentaram maiores concentrações de compostos inorgânicos (micro e macroelementos químicos).

Resultados e Discussão: A partir desses dados, esta pesquisa investigou o emprego destas espécies vegetais da biodiversidade amazônica. Observou-se, macroscopicamente, que ambas são trepadeiras e possuem gavinhas. Já microscopicamente, a *Momordica charantia* apresenta pêlos tectores e um feixe vascular centralizado, enquanto que na *Cissus sicyoides*, sua epiderme superior é constituída por células poliédricas com paredes retas e seis feixes vasculares dispersos pelo parênquima fundamental. Em contrapartida, os estômatos, nas duas, são do tipo anomocítico. Utilizando o método analítico de absorção e emissão atômica, as folhas apresentaram maiores concentrações de compostos inorgânicos (micro e macroelementos químicos), na ordem de 75% em comparação com as demais estruturas vegetais, ressaltando que, quimicamente, a *Cissus sicyoides* tem maior relevância hipoglicemiante se comparada à *Momordica charantia*.

Implicações da Pesquisa: As implicações desta investigação abrangem várias áreas, como: farmácia, biologia, botânica, biotecnologia e medicina. Pois se trabalha com plantas que podem melhorar a diabetes e as mesmas podem ser usadas como compostos para novos medicamentos, destacando a necessidade de integrar abordagens de preservação da floresta Amazônica com produção de novos produtos biotecnológicos que gerarão recurso financeiro para manter a floresta em pé, trazendo uma nova possibilidade de preservação deste tão importante ecossistema para o planeta todo.

Originalidade/Valor: Este estudo contribui para a literatura ao analisar abordagens inovadoras para a integração de biotecnologia, preservação da floresta Amazônica e medicina. O seu valor reside na necessidade de desenvolver projetos que quebrem a monotonia da medicina apenas por compostos sintéticos, promovendo possibilidades de novos medicamentos de plantas medicinais que possam realmente trazer melhora das condições sócio econômicas aos Amazônidas que residem e vivem da floresta. Experiências que os capacitem a preservar e trabalhar com ela e não apenas desmatar.

Palavras-Chave: Diabetes, Cipó-pucá, Melão São Caetano.

ESTUDIO MORFO-ANATÓMICO-QUÍMICO DE PLANTAS MEDICINALES: CISSUS SICYOIDES Y MOMORDICA CHARANTIA, PLANTAS AMAZÓNICAS CON EFECTO HIPOGLICÉMICO

ABSTRACTO

Objetivos: Este estudio analiza las características morfológicas, anatómicas y químicas de las especies vegetales Cissus sicyoides y Momordica charantia.

Marco teórico: Estas plantas son utilizadas empíricamente por la medicina popular para tratar la diabetes, una enfermedad con alta prevalencia en Brasil. Los datos de la OMS indican una prevalencia de diabetes del 7,6% en Brasil, en comparación con el 3 al 10% en Estados Unidos y Europa. En la Amazonia, la prevalencia es del 3,3%.

La diabetes mellitus es una enfermedad metabólica caracterizada por hiperglucemia, y es de tipo 1 o 2. La terapia propuesta por la medicina tradicional para el tipo 1 es la insulina, y para el tipo 2, los agentes hipoglucémicos orales, como las sulfonilureas y las biguanidas. Sin embargo, en la medicina popular, muchas plantas se utilizan para controlar la hiperglucemia, con la misma especie siendo utilizada en diferentes países, lo que indica una alta probabilidad de eficacia del fármaco.

Método: Evaluación macroscópica y microscópica de estructuras vegetales. Utilizando el método analítico de absorción y emisión atómica, las hojas presentaron mayores concentraciones de compuestos inorgánicos (micro y macro elementos químicos).

Resultados y Discusión: Con base en estos datos, esta investigación investigó el uso de estas especies vegetales de la biodiversidad amazónica. Se observó, macroscópicamente, que ambas son plantas trepadoras y tienen zarcillos. Microscópicamente, Momordica charantia presenta pelos tectoriales y un haz vascular centralizado, mientras que en Cissus sicyoides, su epidermis superior está compuesta de células poliédricas con paredes rectas y seis haces vasculares dispersos por toda la parénquima fundamental. Por el contrario, los estomas en ambos son de tipo anomocítico. Utilizando el método analítico de absorción y emisión atómica, las hojas presentaron mayores concentraciones de compuestos inorgánicos (micro y macro elementos químicos), en el orden del 75% en comparación con las otras estructuras de la planta, destacando que, químicamente, Cissus sicyoides tiene mayor relevancia hipoglicémica en comparación con Momordica charantia.

Implicaciones de la investigación: Las implicaciones de esta investigación abarcan varias áreas, tales como: farmacia, biología, botánica, biotecnología y medicina. Plantas que pueden mejorar la diabetes y que pueden ser utilizadas como compuestos para nuevos medicamentos, destacando la necesidad de integrar enfoques para preservar la selva amazónica con la producción de nuevos productos biotecnológicos que generarán recursos financieros para mantener la selva en pie, trayendo una nueva posibilidad de preservar este ecosistema tan importante para todo el planeta.

Originalidad/Valor: Este estudio contribuye a la literatura analizando enfoques innovadores para la integración de la biotecnología, la preservación de la selva amazónica y la medicina. Su valor radica en la necesidad de desarrollar proyectos que rompan la monotonía de la medicina utilizando solo compuestos sintéticos, promoviendo la posibilidad de nuevos medicamentos a partir de plantas medicinales que realmente puedan traer mejoras en las condiciones socioeconómicas de los amazónicos que viven y viven en la selva. Experiencias que les permitan conservarla y trabajar con ella y no solo deforestarla.

Palabras clave: Diabetes, Cipó- Pucá, São Caetano Melón.

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1 INTRODUCTION

The importance of the Amazon is not restricted to animal and plant species, but also to the wealth of popular knowledge about the therapeutic use of plants, which originates both from the need for alternative therapy due to the low purchasing power of the population and the difficult access to medical care, which has a great influence, especially on the indigenous peoples of the region (Di Stasi, 2002).

Medicinal plants are plants that produce products called active ingredients, which are substances that perform a pharmacological function, beneficial or harmful to living organisms

(Bustamante, 1993). Their primary, sometimes specific, use is to serve as a drug or medicine, alleviating illness or restoring lost health (Borges Neto, 2004).

The World Health Organization (WHO) demonstrated through a meta-analysis of epidemiological surveys that diabetes prevalence rates of between 3% and 10% were observed in European countries or countries with a majority of European immigrants, such as the United States, Brazil and Colombia, as well as in certain ethnic communities in poorer areas of the Pacific islands (Grimaldi, 2004), affecting approximately 7.6% of the population in Brazil, considering medical costs estimated at 9 billion dollars (SBD, 1995). In the state of Amazonas, this estimate is around 3.3% (SUSAM, 2004).

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia, (Akerele 1992, a, b). The two main types of diabetes are named 1 and 2, with the first being related to a total insulin deficiency, while the second includes cases in which there is a relative insulin deficiency or normal or even high insulin production, thus observing tissue resistance to insulin (E DM, 2003).

Conventional therapy is done with insulin, type 1, and with oral hypoglycemic agents (sulfonylureas, biguanides, etc.) in type 2 (Sacks, 1999; Rosak, 2002). However, many plants are popularly used to control hyperglycemia, such as: Melon-são- caetano, cipó- pucá, Bryonia -branca, cashew, carqueja, rye damiana, pau-ferro and pedra-ume- caá (Cruz, 1964), and the same species has been used by different countries, which indicates the high probability that traditional practitioners have found an effective remedy (Marles, 1995).

The *Cissus species sicyoides* commonly known as vegetal insulin, cipó- pucá and climbing indigo, is a climbing vine belonging to the Vitaceae family, occurs em toda América Tropicaland found in the Amazon Region (Correa, 1978). This species is popularly used in the treatment of diabetes, control of epileptic states, sudorific, hypotensive and in the treatment of heart diseases, is predominant in the forests near water courses (Viana, 2004). *Momordica charantia from the* Cucurbitaceae family, commonly called melon, washerwort, St. Caetano 's herb, St. Vincent 's herb, snake fruit, black fruit is a plant which is often small and creeping, used in the treatment of diabetes, malaria, vermifuge, purgative, antivenereal, antihelminthic, antifebrile, antiflu, colds, anemia (Revilla, 2002 b) **and in therapy as a hypoglycemic** (Abascal, 2005; Abreu, 2002; and Welihinda, 1986).

Plant products are commonly used, reaching notable percentages, around 25% in industrialized countries and 80% in developing countries (Akerele 1992, a, b). Based on these data, we intend to contribute both with morpho-anatomical and chemical information on these

two species, as well as providing additional subsidies in the area of research with experiments on hypoglycemic drugs.

2 MATERIALS AND METHODS

The plant material used to prepare the project is collected at the Federal University of Amazonas-UFAM, South sector, in the area subordinate to the Medicinal Plants laboratory of the Faculty of Agricultural Sciences.

Exsiccata was prepared in which the plant species ***Momordica charantia from the*** Vitaceae family *and* ***Cissus sicyoides of the*** Cucurbitaceae family, were respectively collected by S. Silva and TP Noronha, under number 621 and 622 in the area of the UFAM mini university campus and registered in the herbarium (HUAM), 7575 and 7576, where they are stored in the UFAM Botany Laboratory where they were cataloged by the SISTAC system.

The anatomical procedures involved dissociation of the epidermis, where the leaves were expanded and dissociated in Jeffrey's mixture, stained with Astrablau -Fuchsin (Braga, 1977), and dehydrated and mounted in glycerin (Johansen, 1940; Duarte, 2005). The histological sections were made transversally and paradermally, always from freehand.. For microscopic characterization, the sections were clarified with sodium hypochlorite and subjected to double staining with basic fuchsin and 0.1% Astra blue, mounted in glycerin (Duarte, 2003)

The analytical method aimed to demonstrate the mineral salts existing in plants, which are divided into: macrominerals, which are calcium, phosphorus, potassium, sodium, magnesium, and microminerals: iron, zinc, manganese, copper, and cobalt. The method of detecting them was through an atomic absorption spectrometric method, which is a technique used to detect and quantify a given metal in a sample (Osório, 2004). The results obtained were presented in the form of tables and graphs, and are characterized as a descriptive study.

The human body requires several nutrients to function. The essential nutrients are carbohydrates, proteins, fats and mineral salts, the latter being divided into macrominerals (Ca, P, Mg, Na, K), which are inorganic components whose daily consumption is necessary for the body in concentrations above 100 mg. And microminerals (Fe, Cu, Mn, Zn, Cr, Co), which are necessary for the body in daily concentrations below 100 mg or in μgrams (Harper, 1982). In plants, organs such as leaves and stems, for example, present these macro and microminerals.

Its functions are diverse, among which the following stand out:

- participation in osmotic mechanisms, stimulating the entry or exit of water into the cell;
- acting, when ionized, as catalysts. Ca^{++} is an ion that is important in the blood coagulation process and in muscle concentration; Mg^{+} catalyzes phosphorylation reactions and is also important in the binding of ribosome subunits. (Lee, 1999).

3 RESULTS AND DISCUSSION

The most important macro and micro minerals are: Chromium (Cr) is an essential nutrient that enhances the action of insulin and thus influences the metabolism of carbohydrates, lipids and proteins. However, the nature of the relationship between chromium and insulin function has not yet been clearly identified (WHO, 1998). It is known that Cr III is the most biologically active form and is not toxic, but in hexavalent form it can cause kidney and liver damage, being part of the glucose tolerance factor molecule, FTG-Cr, a peptide composed of chromium. FTG-Cr is what enhances the normal function of insulin. Its mechanism of action is not yet known, but it is assumed that it helps in the binding between insulin and its cellular receptors (Dutra, 1998).

Zinc is essential for living cells, performing several structural functions due to its high concentrations in the brain, retina, muscles and bones, as well as enzymatic functions where more than 300 enzymes require zinc for metabolic and regulatory activities; it acts in synapses, regulating neuronal activity and memory. It is considered a growth factor, necessary for cell division, prolactin modulation, insulin action and thymus and thyroid hormones. adrenal gland and testicles (WHO, 1998).

3.1 MORPHO-BOTANICAL CHARACTERISTICS

The Cissus species *sicyoides* is a climbing plant (figure 1) with quadrangular branches, where the roots are replaced by tendrils (Beltrame, 2001). The leaves are arranged alternately, and may or may not be present when the tendrils are attached, but they occur opposite the leaves. It has the particularity of emitting aerial roots that descend vertically. The leaves are delicate, glabrous and alternate with serrated edges (figure 2). They have an oval outline, an acuminate apex, a reentrant- auriculate base, and a wavy margin. The upper surface is bright green and the lower surface is opaque green. The blade has well-defined palmate- nerves, consisting of a central one and two on each side that emerge from the leaf base at the same

point. The surface is smooth to the touch and full of high reliefs on the underside, having an unpleasant taste. Its consistency is membranous without translucency. Its petiole has a concave-convex C-shaped contour. Its shape is straight and slightly contorted. The stem is grayish with a biconvex conformation, presenting grooves and longitudinal striations, forming a channel, where there are hairs along its entire length, however its base has thin bark (Correa, 1978).

Young fruits are greenish in terminal penicles, when ripe they are fleshy, black, brown or wine-colored with a globose black berry, containing one seed (figure 3) (Vidal, 1995)

influorescence, showy, nectariferous flowers, very small pale or greenish-yellow flowers arranged in numerous cymes or in umbellates of 40-60. (Correa, 1978).

Figure 1

Cissus sicyoides has a climbing habit.



Figure 2

Alternate leaves in Cissus sicyoides.

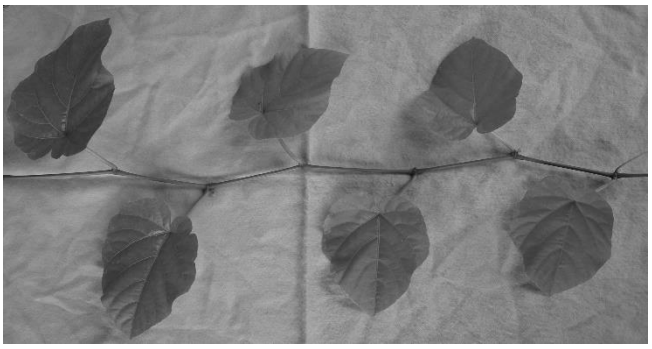


Figure 3

Cissus fruit sicyoides.



Momordica species *charantia* It is a creeping plant (figure 3), climbing and with tendrils, presenting itself as monoecious, herbaceous. Climbing. Delicate. Very branched, with a striated, thin stem covered in hairs. Quadrangular branches of membranous, suborbicular, palmatifid leaves with 5-7 sinuate-toothed lobes with ovate- ohlong lobes, narrowed at the base, toothed or lobed, simple tendril, delicate, long and pubescent (figures 11 and 12). (Revilla, 2002 a, b).

Flowers basically pale yellow or white, in clusters or corumbs: male flowers, solitary, on a peduncle as long or longer than the leaf, provided in the median portion or lower by a bract, bract reniform or orbicular cordate, mucronate, entire, calyx with lanceolate-ovate lacinia, carola lacinia obtuse or emarginate, agglutinated stamens with very flexuous anther locules and female flower long pedunculated, with bractate peduncle ; ovary fusiform, muricate, staminodes, glanduliform, short trifid style at the apex; stigmas, bifid. (Correa, 1978; Vidal, 1995)

The fruits are green when young and when ripe they are fleshy, dehiscent and golden yellow, always rounded and are edible, opening into three spiny valves with small red seeds and orange pericarp (figure 6). It is bitter, edible and has a sickening smell (Revilla, 2002 a)

Figure 4

Creeping plant (Momordica charantia).

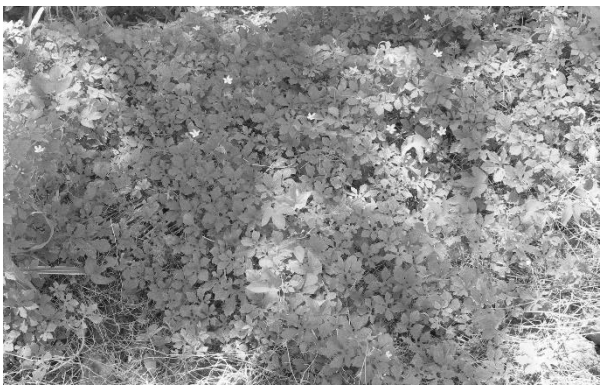


Figure 5

Sheet of Momordica charantia.

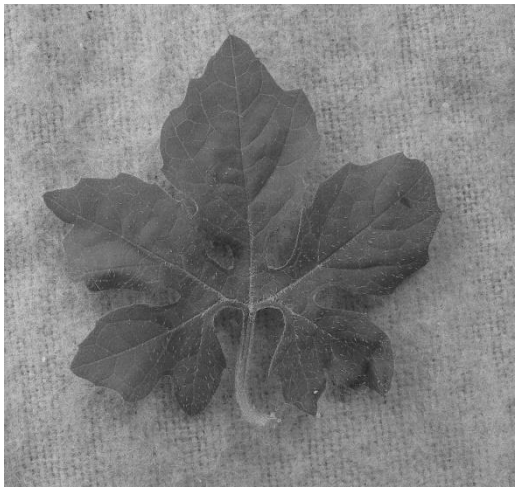


Figure 6

Momordica fruit charantia.



3.2 DETERMINATION OF MACROMINERALS

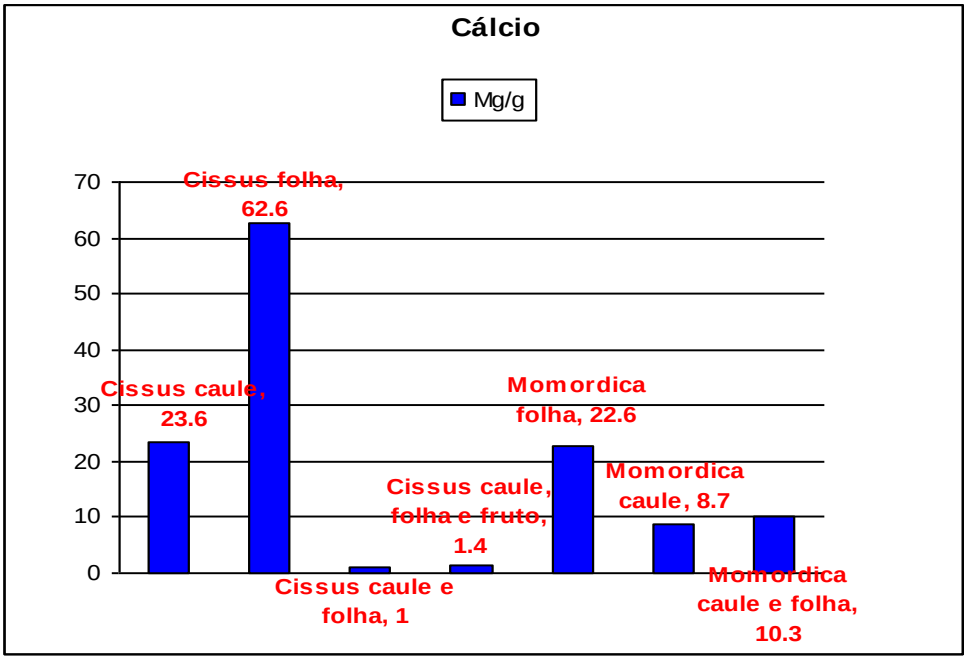
For the analysis of calcium by atomic absorption and potassium by atomic emission, the samples underwent treatment with 1% lanthanum oxide, to suppress the interfering agents, phosphorus, silica, vanadium, aluminum and zirconium, through complexation, thus promoting an increase in the sensitivity of these minerals. em estudo. EPhosphorus analyses will also be performed by calorimetry, which are the only ones for which this type of prior care is necessary.

3.3 ANALYSIS OF INORGANIC COMPONENTS

3.3.1 Macroelements (lack of P, Na, Mg, Ca and K)

Figure 7

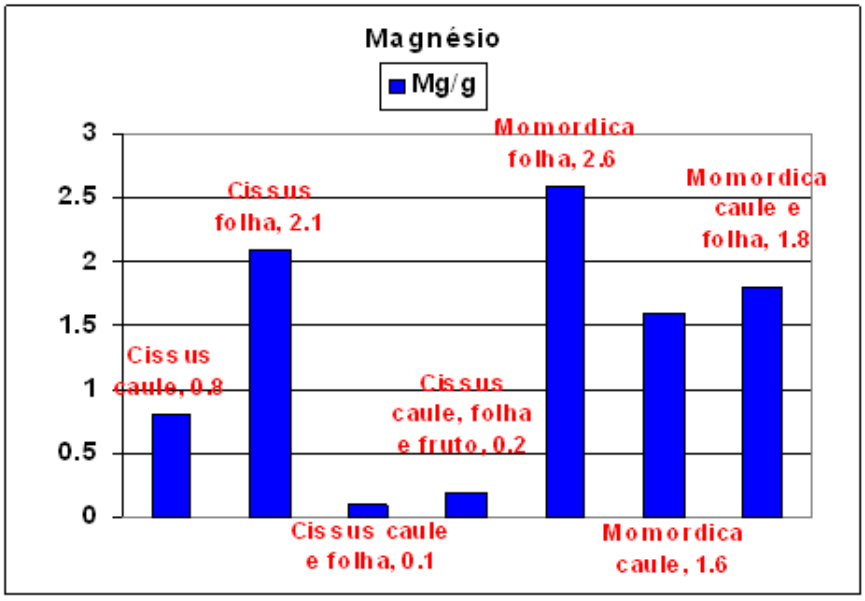
Calcium Analysis.



This figure demonstrates that the calcium levels in the leaf of the *Cissus species sicyoides* was 62.66 mg/g, while the calcium levels in the *Momordica leaf charantia* was 22.66 mg/g. we can observe that the calcium levels in the stem, fruits, etc., presented lower values. We can suggest that the calcium levels in *Cissus sicyoides* provides greater therapeutic power.

Figure 8

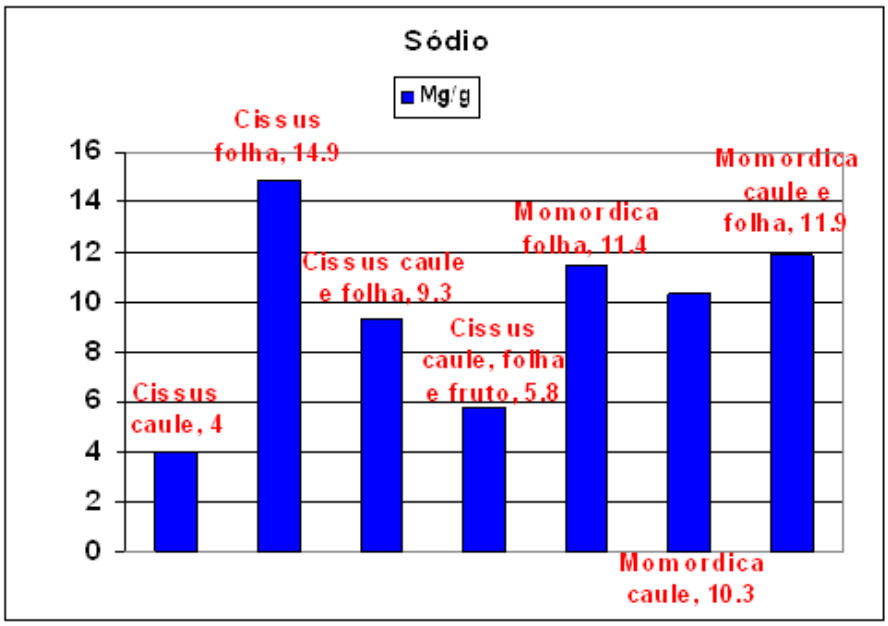
Magnesium Analysis.



Magnesium concentrations in the leaves of *Momordica species charantia* and *Cissus sicyoides* are found with levels of 2.66 and 2.16mg/g respectively, while in the stems and fruits the levels are lower. Thus demonstrating a greater presence of magnesium in the leaves of both species.

Figure 9

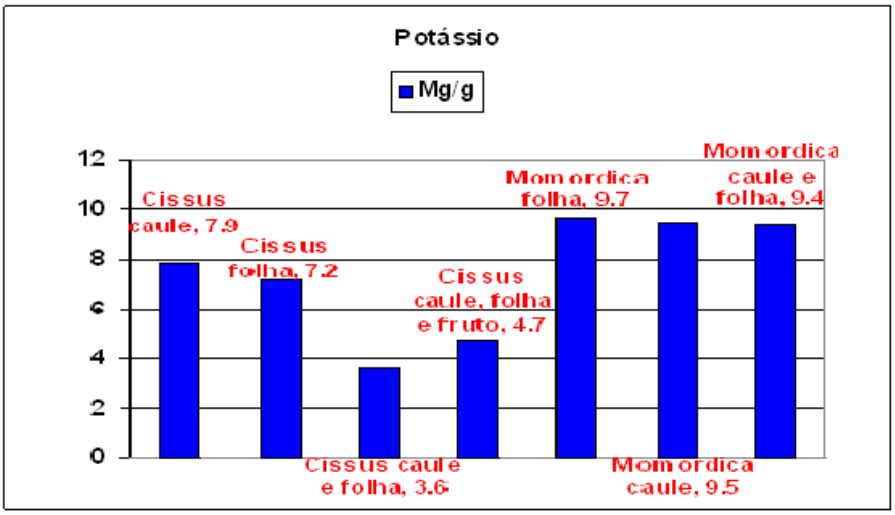
Sodium Analysis.



The *Cissus leaf sicyoides* has the highest sodium level, followed by the leaf and stem of *Momordica charantia*, which has similar results to the previous one

Figure 10

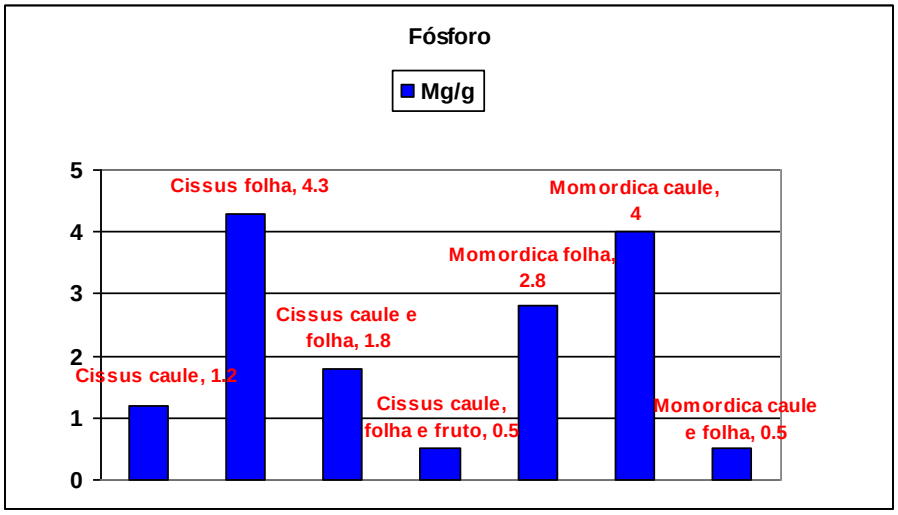
Potassium Analysis.



Potassium levels are higher in *Momordica charantia*, both in the leaf and in the stem, these indices are higher than those of *Cissus sicyoides*

Figure 11

Phosphorus Analysis.



Phosphorus shows that the *Cissus leaf sicyoides* has higher levels, when compared to all samples, only matching the stem of *Momordica charantia*

3.3.2 Microelements

The indexes related to microelements were:

Figure 12

Cobalt Analysis.

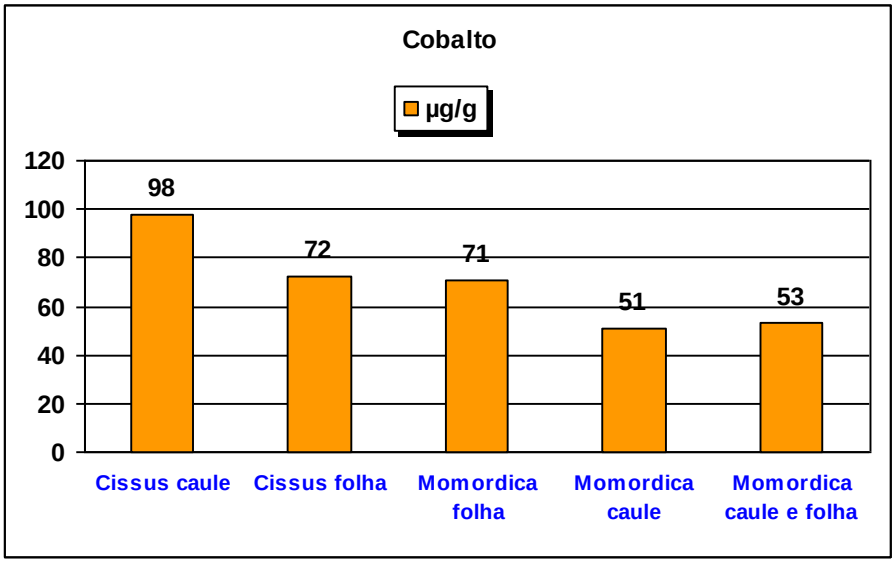
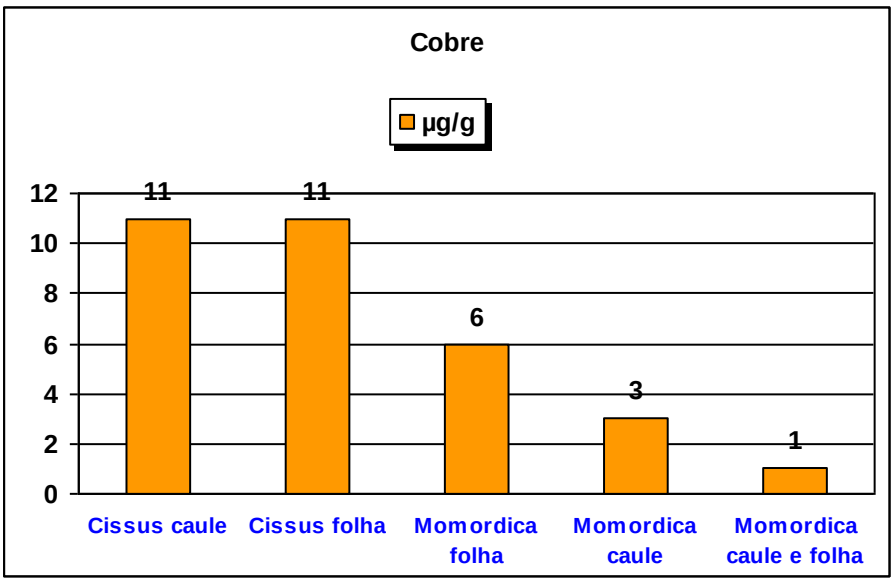


Figure 13

Copper Analysis.



The graphic organization of Cobalt and Copper (figures 12 and 13) shows a visually decreasing sequence, mainly in the graph 9, astarting from the *Cissus species. sicyoides* for *Momordica charantia.* These graphs further indicate that *Cissus sicyoides* and *Momordica*

charantia have a high concentration of cobalt, *C. sicyoides* notably in the stem (PC), while in *M. charantia* the leaf (MSC-Fo) contains the highest concentration of this microelement. Zinc, compared to cobalt, shows an apparently lower concentration in µg/g, which is higher in *C. sicyoides* both in the stem and in the leaf (PC and PF), in relation to *M. charantia* which reveals lower levels, with its leaf (MSC-FO) being the one that presents a higher concentration of copper.

Figure 14

Manganese Analysis.

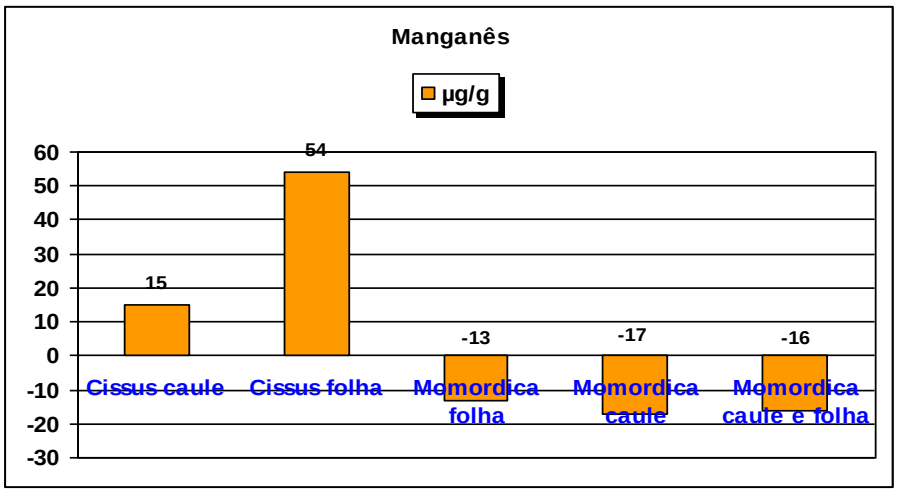
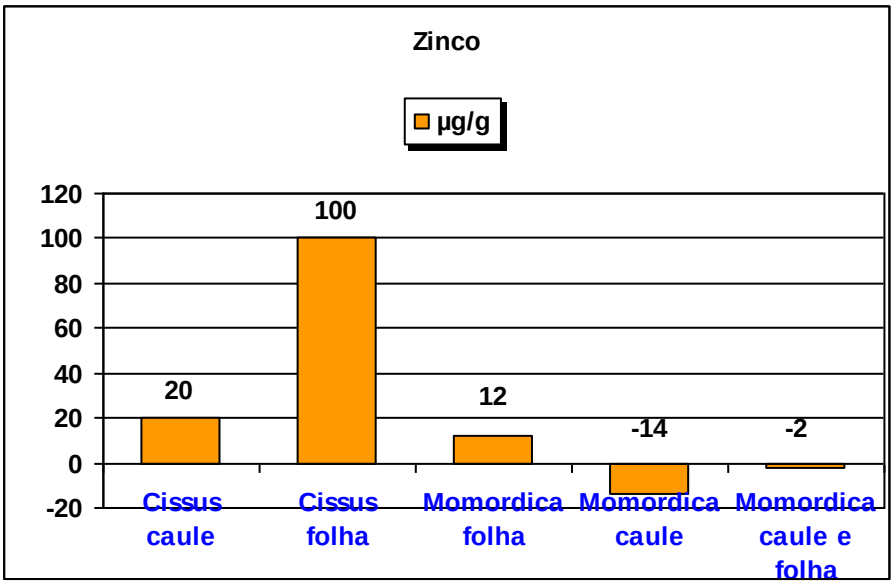


Figure 15

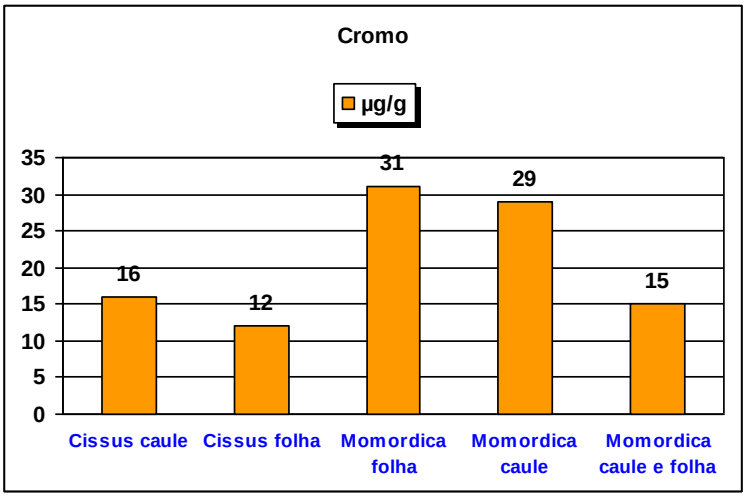
Zinc Analysis.



In the two graphs, Manganese and Zinc (figures 14 and 15), it is possible to observe the accentuated concentration of both manganese and zinc, mainly in the leaf (PF) of the *Cissus species sicyoides*. While in the species *Momordica charantia* the quantity of these microelements was significantly lower, with only the concentration of zinc in the leaf (MSC-FO) standing out, reaching around 12 µg/g.

Figure 16

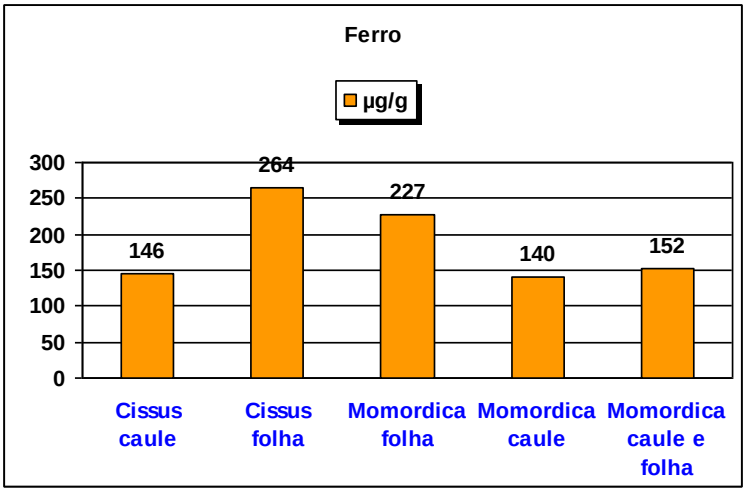
Chromium Analysis.



Chromium (figure 16) contrasts with potassium to other substances, as it is found in greater quantities in the leaves and stems of *Momordica. charantia*, proving its value, as it is precisely this microelement that helps in the connection between insulin and its receptors.

Figure 17

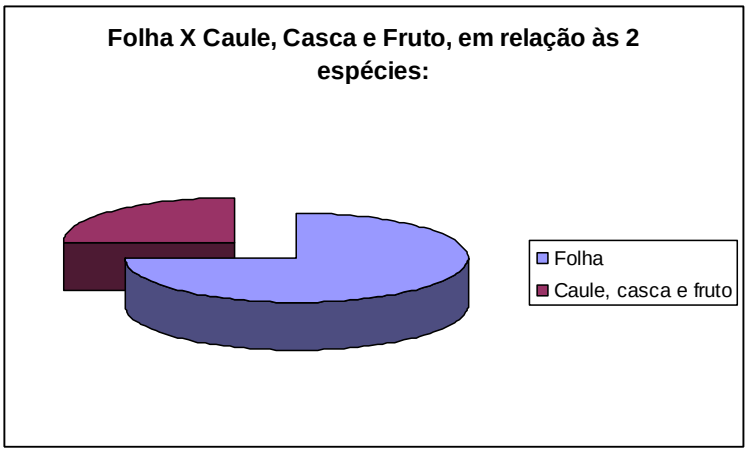
Iron Analysis.



Iron (figure 17) reaffirms the greater existence of this substance in the leaves of these two species than in other parts of these plants, with an index of 75% (figure 18) in relation to equal percentages of the plant.

Figure 18

Relationship between the concentration of trace elements leaf X stem, bark and fruit.



3.4 DETERMINATION OF MORPHOLOGICAL CHARACTERISTICS

3.4.1 Macroscopic characteristics

Both species are climbing plants, and can be creeping, where the roots are replaced by tendrils, where *Cissus sicyoides* has an oval outline, acuminate apex, reentrant- auriculate base, wavy margin. The upper surface is bright green and the lower surface is opaque green, the blade has well-defined palmate- nerves, consisting of a central one and two on each side that come out of the leaf base at the same point. While *Momordica charantia*, has membranous, suborbicular, palmatifid leaves with 5-7 sinuate-toothed lobes with ovate- ohlong lobes, narrowed at the base, toothed or lobed, simple, delicate, long, pubescent tendril.

3.4.2 Microscopic features

a) *Cissus Sicyoides* (Pucá vine)

- Anatomical description

The upper epidermis is made up of polyhedral cells with straight walls and no stomata. The lower epidermis has cells similar to those of the upper epidermis, but with a large number

of stomata located at the same level as the other cells. There are striations perpendicular to the subsidiary cells, including near the stomata (Figure 19). The stomata are surrounded by a variable number of cells that do not differ in shape and size from the other epidermal cells, and are characterized as anomocytic (Figure 20).

In cross-sectional view, the median vein has a biconvex outline, the collenchyma is located with both epidermises, and has six vascular bundles dispersed throughout the fundamental parenchyma (Figure 21). The bundles are of the collateral type, the cambium is clearly visible and the bundles are arranged in circles and separated by medullary rays. Note the presence of giant cells dispersed throughout the median region of the mesophyll.

Next to the lower epidermis, collenchyma is observed, formed by 4 layers of cells located throughout the entire length of the vein. The cells that make up the mesophyll present a small distinction between palisade parenchyma and collenchyma, corroborating Silva (1997).

Figure 19

Photomicrograph of the abaxial epidermis of Cissus sicyoides showing: stomata (yellow arrow), striations perpendicular to subsidiary cells (red arrow).

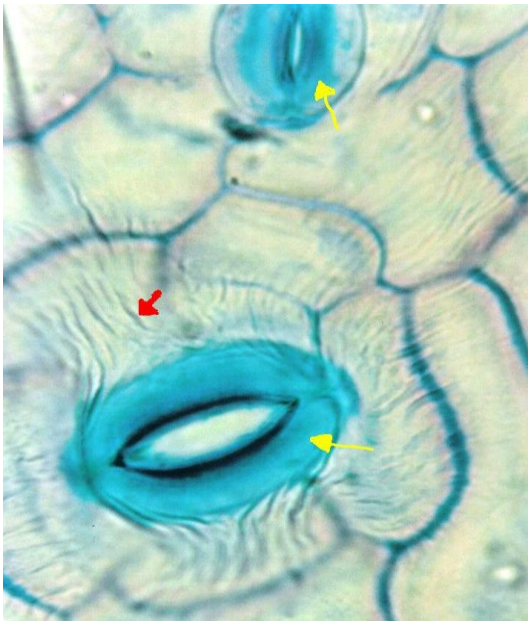


Figure 20

Photomicrograph of the abaxial epidermis of Cissus sicyoides showing: Stoma surrounded by anomocytic cells (yellow arrow).

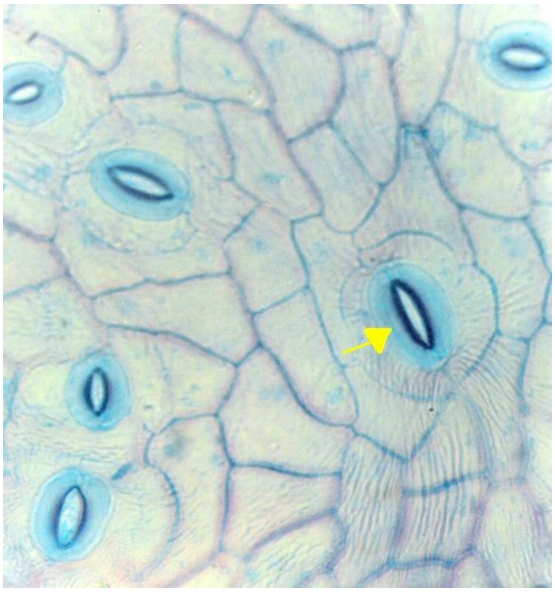
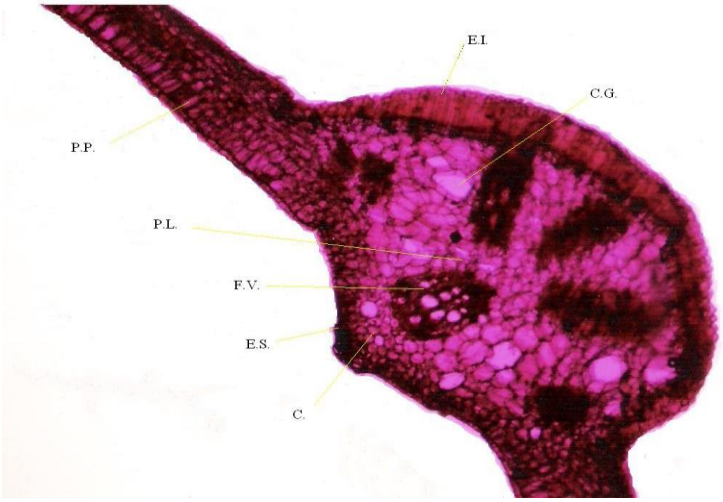


Figure 21

Photomicrograph of Cissus sicyoides in cross-sectional view, with structures described: PP palisade parenchyma, PL lacunar parenchyma, FV vascular bundle, ES upper epidermis, C. collenchyma, EI inner epidermis and CG giant cell. Momordica charantia (Berlin melon).



- Anatomical description

The cells of the abaxial and adaxial epidermis have an irregular shape, and the presence of stomata is observed in the abaxial epidermis, characterizing the hypostomatic leaf type. The stomata, according to Appezatto -da- Glória (2003), are of the anomocytic type, that is, they are surrounded by a variable number of cells that do not differ in shape and size from the other

epidermal cells (Figure 22). The presence of numerous trichomes is also noted throughout the leaf surface. tectors uniseriate and multicellular, ranging from 4 a5 cells with reinforced walls (Figure 23).

Hairs is noted. tectors. In the mesophyll region, there is no clear distinction between the tissues.

Figure 22

Photomicrograph of the abaxial epidermis of Momordica charantia showing: Stomata surrounded by anomocytic cells (yellow arrow).

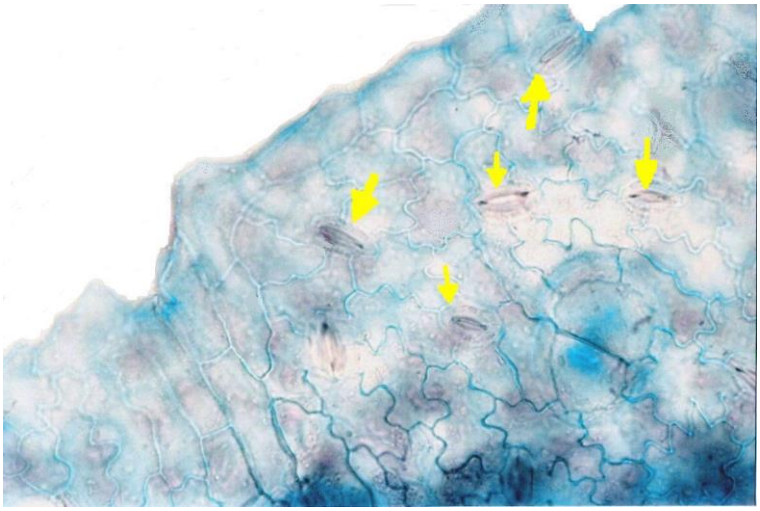


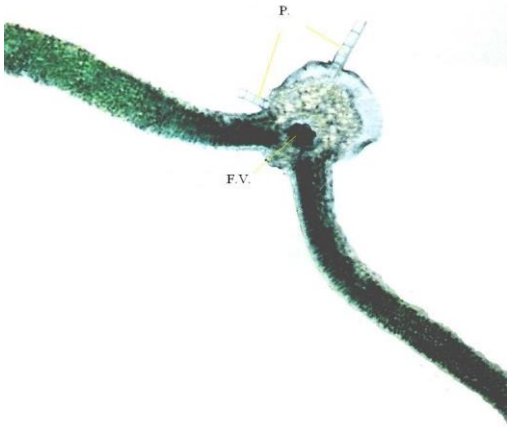
Figure 23

Photomicrograph of the abaxial epidermis of Momordica charantia showing: Trichomes Tectors or Hairs tectors, ranging from 4 a5 cells with reinforced walls (yellow arrow).



Figure 24

Photomycography of Momordica charantia in cross-sectional view with hairs tectors (P.) and only 1 centralized vascular bundle (FV).



Given the demand for and commercialization of medicinal plants, it is necessary to intensify efforts to expand botanical knowledge of potential species, especially those from the Amazon region, which are consumed and used randomly. Specific phytochemical and pharmacological investigations are essential to determine the real phytotherapeutic potential of the species.

The microscopic descriptions performed in this work are still incipient, and a more in-depth study with broader and more detailed tests for both species is necessary. It is important to highlight that the species *M. charantia*, due to the difficulty in obtaining material with the types of cuts and reagents used, did not present satisfactory results. Therefore, a more rigorous study will be necessary, testing several methodologies until obtaining the most appropriate one for this species. Silva and Akisue (1997) described the anatomical structure of the leaf and stem of *Cissus sicyoides* with the aim of contributing to the morphodiagnosis of the genus.

The investigation of the anatomical structure of plants with medicinal properties contributes to the identification of plants through the analysis of their microscopic structures.

4 CONCLUSION

The results obtained in this work allow the following partial conclusions:

- **inorganic compounds:** when examining the graphs it can be seen that 75% of the samples from both *Cissus sicyoides* like *Momordica charantia* have a greater quantity

of macro and microelements in their leaves, distinguishing Potassium and Chromium from which they are outside the statistics, not questioning their relevance, since chromium helps in the connection between insulin and its receptors, thus chemically *analyzing* Cissus *sicyoides* (cipó- pucá) has greater hypoglycemic relevance compared to *Momordica charantia*;

- **morphoanatomy:** the morphological study was carried out with the aim of identifying and cataloging the species. em questão. AsTwo species are climbing plants with tendrils, but they are very distinct species macroscopically and microscopically, *Momordica charantia* has hairs tectors, stomata surrounded by anomocytic cells and a single vascular bundle. In *Cissus sicyoides*, the upper epidermis is made up of polyhedral cells with straight walls, there are striations perpendicular to the subsidiary cells, including those close to the stomata, which are anomocytic in both species and have six vascular bundles dispersed throughout the fundamental parenchyma.

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