

STUDY OF PLANT CHARACTERISTICS OF *ASCLEPIAS CURASSAVICA* L. – APOCYNACEAE

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Background: Identification of scientific name and identification of plant characteristics include: Microsurgery and powder characteristics of stem and leaf, in order to standardize herbal *Asclepias curassavica* L.. **Materials and Methods:** Stem and leaf of *A. curassavica* L. were collected in Dakrong district, Quang Tri province in February of 2016. **Results: Powder characteristics of stem:** epidermis, parenchyma, starch grains, rectangle sclereids, fiber bundles, crystal cluster of calcium oxalate, scalariform vessels, spiral vessels and pitted vessels. **Powder characteristics of leaf:** epidermis, parenchyma, stomata, multicellular protective hairs, crystal cluster of calcium oxalate, scalariform vessels, spiral vessels and pitted vessels. **Microsurgery of stem:** Section slightly rounded. From outside to inside: epidermis, collenchyma and parenchyma with some fiber bundles. Phloem has overlap on xylem. The last part is made up of pith. **Microsurgery of leaf:** Section of leaves nerve has smooth upper nerve and protruding lower nerve. From outside to inside: upper epidermis, collenchyma, parenchyma with phloem and xylem. The last part is pith, lower epidermis bearing many protective hairs. Leaves blade is characterized by crystal cluster of calcium oxalate, stomata and spongy mesophyll. **Conclusion:** These findings contribute to the testing and identifying standards of herbal *A. curassavica* L., in order to standardize this herbal.

Keywords: *Asclepias curassavica*, Apocynaceae, microsurgery, powder characteristics.

1. INTRODUCTION

Plants are valuable resources for the research and development of new drugs. The active compounds isolated from biological pharmaceuticals used directly in medicine or semi-synthesis, synthesis of new compounds for clinical applications.

The family Apocynaceae is known for many species that possess compounds used as medicines such as reserpine derived from *Rauwolfia verticillata* (Lour) Baill. is used as antihypertensive drugs [9]. The alkaloid vinblastin and vincristine extracted from *Catharanthus roseus* (L.), are used in anti-cancer chemotherapy [12]. Leaves of *Nerium oleander* L., seeds of *Thevetia peruviana* (Pers) Schum K. and seeds of *Strophanthus* contain many glycosides are extracted for heart tonic drugs such as nerioline, thevetin, strophantin ... [3]. Also, many of their medicinal plants are used in traditional medicine, such as *Calotropis gigantea* (L.) used to treat asthma, *Alstonia scholaris* (L.) contains many alkaloids treat malaria and diarrhea; *Streptocaulon Juventas* (Lour.) are the tonic, cure fever, malaria and dairy interests ... [3].

The *Asclepias curassavica* L. wide distribution in our country with many effect in traditional medicine

such as anti-inflammation and relieve pain, nourishing blood activity, hemostasis, cardiogenic, cough relief. In addition, the roots of *A. curassavica* also cause vomit and laxity, cure gonorrhea and asthma. Specially, the trees have a cytotoxic effect [3], [4]. Besides, the study of modern medicine has proven the extracts and compounds isolated from *A. curassavica* contain many bioactive activities: heart tonic, cytotoxic, antioxidant, antiviral, antibacterial, antifungal, anti-amoeba, anti-inflammatory ... [8], [10], [11], [13]. According to the literature review showed *A. curassavica* is a potential for herbal medicinal products, especially its ability to inhibit cancer cells.

Study of characteristic plant is the first basic step. The determination of the correct scientific name of the plant is great significance and essential in starting the research and development of herbal medicines. So far, the number of announced characteristic of *A. curassavica* worldwide as well as in Vietnam is still modest. With the purpose of creating a database to precisely identify this species to avoid confusion in the process of collecting samples of medicinal plants as well as to prevent and treat some diseases, we conducted the theme: "The study of plant characteristics of *Asclepias curassavica* L.".

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2. MATERIALS AND METHODS

2.1. Materials

Species Earrings (*Asclepias curassavica* L.) - Apocynaceae, are collected in Dakrong district, Quang Tri province in February of 2016.



Figure 1. Branch bearing leaves and inflorescences

2.2. Methods

2.2.1. Method for determining the scientific name for herbal research

- Sampling all of necessary parts such as stems, leaves, flowers and fruit. Making dry specimen. Recording all information of the species studied, such as morphological description, color of flowers, fruits, distribution and habitat, condition of the plants in the wild; size, growth of natural development. Photographing habitat, environment plants, branches bearing flowers / fruit; Imaging used parts [6].

- Identify the scientific name of the plant-based study analyzed morphological features of trees, reproductive parts, compared to stored template and document sorting plant with the assistance of scientists specialized botanists [6]

2.2.2. Method for identifying plant characteristics

2.2.2.1. Powder characteristics

After collecting, medicinal herbs are washed, dried, finally ground into flour, sifted flour with the appropriate size. Next, medicinal powder is placed on slides available drops of distilled water, cover glass and leaf characteristics observed under an optical microscope. Take photos and descriptions of medicinal powder characteristics [1], [2], [7].

2.2.2.2. Microsurgery

Method as temporary template:

Fresh or dried medicinal are softened, cut with a razor blade or microsurgical instruments; choose thin slices. Then soak the slices in water Javen about 30 minutes to remove the substances in the cells. Continue washing with water several times, then wash slices with acetic acid and finally rinse with water. Dye slices with a solution of methylene blue about 15-30 seconds and quickly rinse with water. Dye slices with carmine red about 30 minutes. Washed slices after dyed with water several times. Place the slices on a drop of glycerin on glass slides, cover glass leaves. Observing, the slices under an optical microscope, photographing and recording the characteristics of microsurgery [1], [2], [7].

3. RESULTS AND DISCUSSION

3.1. Botanical descriptions and Identify the scientific name

The *A. curassavica* are herbaceous, 50-150 cm tall, branching sparse branches. Leaves opposite; leaf blade lanceolate or oblong-lanceolate, 6-8 cm long; petiole to 3-4 mm. Bracteate inflorescence, bearing 6-8 yellow flowers in the middle, reddish brown flowers around. Petals joined together at the base and droopy. Stamen forms a red column. Sub-corolla is yellow, curly lobed, attached to stamen column. Follicle arranged in pairs, 6-8 cm long. Seeds are ovate (Figure 1).

Msc. Nguyen The Cuong - Institute of Ecology and Biological Resources Vietnam Academy of Science and Technology identified the scientific name of sample is *Asclepias curassavica* L. – Apocynaceae.

3.2. Microscopic characteristics

3.2.1. Microscopic characteristics of the powder

Microscopic characteristics of the stem powder

Dark brown and light fragrance powder. Observation under a microscope showed: the epidermis piece (1) was polygonal cells or rectangular size uneven cells, ranked close together; piece of parenchyma (2) was roughly circular shaped cells, with thin walls, usually had piece of parenchyma containing starch grains (3). Single starch grain, spherical, hilum was in the middle of grain and visible to see (4). Interspersed with some rectangle sclereids (5), with thick walls, narrow cavity individually or clustered. Fibers scattered or concentrated into bundles (6). Crystal cluster of calcium oxalate (7). There were vessels such as scalariform vessels (8), spiral vessels (9), pitted vessels (10) (Figure 2).

Microscopic characteristics of the leaf powder

Dark green powder. Observation under a microscope shows: the upper epidermal piece (1) has thin walls, polygon. The lower epidermal piece (2) have slightly curved walls and stomata (3). Piece of parenchyma (4) is roughly circular shaped cells, with thin walls. Fibers scattered or concentrated into bundles (5). Protective hairs (6) have 2-4 cells. Crystal cluster of calcium oxalate (7). Additionally, there are vessels such as pitted vessels (8), spiral vessels (9), scalariform vessels (10) (Figure 3).

3.2.2. Microscopic characteristics

Microscopic characteristics of stem

Section slightly rounded. From outside to inside: the epidermis (1) contains one layer of rectangle cell arranged regularly, below the epidermis is 2-3 layer collenchyma cells (2). Parenchyma cells (3) has thin wall, slightly rounded and irregular size. Fibers (4) placed scatteredly in cortex parenchyma, thick wall and wide cavity, cell's wall still is cellulose. Phloem (5, 8) are small polygonal cells and placed scatteredly into clumps. Xylem parenchyma (6) has thin wall, rectangles and arranged close together. Xylem bundles not arranged continuously, round or polygonal xylem vessel (7). Phloem's features arranged in 2 circles surrounding xylem. Pith parenchyma (9) are round cells, irregular size and interstitial space scattered. Crystal cluster of calcium oxalate (10) are scattered cortex parenchyma and pith parenchyma (Figure 4).

Microscopic characteristics of leaf

Microscopic characteristics midrib of leaf:

- Section of leaves nerve has smooth upper

nerve and protruding lower nerve. From outside to inside: upper epidermis (1) and lower epidermis both consists of 1 layer of small cells arranged regularly. Lower epidermis contains a lot of multicellular protective hair (8), each made up of 2-4 cells. Under the epidermis is collenchyma cells (2) nearly rounded cells, irregular size, standing close together and thick wall. Parenchyma cells formed by thin-walled cells, is round and irregular size. Fiber bundles (3) are scattered in the parenchyma, thick wall, wide cavity, cell's wall still is cellulose. Crystal cluster of calcium oxalate (4) are scattered. Phloem (5, 7) with small polygonal cells are organized in 2 circles surrounding xylem (6). Xylem vessels (6) ratings steadily, contiguous ranges from 3-8 each circuit (Figure 5).

Microscopic characteristics blade of leaf:

- Upper epidermis (1) and lower epidermis (4) are rectangle cells that are arranged regularly and have thin wall. Lower epidermis has multicellular protective hairs (5) and stomata (6). Spongy tissues (3) have thin wall, shape changed and irregular size. Crystal cluster of calcium oxalate (2) are scattered (Figure 6).

In Vietnam, the species *Asclepias curassavica* grows wildly across the country. The species have effects used widely by local. However, the species have poisonous pus, be careful when using, especially orally [3]. Identifying correctly *A. curassavica* is very important, preventing poisons or other undesirable effects. In this study, the morphological characteristics of the plant *A. curassavica* collected in Dakrong District - Quang Tri Province were observed, analyzed and compared to the characteristics described in the classification of plant material to identify the scientific name.

People use different methods to identify and control herbal: sensory perception (based on morphological characteristics seen with the naked eye), using a microscope (based on the characteristics of observation study be under the microscope), chemical methods (the chemical reaction or chromatographic methods or modern classic combination as thin layer chromatography, column chromatography, gas chromatography, high-performance liquid chromatography etc ...). In there, identify herbal with microscopy method is the method still widely used cause its simplicity and effectiveness.

The study has identified the typical characteristics of the species *A. curassavica* such as: Microsurgery

has found that fiber bundles concentrate into group with thick wall, scatter between soft tissues and cell's wall is cellulose; crystal cluster of calcium oxalate; phloem - xylem bundles arranged archedly between midrib of leaf, characterized by phloem surrounding the pith. Powder of herbal stems and leaves both have crystal cluster of calcium oxalate. In addition, powder of stem contains more starch grain nearly round shape, hilum is in the middle of grain and single grain. The typical characteristics of many species in the family Apocynaceae such as 2 circles phloem surrounding xylem or crystal cluster of calcium oxalate scattered into the soft tissues are

found in species studied [5].

4. CONCLUSION

The microsurgery characteristics of the species *A. curassavica* including features powder and microsurgery characteristics of stem and leaf have also been described in detail. This is the first report on the phytotomy of the plant *A. curassavica*. This result is useful database for identification and standardization of *A. curassavica*.

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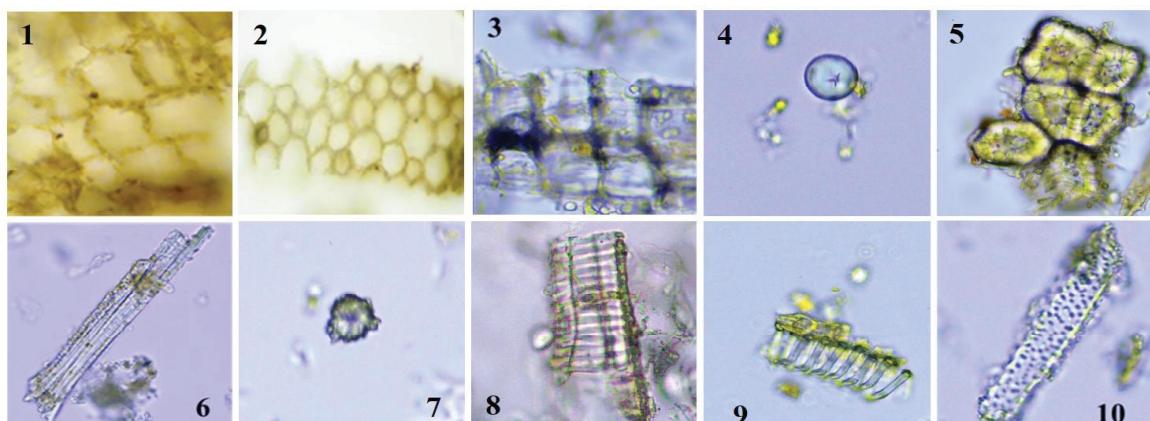


Figure 2. Powder microscopic details characteristics of *A. curassavica*'s stem

Note

- | | | |
|---|------------------------|---------------------------------------|
| 1. Pieces of epidermis | 4. Starch grain | 7. Crystal cluster of calcium oxalate |
| 2. Piece of parenchyma | 5. Rectangle sclereids | 8. Scalariform vessels |
| 3. Piece of parenchyma containing starch grains | 6. Fiber bundles | 9. Spiral vessels |
| | | 10. Pitted vessels |

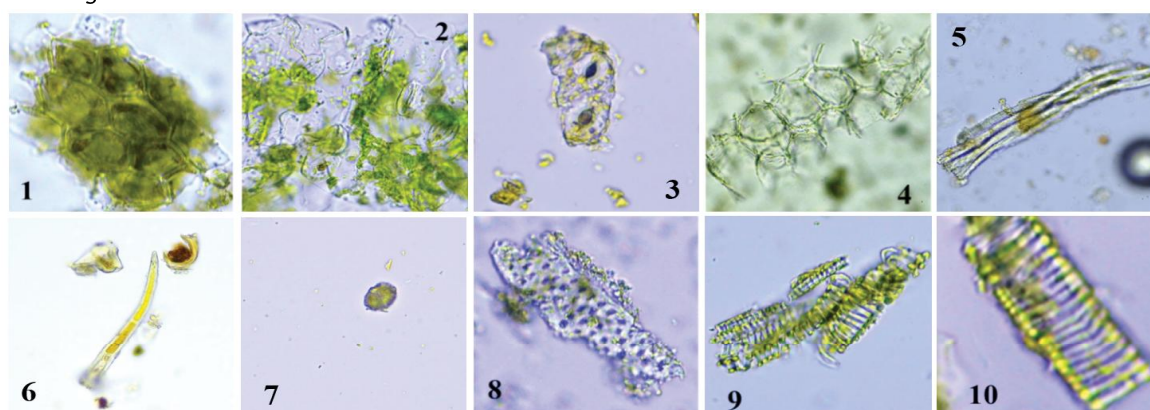


Figure 3. Powder microscopic details characteristics of *A. curassavica*'s leaf

Note:

- | | | |
|----------------------------------|-----------------------------------|---------------------------------------|
| 1. The upper epidermal piece | 4. Piece of parenchyma | 7. Crystal cluster of calcium oxalate |
| 2. Lower epidermis bring stomata | 5. Fiber bundles | 8. Pitted vessels |
| 3. Stomata | 6. Multicellular protective hairs | 9. Spiral vessels |
| | | 10. Scalariform vessels |

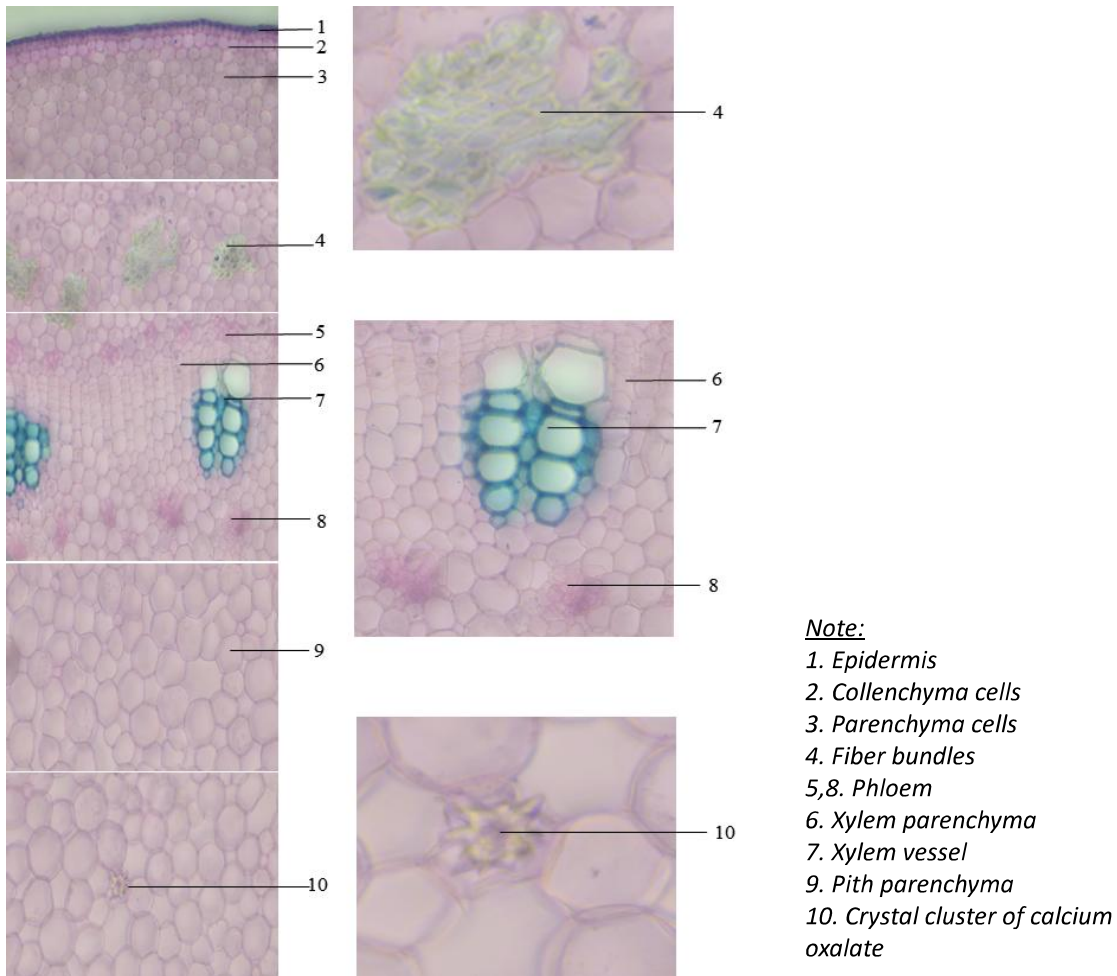


Figure 4. Microscopic characteristics of *A. curassavica*'s stem

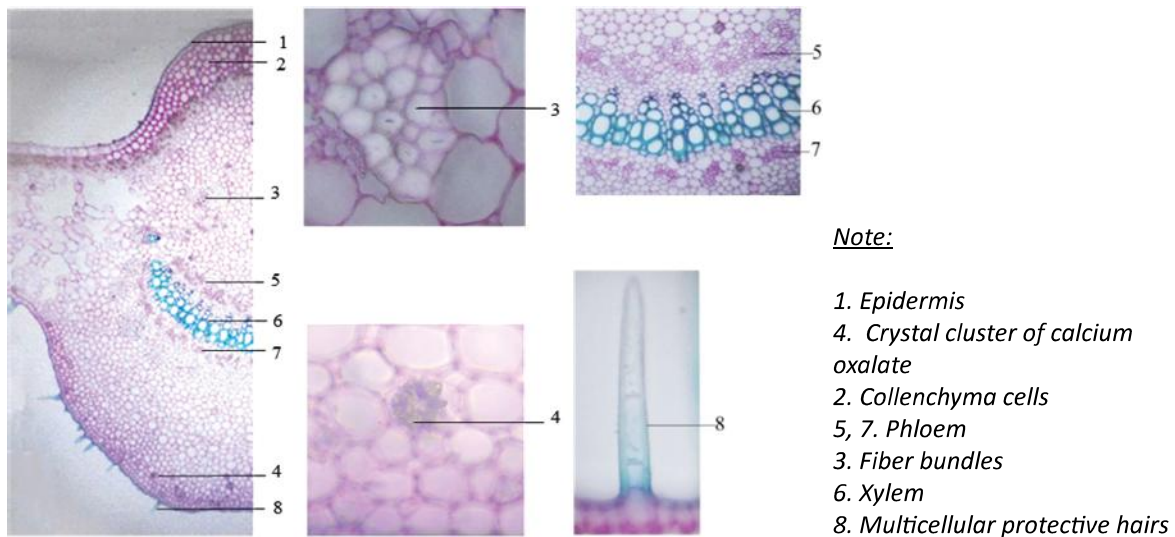


Figure 5. Microscopic characteristics midrib of *A. curassavica*'s leaf

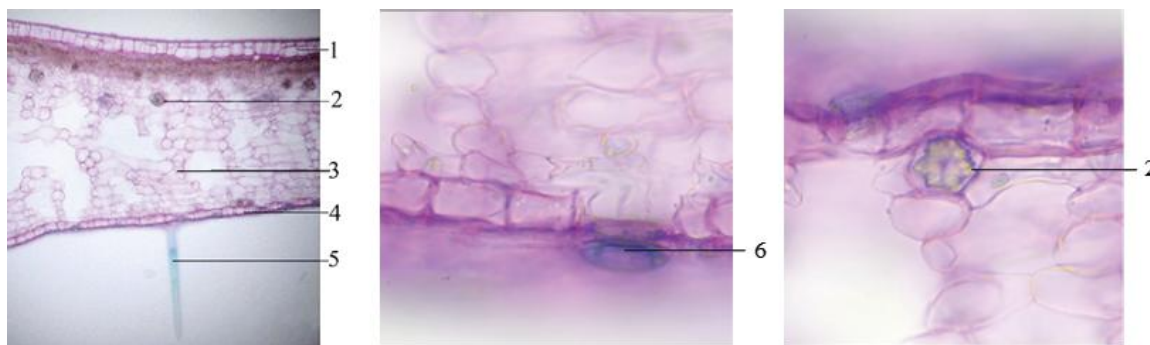


Figure 6. Microscopic characteristics blade of *A. curassavica*'s leaf

Note:

- | | |
|-----------------------------------|---------------------------------------|
| 1. Upper epidermis | 2. Crystal cluster of calcium oxalate |
| 3. Spongy mesophyll | 4. Lower epidermis |
| 5. Multicellular protective hairs | 6. Stomata |

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