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ETUDE MONOGRAPHIQUE, PHYTOCHIMIQUE ET MICROGRAPHIQUE DE TROIS PLANTES MEDICINALES DE LA FAMILLE DES FABACEAE

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ABSTRACT: Medicinal plants play a vital role in addressing health problems, particularly in Africa, where they often constitute the primary therapeutic resource. Encouraged by the WHO, which recommends their integration into health systems, their use nevertheless requires rigorous control based on identification. In Côte d'Ivoire, among the most widely used botanical families are the Fabaceae, renowned for the diversity of their species with pharmacological properties. This study presents, a micrographic and chemical analysis of three plants from this family: *Abrus precatorius*, *Bafia nitida*, and *Desmodium adscendens.* The analyses performed included micrographic examination of leaf powders, phytochemical screening of hydroethanolic extracts, using thin-layer chromatography, and chemical analysis by HPLC-ESI(+)-Q/TOF. Microscopic analysis allowed us to identify the characteristic elements. Chemical analysis revealed the presence of several groups of secondary metabolites (alkaloids, flavonoids, quinones, tannins, sterols, terpenes, and polyphenols), confirming the potential of these plants as sources of bioactive molecules and highlighting the importance of their valorization and integration into healthcare systems.

INTRODUCTION: Medicinal plants constitute an invaluable asset to the world's flora. They are used in numerous fields, particularly in health, and for centuries, humans have used them for healing. According to studies conducted by Newmann, two out of three medications have a natural origin.

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These are produced by semi-synthesis from a pharmacological model or by modifying a natural product, that is, compounds derived from biotechnology, compounds of plant, microbiological, or animal origin (Newmann, 2007) [1].

Natural substances, and plants in particular, represent an immense source of chemodiversity, often with highly original structures for which total and cost-effective synthesis (structural complexity, stereospecificity, etc.) is often impossible. Furthermore, of the hundreds of thousands of

identified plant species, only about 15% have been studied chemically and 6% for their biological activities (Verpoorte, 2002) [2]. Plants thus constitute a largely unexplored reservoir of bioactive molecules. Indeed, in recent decades, several plant-based products have garnered significant interest in the scientific community due to the biological properties of their chemical compounds (Saidi, 2019) [3]. However, the development of new drugs requires a thorough understanding of the plant raw materials used in order to detect any contamination, adulteration, or falsification. The lack of safety data on plants hinders the development of our pharmacopoeia. It is difficult to demonstrate the true potential of these plants, which have nevertheless proven their worth in traditional medicine. Therefore, the development of the pharmacopoeia depends on accurate plant identification and characterization (Moretti, 1998) [4]. Despite the enthusiasm for the industrial application of traditional knowledge, there is a lack of sufficient documentation to guarantee the safe use of the resulting products. This study is part of an effort to address the gap in scientific data on the plant families that provide many plants used in traditional Ivorian medicine, particularly the Fabaceae family. It is essential to provide factual identification elements that guarantee safe use. Our work, whose overall objective was to study plant species belonging to the Fabaceae family, contributes to the development of Ivorian traditional medicine. Specifically, it aims to describe the phytochemical composition and micrographic characteristics of the leaves of three species from the Fabaceae family, regularly used in traditional Ivorian medicine and listed in the Ivorian Pharmacopoeia: *Abrus precatorius*, *Baphia nitida*, and *Desmodium adscendens*.

MATERIAL AND METHODS:

Study Site: This study took place at the FELIX HOUPHOUËT-BOIGNY University, at the Training and Research Unit of Pharmaceutical and Biological Sciences (UFR SPB) in Abidjan, more specifically at the Pedagogical Unit 1: Pharmacognosy, Botany, Plant Biology and Cryptogamy of the Department of Pharmaceutical Sciences.

Material: The material consisted of plant material, technical equipment, solvents and reagents.

Vegetal Materiel: The plant material consisted of aerial parts (leaves) from eight plants, five from the Euphorbiaceae family and three from the Fabaceae family. The samples were collected between May and June 2021 at two sites in Côte d'Ivoire: the Grand Yapo forest (Agboville) and the National Floristic Center (CNF) of the Félix Houphouët-Boigny University in Cocody (Abidjan). The botanical identification and authentication of these plants were carried out by a taxonomist from the National Herbarium of the Félix Houphouët-Boigny University. Supporting specimens and identification numbers were deposited in the same Herbarium **Table 1.**

The main parts of the plant were the leaves, which, after harvesting, were cleared of foreign matter (branches, dead leaves, various debris) and then carefully washed and dried at the Pharmacognosy, Botany, and Cryptogamy Laboratory of the Faculty of Pharmaceutical and Biological Sciences (Félix Houphouët-Boigny University (UFHB) in Abidjan) at a temperature of 20°C for four weeks. They were then ground using a mechanical grinder (RESCHT GM 300) to obtain powders for phytochemical analysis and micrography.

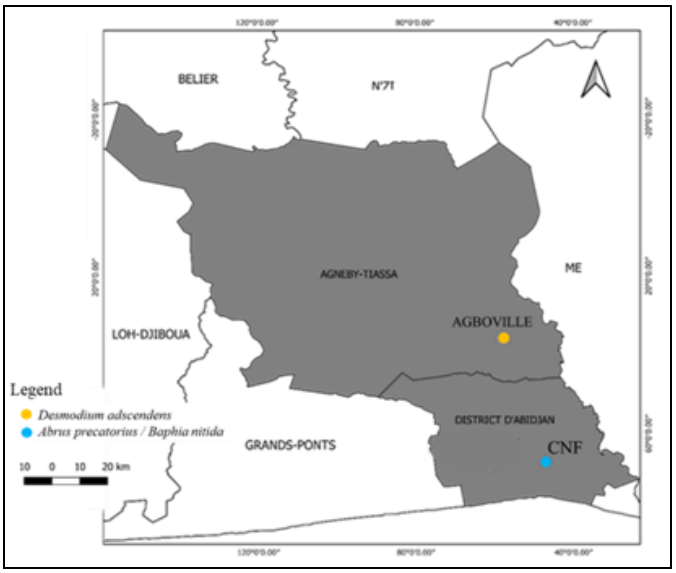


FIG. 1: LOCATION OF HARVEST AREAS

TABLE 1: LIST OF PLANTS COLLECTED, HERBARIUM NUMBERS, AND COLLECTION LOCATIONS

Nom scientifique	Famille	Organe	N° id	N° herbier	Lieu de récolte	Géolocalisation
Abrus precatorius L.	Fabaceae	Feuille	Ap_{21}	UCJ009870	CNF	5.346341-3983340

Baphia nitida G.Lodd.	Fabaceae	Feuille	Bn_{20}	UCJ009987	CNF	5.346341-3983340
Grona adscendens (Sw.) H.Ohashi & K.Ohashi (ex. *Desmodium adscendens*)	Fabaceae	Feuille	Da_3	UCJ010247	Agboville	5.701038,-4.104699

Technical Equipment: The technical equipment consisted of apparatus, glassware, and small tools.

The apparatus included a mechanical grinder (RESCHT GM 300), used to pulverize the dried plants; a precision balance (KINLEE EK03) used for weighing; an optical microscope coupled to a tablet (Optika Italy version like 2.1) used for micrographs; a sand bath (LHG) and a water bath (MEMMERT) used for chemical tests; and a refrigerator (Liebeherr premium, France) used to store the liquid extracts. In addition, silica gel plates on aluminum supports (Silica gel 60 F254, 0.2 mm thick) were used for thin-layer chromatography (TLC), and a UV lamp (254 and 366 nm) was used for reading the plates.

The glassware included a chromatography tank for TLC and a separatory funnel for liquid-liquid extractions.

The small equipment included paper envelopes for storing ground plant material, filter paper, cotton, microscope slides, coverslips, forceps, porcelain stoppers, test tubes, capillary tubes, and Erlenmeyer flasks. A high-resolution ESI-Q/ToF mass spectrometer coupled to an ultra-high-performance chromatography (UHPLC-UV-DAD) system was used for spectral analyses. A C_{18} Sunfire® Waters 3.6 µm, 4.6 mm x 150 mm column, equipped with a pre-column, was used for chromatographic separation.

Solvents and Reagents:

Solvents: They consisted of distilled water, 60° alcohol, hydrochloric alcohol, acetic anhydride, hydro-ethanolic solution (v/v: 30/70), dichloromethane, sulfuric acid, hydrochloric acid, chloroform, half-diluted ammonia, formic acid, acetonitrile and sodium acetate.

Reagents: They consisted of 5% diluted potassium hydroxide (KOH), used for micrography, sodium acetate, 1/2 diluted ammonia, Libermann's reagent, magnesium shavings, 2% iron chloride, and Stiasny, Bouchardat, and Dragendorff reagents. These reagents were used for phytochemical characterization in tubes and on TLC plates.

Methods:

Monographic Description of Plants: A brief monographic description based on the bibliography was made for each of the plants, in order to describe the macroscopic elements for identification.

Extraction of Secondary Metabolites: Hydro-Ethanolic Maceration: Ten (10) grams of each powder were macerated in a solvent mixture consisting of 70 ml of 96% ethanol and 30 ml of distilled water. The mixture was stirred and then left to stand for 48 hours. The resulting extracts were filtered, placed in test tubes, and hermetically sealed.

Thin-Layer Chromatography (TLC): Thin-layer chromatography (TLC) is a method for separating the components of a mixture to be analyzed by their differential migration along a separating device. This device consists of two phases: a stationary or fixed phase, which is granular, and a mobile or liquid phase, which is volatile, in which the stationary phase granules are immersed. This technique allows the components of the mixture to be separated based on their affinity for the mobile phase and their adsorption capacity onto the stationary phase.

The chromatography tank is prepared beforehand by pouring the solvent system (mobile phase: a mixture of dichloromethane, ethyl acetate, and methanol (6/3/1)) into it to a height of 1 cm from the bottom, then hermetically sealed so that it is saturated with eluent vapors.

The chromatography plate (stationary phase) is also prepared by drawing a starting line 1 cm from the bottom edge and a front line 1 cm from the top edge. The extracts under study are applied to the loading line and then dried.

Once ready, the plate is placed in the tank, in contact with the mobile phase, which rises by capillary action along the plate to the elution front, carrying the constituents with it according to their affinity for the stationary and mobile phases (Bess and Baccini, 2011) [5].

At the end of the elution, the plate is air-dried, and the constituents are characterized by their retention factor (Rf: ratio of the distance traveled by the compound to that traveled by the solvent).

The chromatograms are then examined in the visible spectrum and under UV lamps at 254 nm and 366 nm, revealing the organic compounds (alkaloids, flavonoids, polyphenols, and sterols) using the reagents listed in **Table 2.**

TABLE 2: DETECTION REAGENTS USED FOR ORGANIC COMPOUNDS

Revelation reagents	Compounds revealed
Dragendorff	Alkaloids
Potassiumhydroxyde	Flavonoids (Anthraquinones)
Ferric chloride	Polyphenols
Sulfuric vanillin	Sterols

Chemical Screening by Test Tube Reactions: Chemical tests in test tubes were performed on the hydroethanolic extracts of the plant powders to determine the nature of the chemical constituents present. These analyses were based on colorimetric and precipitation reactions.

The qualitative chemical composition was determined using standard methods (Danielle and Odile, 2007) [6]. The chemical groups sought were: alkaloids, quinonic substances, flavonoids, polyphenols, tannins, and sterols.

Sterol and Polyterpene Analysis: For this analysis, the Libermann reaction was performed. Ten mL of each fluid extract was evaporated to dryness in a porcelain capsule. Each residue was dissolved in 0.5 mL of aceticanhydride, then in 0.5 mL of chloroform. The resulting solutions were then transferred to test tubes where 1 to 2 mL of concentrated sulfuric acid was carefully added to the surface of the preparation, causing the formation of a reddish-brown or purple ring at the interface between the two liquids. The upper liquid turned gray, blue-green, or purple in the presence of sterols or polyterpenes.

Polyphenol Analysis: The dry extracts obtained by evaporation from the hydro-ethanolic extracts were dissolved in distilled water and then filtered. To 2 mL of each solution, a drop of 2% ferric chloride alcoholic solution was added. In the presence of polyphenolic derivatives, this causes a bluish-black or greenish-green coloration of varying shades.

Detection of Quinone Substances: Each of the fluid extracts was evaporated to dryness (2 mL per extract) in a porcelain capsule. The resulting residues were each triturated in 5 mL of 1/5 hydrochloric acid. The resulting solutions were transferred to test tubes and placed in a boiling water bath for half an hour. After cooling, the hydrolysates were extracted with 20 mL of chloroform each. The different chloroform phases were collected in test tubes, and 0.5 mL of 1/2 ammonia was added to each. The appearance of a color ranging from red to violet indicated the presence of quinones.

Flavonoid Detection: Flavonoids were detected using the cyanidin reaction. Two mL of hydrochloric alcohol and a few magnesium shavings were added to 2 mL of fluid extracts. The development of a pink, then red, color indicated the presence of flavonoids.

Tannin Detection: This was performed using Stiasny's reagent. For this test, 4 mL of Stiasny's reagent were added to 8 mL of filtrates from each plant. After boiling in a water bath for 30 minutes, the presence of condensed (catechin) tannins was indicated by the formation of precipitates. The solution was then filtered to collect the supernatant, 1 mL of which was saturated with sodium acetate. The addition of a few drops of 2% ferric chloride (FeCl3) solution, in the presence of hydrolyzable (gallic) tannins, resulted in a blue-black color.

Alkaloid Detection: Each extract was evaporated to dryness in a 6 mL capsule. The residues were then reconstituted with 6 mL of 60% alcohol. The resulting alcoholic solutions for each extract were divided into two test tubes, one for each extract. In the first tube, two drops of Dragendorff's reagent (potassium iodobismuthate reagent) were added. The formation of a precipitate or an orange color indicates the presence of alkaloids. In the second tube, two drops of Bouchardat's reagent were added. The formation of a precipitate or a reddish-brown color indicates a positive reaction to the presence of alkaloids.

Chromatographic Imprints: The chromatographic fingerprints consisted of the TLC chromatographic profile on the one hand, and the LC and MS chromatograms and spectra on the

other, obtained by UHPLC-UV-DAD-MS/MS spectral analyses (ESI-Q/ToF) performed in positive mode, from m/z 100 to 1200 in auto MS/MS mode. Chromatographic separation was performed in reversed phase on octadecyl-sylyl silica, using a Waters Sunfire® C18 column equipped with a corresponding pre-column. The separation conditions consisted of a H_2O + 0.1% AF/acetonitrile (ACN) gradient, with the ACN proportion increasing from 5 to 100% over 8 minutes. The flow rate was 0.250 mL/min. The sample concentration was 10 mg/mL; the injection volume was 2 µL. MS/MS conditions: collision energy: 30, 50, 70 eV, with spectral averaging. Fragmentation was performed using the Top 3 method (fragmentation of the 3 most intense ions in MS). The exclusion time was 120 ms.

Etude Micrographique: Micrography, by definition, involves analyzing the morphological structures of a drug's powder at the microscopic level (leaf, flower, fruit, stem, etc.). This assessment of microscopic structures allows for the identification of each plant species, as each possesses a specific combination of morphological characteristics (although epidermal variations within plants of the same species can be observed). According to Dunn and Sharma, it is primarily the frequencies of the "observed organs" that are modified under certain extreme climatic conditions. However, these differences are rare. They still require several observations of each plant of the same species in order to retain only the recurring characteristics. In any case, intraspecific differences are much less significant than interspecific differences (Dunn, 1969)[7]. A pinch of the plant's dry powder is taken and sprinkled onto a drop of 10% KOH previously placed on a microscope slide, which is then covered with a coverslip. The preparation is observed under an optical microscope at magnifications of 10x and 40x. The various characteristic elements observed are photographed and identified.

RESULTS AND DISCUSSION:

Monographic Description of Plants:

Family of Thefabaceae:

Botanical description of the Fabaceae: According to APG IV (Byng, 2016) [8], this family is classified as follows: Phylum: Spermatophytes; Subphylum: Angiosperms; Class: Eudicots; Subclass: Rosideae; Order: Eurosidae I (or Fabidae); Suborder: Fabales. Plants in this family are generally herbaceous plants, shrubs, trees, or climbing plants with twining vines or tendrils. They are characterized by high nitrogen metabolism and contain non-proteinogenic amino acids. Some of these plants often have root nodules containing nitrogen-fixing bacteria (Rhizobium) (Spichiger, 2002) [9].

In many cases, they contain alkaloids, and sometimes cyanogenic compounds. The leaves are alternate, pinnately compound to palmately compound, trifoliate, or unifoliate, entire and sometimes toothed, with leaflets occasionally transformed in to tendrils. The inflorescences are reduced to a solitary flower, terminal or axillary. The flowers, generally hermaphroditic, have five sepals, free or fused, valvate or imbricate, with a posterior petal that differs in shape, size, and color. The fruit may be a pod, samara, achene, drupe, or berry (Spichiger, 2002) [9].

The family has a nearly cosmopolitan distribution and is found in tropical, subtropical, and temperate zones. It is of major nutritional importance, being the second most important food family after the Poaceae, providing carbohydrates and proteins.

In industry, the Fabaceae are used to produce edible oils, and their fibers and wood are used as fuel. Several species are cultivated as ornamental species in gardens and as shade trees.

Abrus precatorius L.:

Synonyms: *Abrus minor* Desv., *Abrus squamulosus* E. Mey., *Zaga latifolia* Raf. (The Plant List) [10].

Vernacular Names: In Côte d'Ivoire, it is called "alobogna" (Baoulé); "klékwé" (Bété); "bahbun" (Attié); "damava" (Abouré); "kuodjé" (Wobé); and "meninyo" (Guéré) (Raphaël, 2012) [11].

Habitat: The plant is common in scrubland along the coast, from Saint-Louis to Portuguese Guinea. In Côte d'Ivoire, it is found scattered in river valleys, gallery forests, and dry or humid forests (Raphaël, 2012) [11].

FIG. 2: *ABRUS PRECATORIUS* (FABACEAE)

Botanical Description: *A. precatorius* is a paired, perennial, woody plant, 3 to 4 m tall, with slender, hairless branches that are woody at the base and twine around the shrubs. The leaves are alternate, paripinnate, with 7 to 10 pairs of finely pubescent, oblong leaflets, 10 mm by 6 mm, rounded or obtuse at the apex and base. The inflorescences consist of short, pedunculate, axillary racemes of pink flowers, with deciduous bracts at the base of the calyx. The fruits are tomentose pods, 3 cm by 1 cm, containing 5 to 6 bright red, ovoid seeds with a black spot at the base (Raphaël, 2012) [11].

Traditional Uses: The plant's leaves are used to treat fever, coughs, colds, and stomach aches. They are also traditionally used to treat tetanus, prevent rabies, and treat scratches and wounds (Attal, 2010) [12].

The roots are used to treat jaundice. A root paste is used to treat abdominal pain. The root is chewed as a remedy for snakebites. An aqueous extract of the fresh root is an antimalarial and an anticonvulsant. A decoction of the dried root is used to treat bronchitis and hepatitis. A paste of leaves and seeds is applied to graying hair. The dried seeds are used against intestinal worms (Attal, 2010) [12].

***Baphia nitida* G.Lodd.:**

Synonymes: *Baphia pyrifolia* (Desv.) Baill., *Delaria pyrifolia* Desv., *Podalyria haematoxylon* Thonn. (The plant list) [10].

Noms Vernaculaires: InCôte d'Ivoire, the plant is called''goeyéboho'' (guéré), ''Kpokpo wa or Schimagnrin'' (baoulé), ''okwe'' (abbey), ''Ghoeuzoehi· guéibouo'' (bété) (Adjanohoun, 1979) [13].

Habitat: The species is widespread in tropical regions. It thrives in all soil types, particularly in areas with high rainfall (250 mm to 2000 mm per year) (Adjanohoun, 1979). In Côte d'Ivoire, it is most often found in forested areas, specifically secondary forests (Adjanohoun, 1979) [13].

Botanical Description: An upright, fast-growing shrub with multiple stems, averaging 9 m in height. The leaves are alternate, simple, and entire, measuring 10 to 15 cm long. The petiole is 4 cm long, strongly thickened at the base and apex. The leaf blade is oval to elliptical, with a rounded base. The flowers are axillary and bisexual. They are 1 to 2 cm in diameter and white with a yellow center. The fruits are straight pods, 10 to 15 cm long and 12 to 16 mm wide, compressed, pointed at both ends, containing 2 to 4 flat, brown seeds (Adjanohoun, 1979) [13].

Traditional uses: White when fresh, the wood of Baphia nitida is very hard but turns redwhen immersed in water and is quite often used as a dye (Adjanohoun, 1979) [13].

The leaves are used in the form of a decoction to treat asthma and respiratory ailments (Adjanohoun, 1979) [13]. They are also used in the treatment of joint pain and inflammation, as well as skin conditions (Chong, 2009) [14].

FIG. 3 : *BAPHIA NITIDA* (FABACEAE)

***Grona adscendens* (Sw.) H.Ohashi & K.Ohashi (ex *Desmodium adscendens*):**

Synonyms: *Desmodium adscendens* (Sw.) DC., *Meibomia thwaitesii* (Baker) Kuntze, *Hedysarum adscendens* Sw. (The plant list) [10].

Vernacular Names: In Ivory Coast, the plant is called "blinblinoto or blougate" (Baoulé); "toutia or siakon" (Dioula); ''oun-mé-pouan'' (Attié); "néné" or "djié" (Guéré); "torogobebe or binbin" (Gouro) (Raphaël, 2012) [11].

Habitat: Native to the equatorial zones of Africa and Latin America, this plant is found in all humid forest regions of the African equatorial zone where it grows in the undergrowth, against the trunks of oil palms or cocoa trees or even in vegetable gardens and along tracks (Raphaël, 2012) [11].

Botanical Description: This is a creeping, perennial herbaceous plant found in damp places or growing upright against the base of oil palms. The leaves are alternate trifoliate. The oval leaflets are 15 to 50 mm long and 10 to 30 mm wide, with the central leaflet being distinctly larger than the lateral ones. The petioles are 15 to 20 mm long, and the lanceolate stipules are 5 to 8 mm long. The fruits are jointed pods 10 to 25 mm long and 3 mm wide (Raphaël, 2012) [11].

Traditional Uses: In Latin America, the dried leaves are used to treat asthma, vaginal discharge, aches and pains, ovarian inflammation, excessive urination, excessive mucus, and diarrhea (Raphaël, 2012) [11]. In Africa, a decoction of the leaves is a popular remedy for asthma, constipation, dysentery, and colic. The leaves are also used to dress wounds, relieve backache, muscle pain, kidney ailments, impotence, and various liver conditions, including viral hepatitis (Raphaël, 2012) [11].

FIG. 4: *DESMODIUM ADSCENDENS* (FABACEAE)

Chromatographic Analyses (TLC): The results of the phytochemical screening by TLC of Ap_{21}, Bn_{20}, Da_3 are shown in **Table 4.**

TABLE 4 : RESULTS OF TLC WITH AND WITHOUT DEVELOPER OF FABACEAE

Plants (extracts)	Without developer			Dragendorff	KOH	$FeCl_3$	Sulfuric vanillin	Possible compounds
	Visible Couleur (Rf)	UV 254 nm Couleur (Rf)	UV 366 nm Couleur (Rf)	Visible Couleur (Rf)	Visible Couleur (Rf)	Visible Couleur (Rf)	Visible Couleur (Rf)	
Ap_{21}	Green (1)	Balck (0,09); Gray (0,16); Gray (0.23); Gray (0,34); Gray (0,72); Gray (0,97)	Pink (0,57); Blue (0,62); Red (0,71); Red (0,97)	Orange (0,94)	Orange (0,09); Green-Grey(0,2); Gray (0,32); Gray (0,54); Green (0,95)	Gray (0,13); Gray (0,24)	Gray (0,13); Purple (0,23); Gray (0,27); Green (0,3); Purple (0,43); Gray (0,85); Purple (0,93)	Alkaloids; Flavonoids; Tannins; Sterols; Polyphenols, Coumarins
Bn_{20}	Green (0,97); Green (0,57)	Gray (0,7); Black (0,97)	Pink (0,5); Purple (0,61); Pink (0,7); Red (0,97)	Orange (0,58); Orange (0,92)	Gray (0,45); Green (0,95)	Green (0,57); Gray (1)	Purple (0,4); Gray (0,55); Gray (0,85)	Alkaloids ; Flavonoids; Tannins; Sterols; Polyphenols, Coumarins
Da_3	Green (0,97)	Gray(0,7); Gray (9,7)	Light Gray (0,7); Pink (0,97)	Orange (0,94)	Green (0,94)	Green (0,98)	Gray (0,08); Gray (0,25); Gray (0,80); Gray (0,85)	Alkaloids; Flavonoids; Tannins; Sterols; Polyphenols, Coumarins

The chromatograms of Ap_{21}, Bn_{20}, and Da_3, transcribed in **Table 4**, were observed in the visible spectrum under UV light at 254 nm and 366 nm. In the visible spectrum, two green spots were observed for Bn_{20}, while only one green spot was observed for Ap_{21} and Da_3.

At 254 nm UV, a greater abundance of spots with two colors (black and gray) was observed, some appearing at the same Rf values as those observed in the visible spectrum. For extract Da3, the spot appearing green at Rf 0.97 was not found.

At 366 nm UV, extracts Ap_{21} and Bn_{20} showed several pink, violet, and red spots, while extract Da3 showed only one pink spot and one light gray spot. The red spots under UV light at 366 nm correspond, according to Lagnika, to chlorophyll (Lagnika, 2005) [15] or to anthraquinone derivatives according to Chevalley (Chevalley, 2000) [16].

To better detect and characterize the phytochemicals observed on the chromatographic plates, specific reagents for each major family of secondary metabolites were used. The presence of alkaloids in our crude hydroethanolic extracts was detected using Dragendorff's reagent, which is specific to this chemical group. After treatment, no spots were observed on the chromatographic plates. Orange spots were observed, but were of low intensity. Two spots were found in extract Bn_{20}, compared to one spot in Ap_{21} and Da_3.

The high Rf value of the orange spots is noteworthy, suggesting a highly polar nature of the alkaloids present. The presence of coumarins in our extracts was revealed using a 5% (v/v) methanolic KOH solution. After processing our different chromatographic plates, we observed the appearance of orange, green, and gray spots in extract Ap_{21} and green and gray spots in extracts Bn_{20} and Da_3.

The appearance of these spots would indicate that each of the plants contains coumarins, according to Béa (Béa, 2020) [17].

Tannins and phenolic compounds were detected using FeCl3, a reagent specific to tannins and phenolic compounds. Extracts Ap_{21}, Bn_{20}, and Da_3 produced gray spots (Ap_{21}) and green spots (Bn_{20}, Da_3), indicating a positive reaction. The use of vanillin sulfuric acid revealed the presence of gray, green, and purple spots for all three extracts. The appearance of these spots would mean that our plants contain sterols and terpenes (Béa, 2020) [17].

Identification by Tube Reactions:

TABLEA 3: PHYTOCHEMICAL SCREENING OF PLANTS BELONGING TO THE FABACEAE FAMILY

Plants	Alkaloids		Flavonoids	Quinones	Tannins		Sterols	Polyphenols	Types of compounds present
	Drag	Bouch			Gal	Cat			
Ap_{21}	+	-	-	-	-	-	+	-	Alkaloids; sterols
Bn_{20}	+	-	-	-	-	-	-	-	Alkaloids;
Da_3	+	+	+	-	+	+	+	+	Alkaloids; flavonoid; tannins; sterols; polyphenols

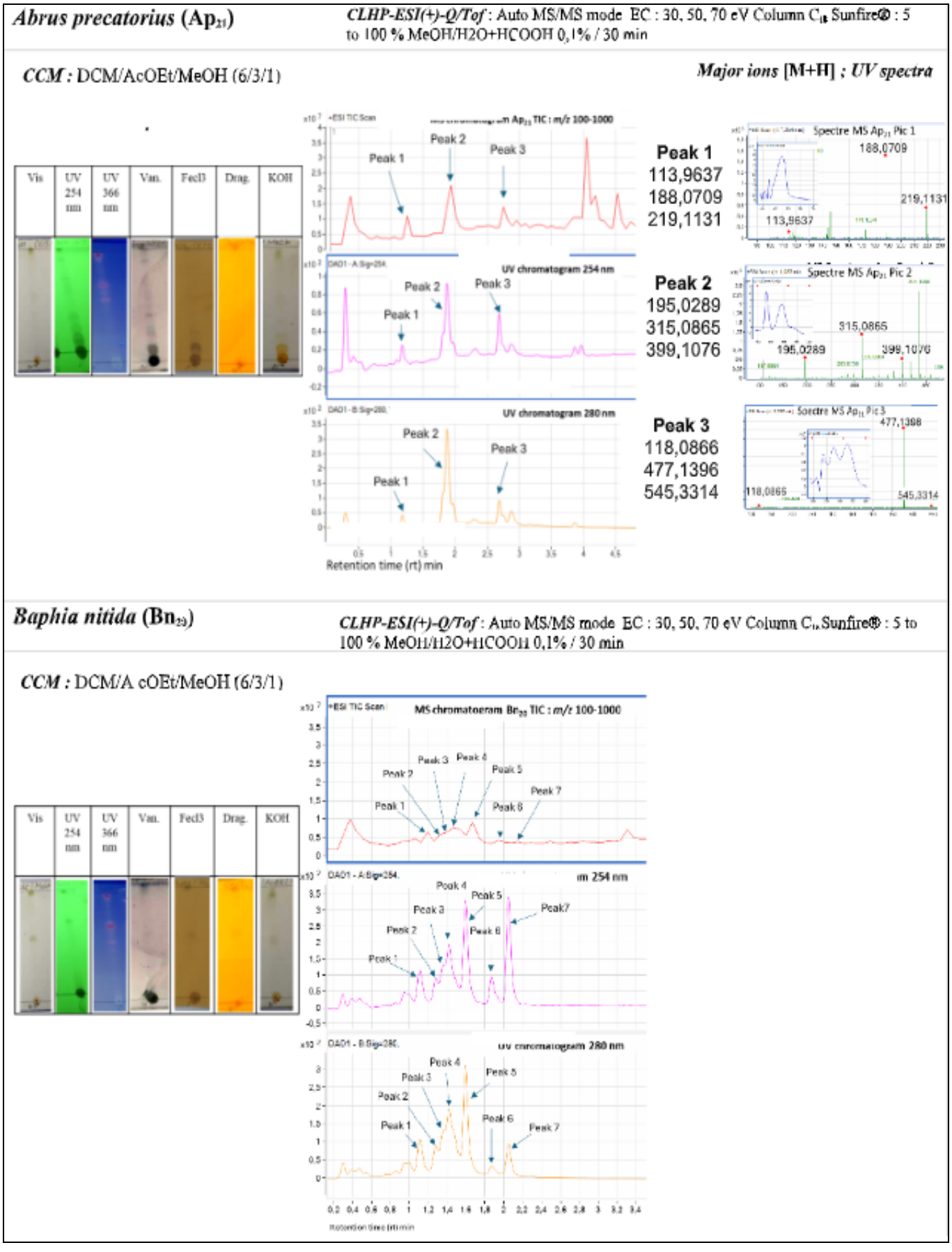
+ : Présence du composé, - : Absence du composé

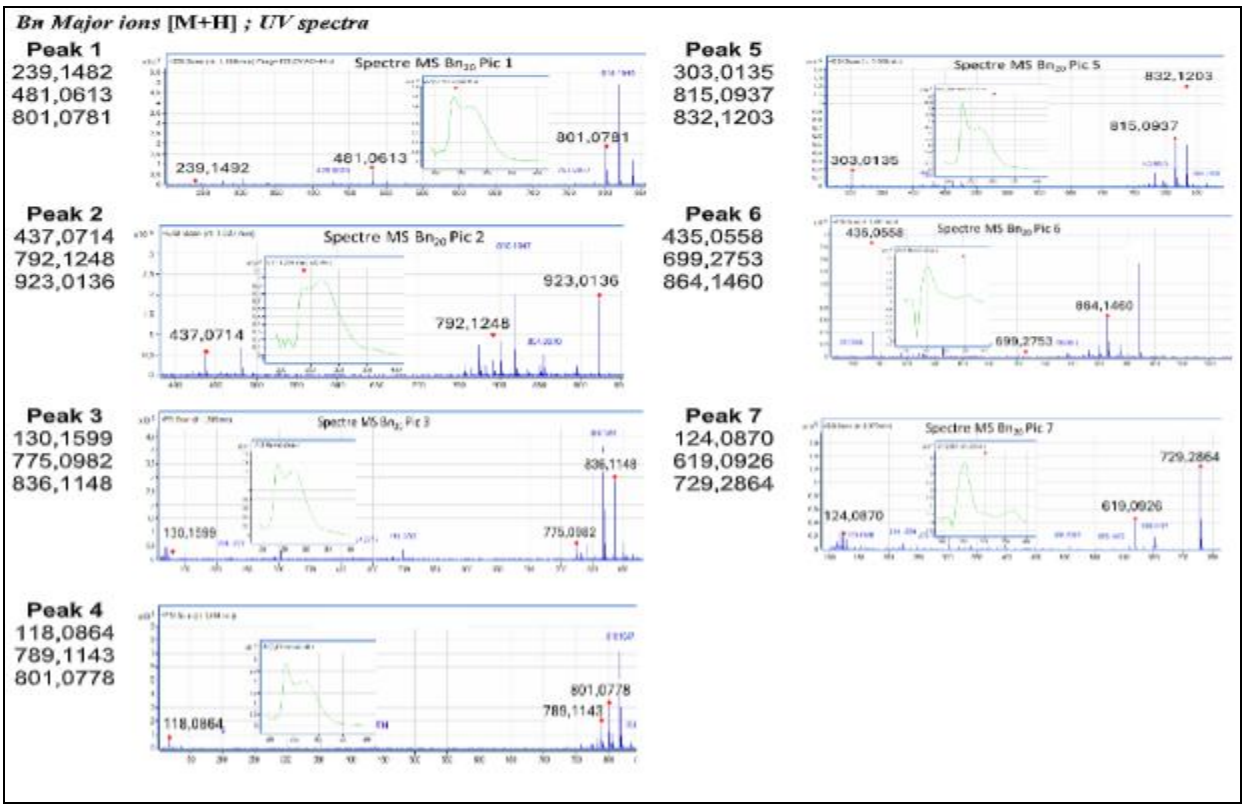
The results obtained show that the extracts of the three plants (Da_3, Ap_{21}, and Bn_{20}) are rich in alkaloids. In addition to alkaloids, Abrus precatorius contains sterols, and Desmodium adscendens contains flavonoids, gallic and catecholic tannins, sterols, and polyphenols.

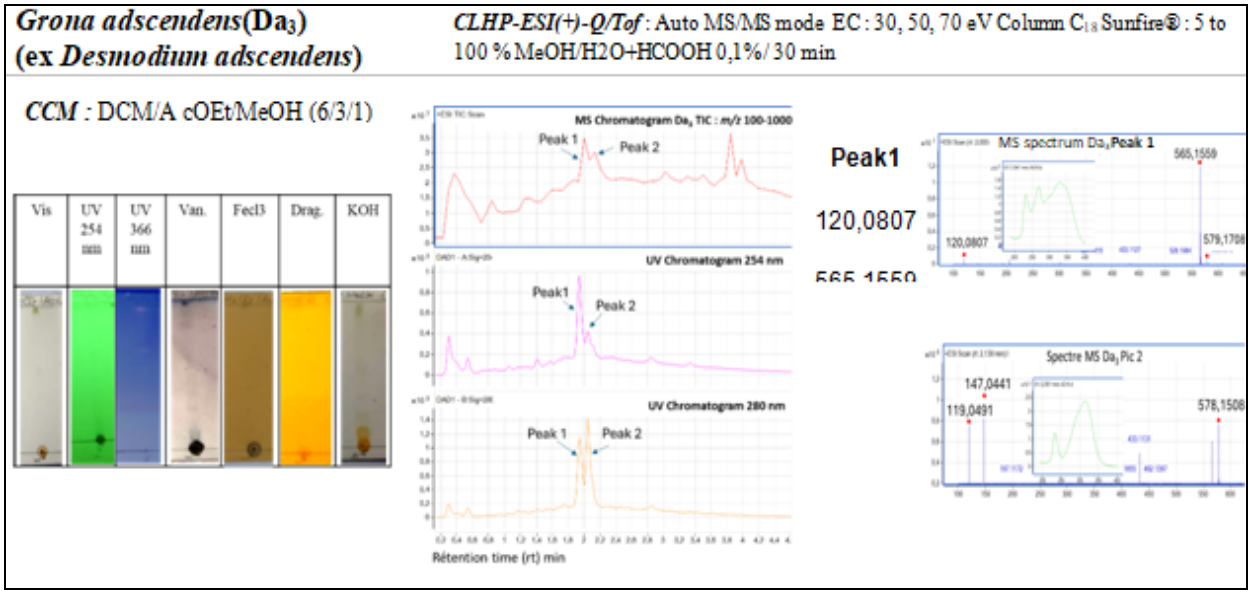
In 1974, Kerharo and Adam obtained similar results in their work on Abrus precatorius; flavonoids, tannins, quinones, triterpenes, saponins, and reducing compounds were also found in the various organs of the plant (Kerharo, 1974) [18]. Several molecules were subsequently isolated from the plant, namely glycyrrhizin, abruquinone B and abruquinone G, and L-abrin (Chutima, 2004) [19]. Our results are also consistent with those obtained by Muanda's team in 2011 during their work on the leaves of Desmodium adscendens. They demonstrated the presence of alkaloids, flavonoids, polyphenols, and sterols (Muanda, 2011) [20].

The results obtained during our work on Baphia nitida are consistent with those of Akré, who also found alkaloids in leaf extracts. However, they also found catecholic tannins, polyphenols, flavonoids, sterols, and polyterpenes, as well as leucoanthocyanins and anthraquinones (Akré, 2022) [21].

Chromatographic Imprints:



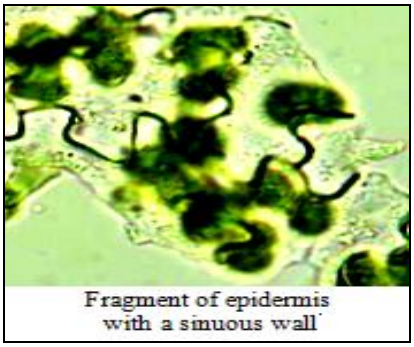




Results of the Micrographic Study:

***Abrus pretorius*:**

Paracytic stoma



Fragment of epidermis with a sinuous wall

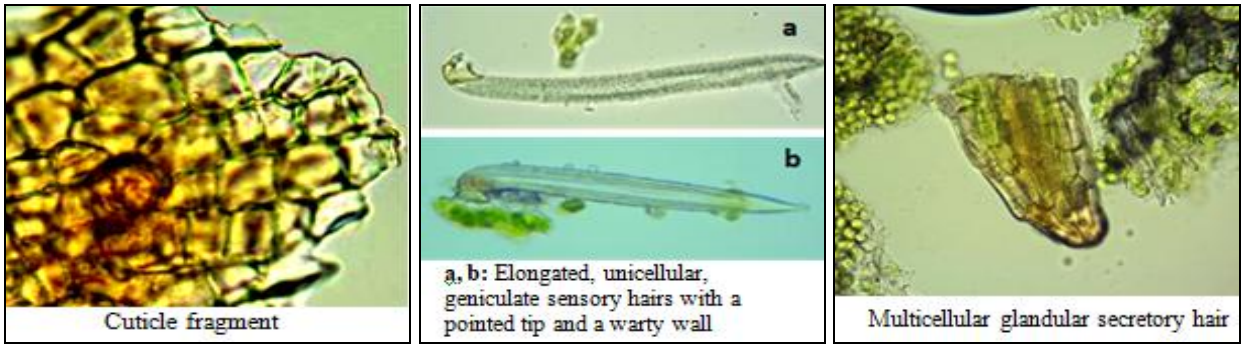


FIG. 5: MICROSCOPIC ELEMENTS OBSERVED IN THE POWDER OF *A. PRECATORIUS*

Baphia nitida:

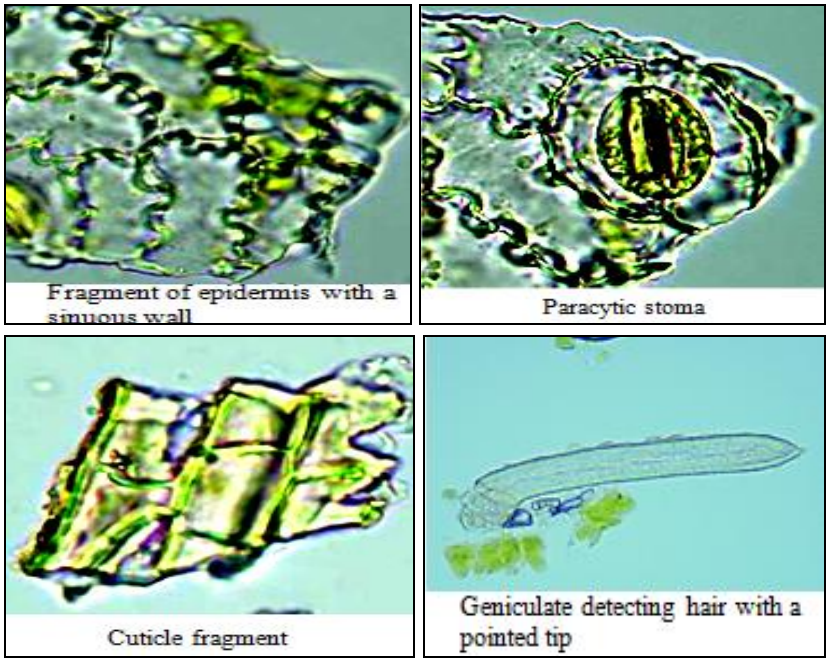


FIG. 6: THE MICROSCOPIC ELEMENTS OBSERVED IN THE POWDER OF *B. NITIDA*

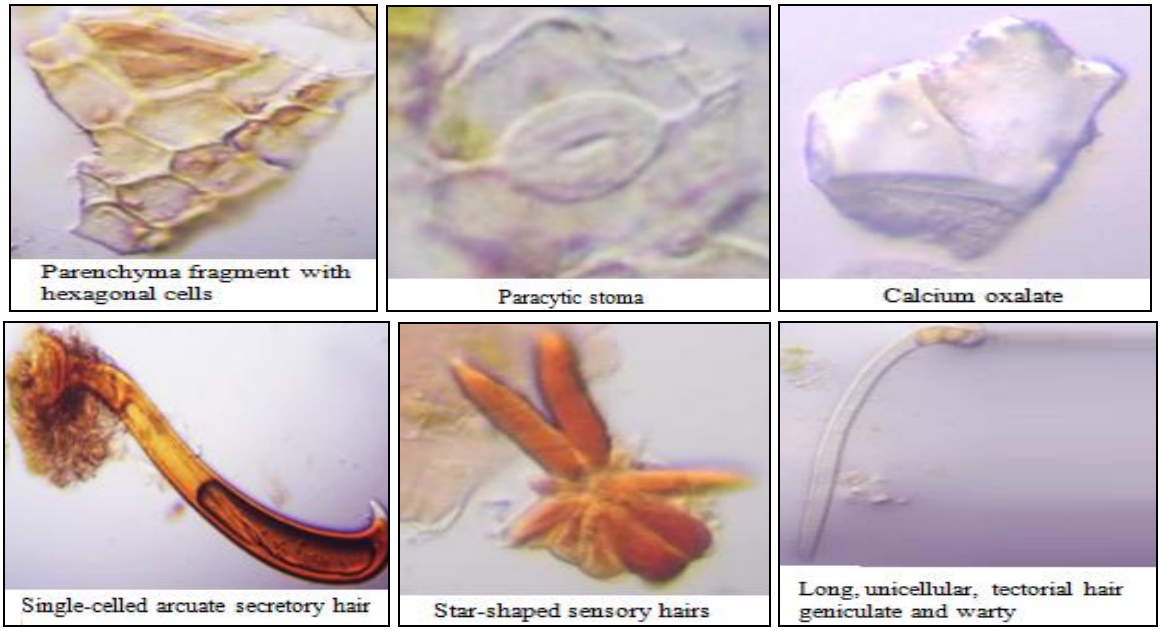


FIG. 7: THE MICROSCOPIC ELEMENTS OBSERVED IN THE POWDER OF *D. ADSCENDENS*

TABLE 5: DESCRIPTION OF THE MICROSCOPIC ELEMENTS OF THE LEAF POWDER FROM EACH OF THE PLANTS

Species	Ap_3	Bn_{20}	Da_{21}
Hair detector	Unicellular Warty Geniculate or Arcuate Pointed Tip	Unicellular Warty Geniculate or arcuate Pointed tip	Unicellular Warty Geniculate or long-arched Pointed tip
Secretory hair(glands)	Multicellular Thumb-Shaped	Absent	Unicellular Often branched Orange with a hooked tip
Stomata	Paracytic	Paracytic	Paracytic
Wooden vessels	Absent	Absent	Présent
parenchyma	Absent	Absent	Present
Calcium oxalate twinning	Absent	Absent	Absent
Calcium oxalate crystals	Absent	Absent	Present
Epidermal surface	Corrugated	Winding	Corrugated
Cuticle	Absent	Present	Absent
Specific elements	-	-	Hexagonal cell parenchyma containing brown substance

The results obtained show that the studied species share common microscopic features that could be common to the family, namely warty, geniculate, or arched unicellular tectorial hairs with a pointed tip, paracytic stomata, and epidermal fragments with wavy or sinuous walls. These features are also described in the West African Pharmacopoeia for *A. precatorius* (Ph. Ouest afr, 2020) [22].

More specifically, the powder of *D. adscendens* shows an abundance of hexagonal cell parenchyma fragments containing a brown substance, which could be typical of this species. In *A. precatorius* and *B. nitida*, we observed cuticle fragments and multicellular, thumb-shaped secretory hairs, respectively, which could be specific to these species.

CONCLUSION: This research contributes to the valorization of medicinal plants from the Fabaceae family. To this end, the leaves of three plant species were chemically analyzed (chemical characterization tests, micrographic tests) to identify the phytocompounds present. The results show that these plants contain bioactive compounds such as flavonoids, coumarins, polyphenols, tannins, sterols, and terpenes. Alkaloids were absent from all the tested extracts. The microscopic study allowed us to identify the characteristic microscopic elements of the leaf powder from each species studied. These identifying elements will enable the development of a method for quality control of health products containing the studied plants.

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CONFLICT OF INTEREST Nil

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