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Pharmacognostic Studies on the Roots of *Agemone Mexicana* Linn (Papaveraceae)

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Abstract: *Macro-morphological, microscopic,chemo microscopic and quantitative determinations were made on the roots of A. mexicana Linn. Morphologically the roots are variable in size (7-32cm), cylindrical in shape, grey-brown in colour with short fracture and the fracture surface is rough. The results of microscopic studies revealed the presence non-lignified fibres, xylem vessels made up of annular, spiral, scalariform, and reticulate type, prismed calcium oxalates, starch grains and laticifers which is articulated anastomizing. Chemomicros copicparameters shows that cellulose, lignin, tannins, calcium oxalate crystals and starch grains to be present. Quantitative physical determinant of the roots such as moisture contents (10.0% w/w), ash value (2.5% w/w), acid-insoluble ash (5.0% w/w), alcohol soluble extractive (11.0 % w/w) and water soluble extractive (27.0% w/w) value were obtained. These findings could be important in the preparation and identification of the monograph of the plant.*

Key words: *macroscopy, microscopy, chemomicroscopy, physical quantities, Argemone mexicana Linn*

I. Introduction

Worldwide over 80% of the people depend on medicinal plant species to meet their day today healthcare needs [1] and discourses on the future of traditional medicine in Africa and other indigenous societies often assume government recognition and integration into the formal health care systems [2]. In certain areas in Nigeria, the only health care providers close to the people are the traditional medical practitioners [3]. However, it should be noted that medicinal plant species have also been discovered to have other uses as some could be used as vegetables, fruits, trees and ornamentals [4]. Plants are valuable resources endowed in Africa and these resources are widely relied on by rural communities in developing countries because of inefficiencies in service delivery or because social services and goods are unaffordable. For this reason many people are currently resorting to traditional medicine for primary health care due to high costs in accessibility, cultural compatibility and self-reliance among others [5]. They also employ herbal medicines because of cultural preferences and perceived effectiveness [6],[7].

Argemone mexicana Linn (Papaveraceae) is a coarse erect herb with milky sap and prickly stems and leaves. The leaves are somewhat irregularly pinnatilobed and serrate, glaucous, the edges crisped-undulate, each tooth spinose. The flowers are sessile, yellow, large and up to 6cm broad [8]. It is also an annual herb; stems branched, sparsely to moderately cover with prickles. The leaves are glabrous, oblong-oblanceolate, pinnately lobed, both surfaces sparsely covered with prickles, sessile, upper one usually somewhat clasping the stem. Mature height is about 24" – 36" or 61cm – 91cm [9]. In Northern Nigeria Argemone mexicana is locally called Karanko, Kwarkwaro or Kaki Ruwan Allah in Hausa [10]. The Hausa traditional healers use a grounded leaf on swollen area of skin against inflammation of skin. The aim of this study is to establish the macroscopic, microscopic, chemomicroscopic and quantitative standards of the stem of Argemone mexicana that would be useful in preparing monograph of the plant.

II. Materials and Methods

2.1Plant Collection

The roots of Argemone mexicana were collected in December 2012 from the bush of Tudun Wada in Zaria. The plant has been identified before collection using the standard method of identification given in the Flora of West Tropical Africa[11] and Woody Plants of Ghana[12].

2.2Identification

However, confirmation of the identity of the plant was carried out, by the comparing the sample with the original herbarium specimen placed in the herbarium of the Department of Biological Sciences, Faculty of Science, Ahmadu Bello University, Zaria, Nigeria, and the voucher specimen number was 2439.

2.3 Macroscopical Examinations

The macroscopical features of the roots were observed with naked eyes and in some cases with aid of a hand lens by adopting the terminologies given by Brain and Turner [13] .

2.4 Microscopic Examination

Microcopical examinations of the whole and powdered sample of the roots were used. Transverse and longitudinal sections of the roots of Argemone mexicana were also used for this study. The sample preparations were observed under the compound microscope at x400 magnification [14].

2.4 Chemomicroscopic Examination

The powdered samples and the various anatomical section were treated separately on microscope slides and observed under the light microscope for the presence of chemical substances which include cellulose, gums and mucilages, starch, proteins, fats and oils, tannins, cutin, suberin and calcium oxalate crystals[15]

2.5 Quantitative Determinations

moisture contents was determined as aloss on dry method and other quantitative evaluations which include ash value, acid-insoluble ash, alcohol soluble and water soluble extractive were determined by using the method of Brain and Turner**[**13**]**

III. Results

3.1Macroscopic Examination

The root is cylindrical in shape or sometimes curved and generally of different sizes, it is grey to dark-brown in colour, the outer surface being dark-brown and inner surface light brown. Detailed description of other macromorphological characteristics were given in Table 1

3.2Chemomicroscopic Examination

The chemomicroscopic features of the powdered root bark observed were as follows: cork cells, parenchyma cells (non-lignified), xylem tissue, phloem fibres, sieve tubes, starch grains, secretary tissues (laticifers) and calcium oxalate crystals (fig.3) These were typical of the powered root bark sample. The appearance of the laticifers in the sample indicates that this plant contain some latex tissue which is one characteristic of the Family Papaveraceae. This feature can help in the identification of the root of Argemone mexicana. The laticifer is articulated anastomizing type, common among members of this family.

3.3Microscopic Examination

Anatomical features observed aids in identifying other significant structures of interest not seen in the powdered sample, as well as arrangement of these particular structures. These features are the cambium, xylem tissues (such medullary rays) and the arrangement of the vascular bundles in ring form (Fig. 2). The transverse section of the root consist of various layers of cells, these are the cork, phellogen, phelloderm, cortex, phloem, cambium, xylem tissues and the pith. The cork, phellogen, phelloderm and the cortex are broadly referred to as the periderm, they are at the outside enclosing the vascular tissues, they consists of parenchyma tissues of various sizes. In this structure the endodermis separate the periderm from the vascular tissue area.

3.4 Quantitative Determinations

The results of quantitative determinations of the powdered vegetable drug is given in table 4

Table 1: results of the macro-morphological features of the roots of A. mexicana

Feature	Observation
Size – length	7cm – 32cm
Width	0.6cm – 4cm
Shape	cylindrical (sometimes curved)
Surface	Outer surface dark brown
Inner surface	grey – light brown.
Colour	grey – brown
Fracture	short
Fractured surface	rough
Sensory characters of the Powdered Root	
Colour	grey – brown
Taste	slightly bitter
Odour	slightly spicy

Texture smooth

Table 2: microscopic features of the roots of A. mexicanaL

Diagnostic features	type
Fibres non-lignified	
Xylem vessels	annular, scalariform, reticulate and spiral
Calcium oxalate crystals	prismed
Starch grains	oval

Table 3: chemomicroscopical studies of the roots of A. mexicana L

Constituents	Inference
Lignin	+
Mucilage	-
Cellulose	+
Tannins	+
Calcium oxalate crystals	+
Oils	-
Protein	-
Cutin and suberin	-

Key: (+) Present
(-) Absent

Table 4: Results of the Quantitative Determinations of the roots of A. mexicana L

Evaluative parameters	Mean(%w/w)
Moisture Contents (%w/w)	10.0 ± 0.3
Ash value (% w/w)	2.5 ± 0.05
Alcohol soluble Extractive value (% w/w)	11.0 ± 7.1
Water soluble Extractive value (% w/w)	27.0 ± 7.1
Acid-insoluble Ash value (% w/w)	5.0 ± 0.04

IV. Discussion

Macromorphological determinations of the roots of A. Mexicana shows that it is of varied length, dark-brown in colur, cylindrical in shape and at times curved. The presence of laticifers which is articulated anastomizing was correlated with Watson and Dallwitz[16] who reported that most members of the family Papaveraceae are characterized by the possession of laticifers located in the leaves, stems, roots, flowers or fruit. Transverse section of the roots revealed the arrangement of vascular bundles typical of the dicotyledonous and this indicated that the plant has organized vascular structure.

Chemomicroscopic examinations revealed the presence of chemical constituents such as tannins, fat and oil, protein, which confirmed the earlier report that some members of the family Papaveraceae contained alkaloids, glycosides and flavonoid [17], [18]. Quantitative physical determinants of the vegetable drug such as moisture contents (10.0% w/w) were also low enough not to support the growth of microorganisms that may lead to the detritions of the vegetable drug (during storage) when compared with documented values in the pharmacopoeia, for example Digitalis leaf, 6.0%,w/w, and Acacia 15.0%w/w[19], total ash (2.5% w/w), Acid-insoluble ash (5.0% w/w) could serve as a standard in determining the residual substances not volatilize when the drug is ignited [20]. The results of the extractive values indicated that the chemical constituents in the roots are more soluble in water (27.0% w/w) than in alcohol (11.0% w/w). This studies is intended to establish a monograph on the root of A. mexicana

V. Conclusion

Pharmacognostic studies on the roots of Argemone mexicanaLinn was carried out which revealed the macroscopic, microscopic, chemomicroscopical and physical quantities determinations of the plant. These parameters determined would serve in the identification of the plant, quality control and adulteration of this vegetable drug.

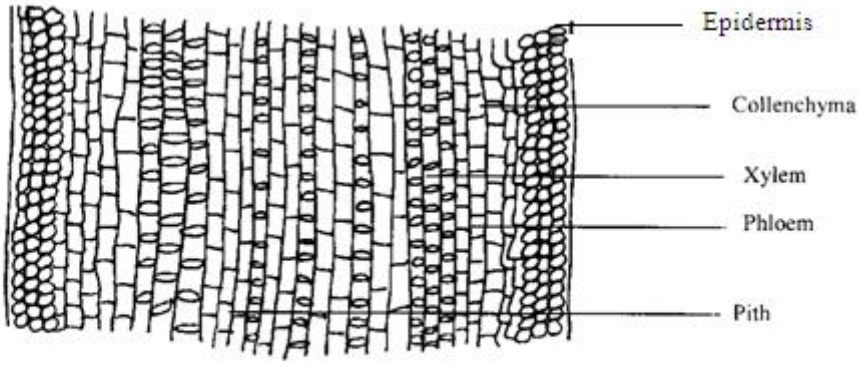


Fig. 1: Longitudinal Section of the root of *A. mexicana* (x 400)

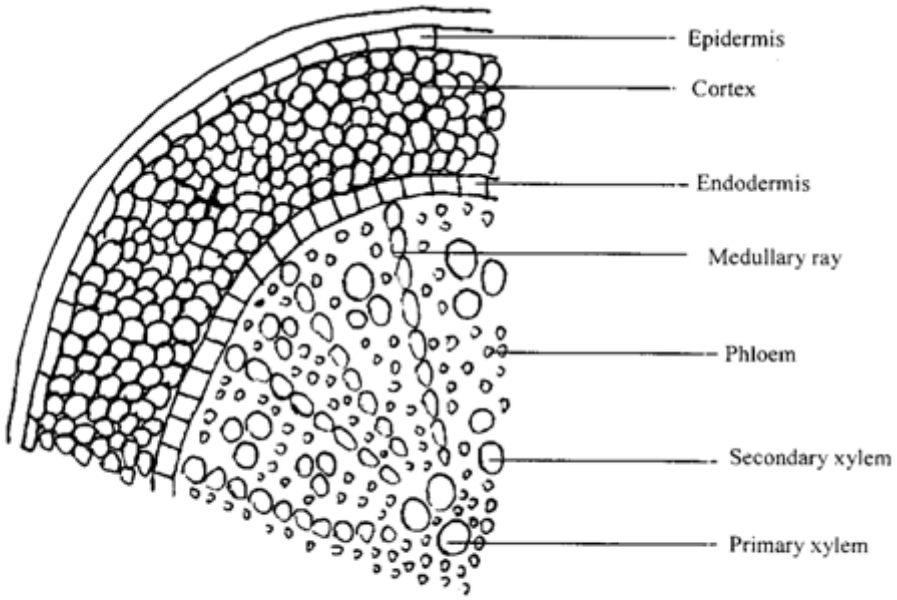
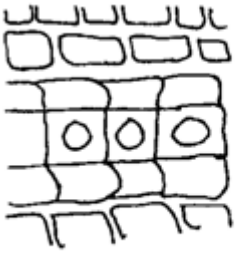


Fig. 2: Transverse section of the root of *A. mexicana* (x 400)



Fibro-vascular bundle

Laticifers

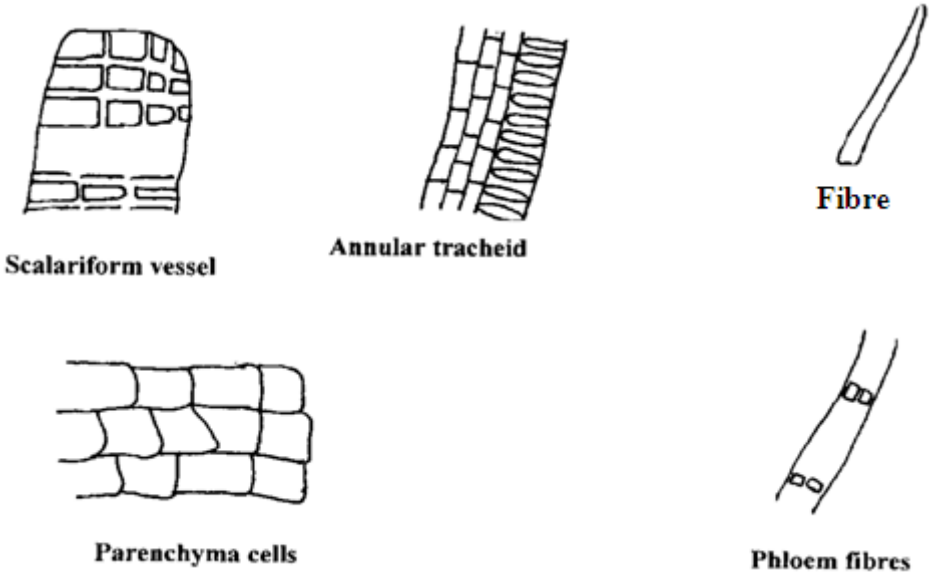


Fig. 3: Microscopical Features powdered of the root of A. mexicana (x 400)

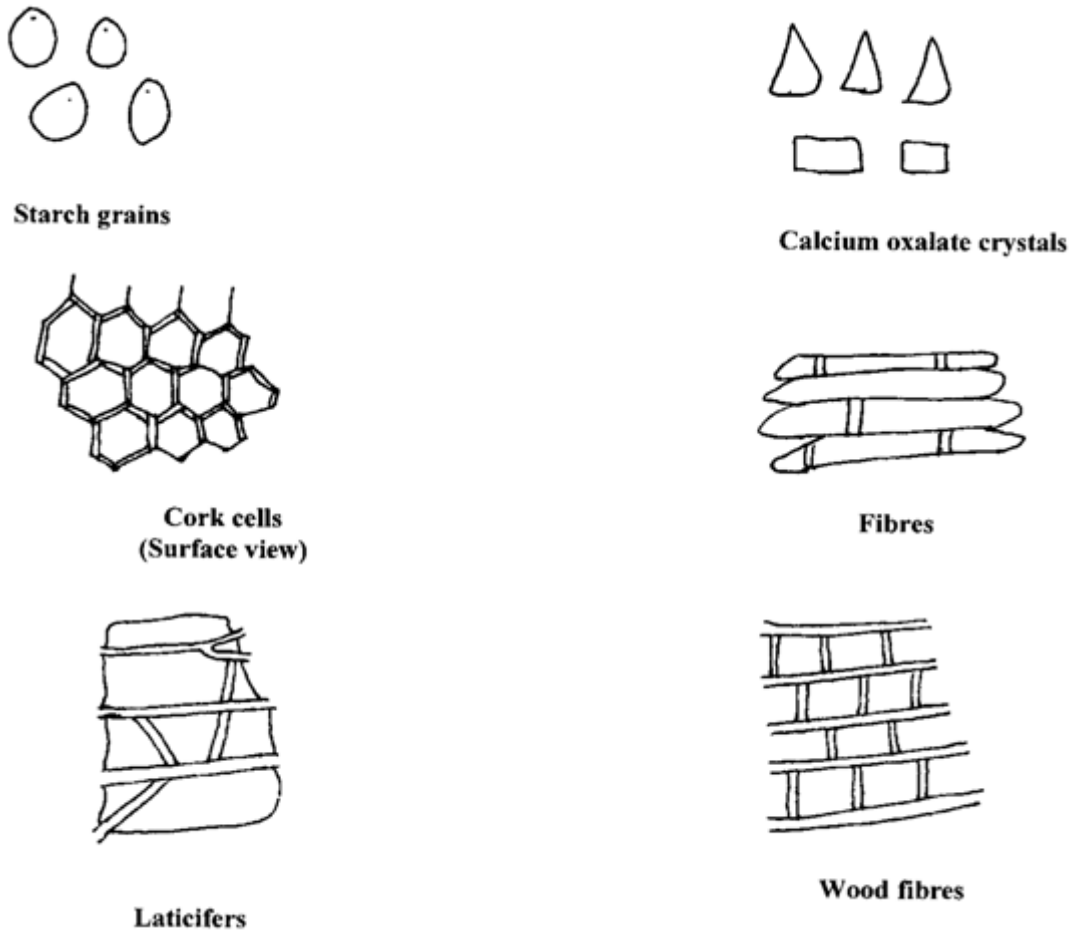


Fig. 3: chemomicroscopic features of the roots Argemone mexicana (x400)

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