



Research Article

## **Pharmacognostical Study of the Fruits of *Acacia nilotica*, *Ammi visnaga* and *Pimpinella anisum***

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### **Abstract**

This study deals with *Acacia nilotica* fruits, *Ammi visnaga* fruits and *Pimpinella anisum* fruits, these plants were selected because of their popularity and they are highly used, they were purchased from herbarium markets of Khartoum. The study is divided into two parts, the main part is morph anatomical studies of the fruits of the plants because it is important in the identification of the medicinal plant when it is in the powder or broken forms. The preparation of permanent slides was done using wax methods. The results of the morph anatomical studies were described and shown in photomicrographs. The transverse sections of the fruits of *A. nilotica*, *A. visnaga* and *P. anisum* are formed of many layers. The epicarp is one layer of small cells covered with cuticle. Many trichomes appeared projecting from the epidermal cells. The mesocarp is formed of parenchyma cells filled with reserved materials, tannins in *A. nilotica* and vittae oil cavities in *A. visnaga* and *P. anisum*. Part two includes physicochemical studies of the powder of the studied plant fruits to determine the percentage values of moisture, ash, acid insoluble ash, alcohol soluble extractives, and water soluble ash.

**Key words:** anatomy; Physicochemistry; fruits; *Acacia nilotica*; *Ammi visnaga*; *Pimpinella anisum*

### **Introduction**

Over hundreds of years, herbal medicines derived from medicinal plants are still the mainstay of about 80 % of the world's population for health care marketed and gaining popularity in developed and developing countries (Sekar *et al*, 2010). Herbal formulations have reached widespread acceptability as therapeutic agents for diabetics, arthritics, liver diseases, cough remedies, memory enhancers and adaptogens (Patel *et al*, 2006).

Adulteration or substitution is nothing but replacement of original plant with another

plant material or intentionally adding any foreign substance to increase the weight or potency of the product or to decrease its cost. Therapeutic efficacy of medicinal plants depends upon the quality and quantity of chemical constituents. The misuse of herbal medicine or natural products starts with wrong identification. The most common error is one common vernacular name is given to two or more entirely different species (Dinesh, 2007). Standardization and quality control are essential analytical tools to assure the correct identification of drugs. Advances in microscope technology and improvements in

light and scanning electron microscopes have increased the accuracy and capabilities of microscopy as a mean of botanical identification. Adulteration and misidentification of herbal drug can cause serious health problems (Serrano *et al*, 2010). All these problems can be solved by pharmacognostic studies of medicinal plants. Pods of *Acacia nilotica* are Anti hypertensive and antispasmodic, anti-diarrhoerial, astringent, anti-fertility and against HIV-1 PR, Inhibited HIV-1 induced cythopathogenicity, antiplatelet aggregators activity and anti oxidant (Ali et al, 2012).

*Ammi visnaga* fruits tea has been used as herbal remedy for kidney stones, as a smooth muscle relaxant (Ziment, 1998).

*Pimpinella anisum* seeds are used as analgesic in migraine and also as carminative, aromatic, disinfectant, and diuretic in traditional medicine (Amin 2005). can increase milk production, menstruation, urine and sweet secretion and also making good complexion. It is also effective in polishing of teeth.

This study for the fruits of *Acacia nilotica*, (Fabaceae) *Ammi visnaga* and *Pimpinella anisum* (Apiaceae) aimed to supply some of their diagnostic characters for correct identification of raw materials and to avoid adulteration.

## Material and Methods

### Materials

#### Plant Materials:

Fruits from *Acacia nilotica*, (Fabaceae) *Ammi visnaga* and *Pimpinella anisum* (Apiaceae) were selected for this study, they were purchased from local markets from Khartoum, central Sudan. They were identified and authenticated.

#### Methods:

#### Morphology

The external features of the studied plant parts were documented.

The morphological studies were carried out for color, surface, shape, taste size, and odor.

#### Anatomy

The anatomical investigation was achieved through transverse sections of the fruits by using wax methods and double staining technique (Willy 1971).

#### Physiochemical methods AOAC (1990)

### I. Determination of Moisture contents:

Moisture contents were determined by accurately weighing two grams (W1) of the fruits powder in a crucible. They were left in 105°C oven for three hours, transferred to a desiccator for one hour to cool and finally reweigh (W2). The moisture contents (W1-W2), percentage of moisture and the percentage of the dry matter were calculated

### ii. Determination of Ash contents:

#### a) Total Ash:

In this method 5 grams (W1) of the dried fruit powder were placed in accurately weighed porcelain dishes. They were put in a muffle furnace at about 550°C until light gray ash content of constant weight were obtained. The dishes were then cooled in a desiccator and reweighed (W2). The ash value (W2 – weight of the porcelain dish) and its percentage were calculated.

#### b) Acid insoluble ash:

The total ash from above were boiled with 25 ml of dilute hydrochloric acid, filtered through an ash less filter papers, washed with hot water until free from chlorides, the filters and their contents were dried, ignited and weighted. The final weights which represent the acid insoluble ash were recorded. The percentage of it was calculated.

### iii. Determination of water soluble Ash:

Boil the total ash for 5minutes with 25 ml of distilled water; collect the in soluble matter in agooch crucible or on an ash less filter paper, wash with hot water, and ignite to constant weight at a low temperature. Subtract the Wight of in soluble matter from the Wight of the ash; the difference in Wight represents the water-soluble ash. Calculate the percentage of water-soluble ash with reference to the air dried drug.

### vi. Determination of alcohol soluble extractive:

1gm of coarsely powdered plant parts was macerated with 100 ml alcohol in a closed flask for twenty four hours. With frequent

shaking. It was filtered rapidly taking precaution against loss of alcohol. 25 ml of filtrate was then evaporated in a tarred flat bottom shallow dish, further dried at 100°C and weighted.

### Results and Discussion

#### 3.1. *Acacia nilotica* fruits

##### 3.1.1 Morphology:

**Origin:** dried ripe fruits narrow indehiscent pods.

**Color:** Dark-brown to grey in color

**Surface:** glabrous

**Shape:** linear, flattened, their pods have a characteristic "necklace" shape with constrictions between the seeds. The pods contain many elliptical, flattened bean-shaped dark seeds

**Taste:** acrid, sweet, cooling

**Dimensions:** Pods 15-18 mm in length and 10-14 mm wide and 35mm in diameter (plate 1)

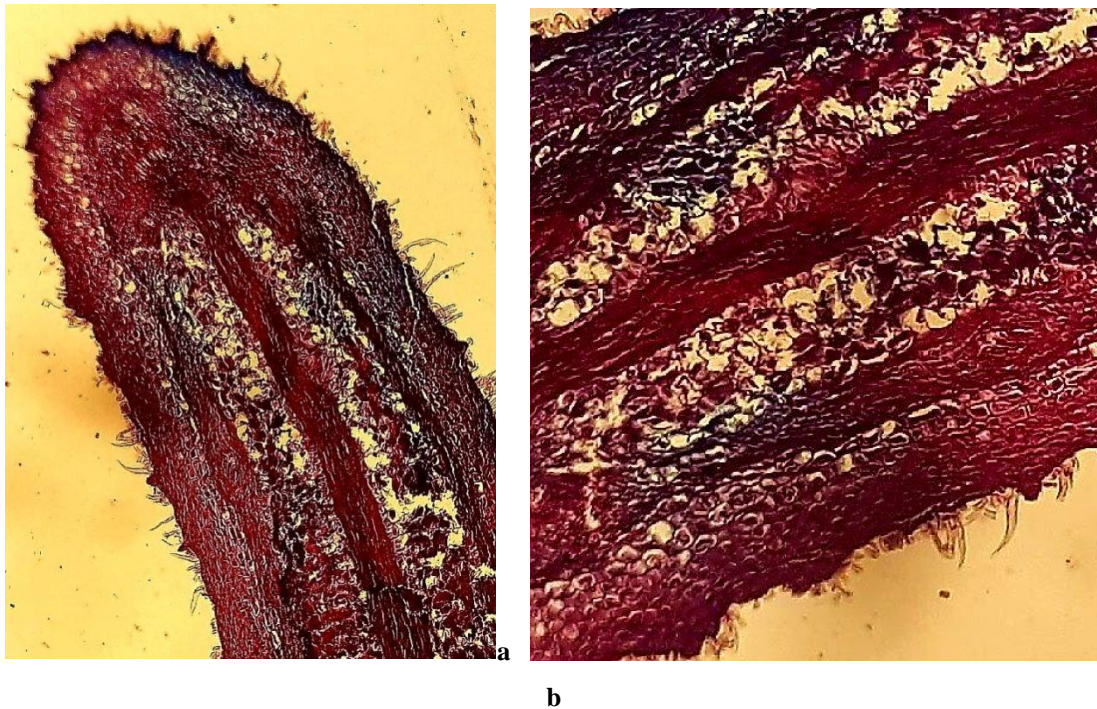


**Plate (1): Morphology of *Acacia nilotica* fruits**

##### 3.1.2. Anatomy:

The transverse section of the fruit is formed of many layers (plate 2). The outermost layer is the epidermis (epicarp) which is formed of one layer of small cells covered with thin cuticle. Many trichomes appeared projecting from the epidermal cells. The mesocarp is following and it is formed of parenchyma cells filled with reserved materials, dense pigments and tannins. It is followed by the endocarp which is formed of small sclerenchyma cells. The seed

is found on the central region and it is differentiated into a testa and small endospermal region. Prathapa *et al* (2018) studied *Acacia Nilotic* a fruit anatomy and mention the presence of elongated macrosclerides, abundant small starch grains and oil globules, uni seriate short tufted trichomes, small rounded stone cells, lumen filled with brown content of tannin and thick walled parenchymatous cells of mesocarp region.



**Plate 2: Transverse section of *Acacia nilotica* fruit a. (X40) b. (X100)**

### 3.2. *Ammi visnaga* fruits

#### 3.2.1. Morphology

**Origin:** dried cremocarp

**Color:** yellowish green to yellowish brown colored

**Surface:** glabrous

**Shape:** oval

**Taste:** sweet, aromatic and agreeable.

**Odor:** aromatic

**Dimensions:** 3 millimeters long, 1 mm wide and 5 mm in diameter



**Plate 3: Morphology of *Ammi visnaga* fruits**

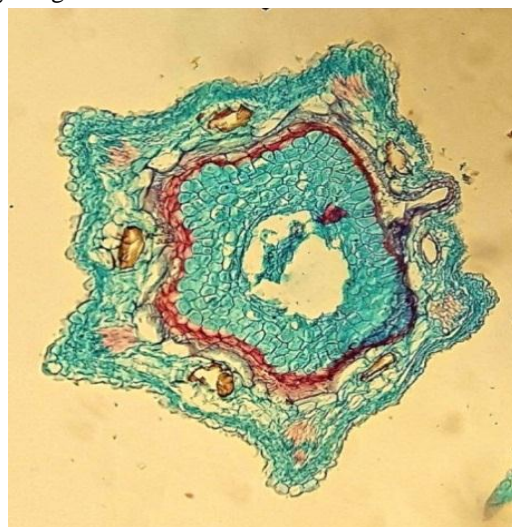
#### 3.2.2. Anatomy

The transverse section of the fruit is pentagon with five projections containing vascular bundles (plate 4). The epidermis (epicarp) composed of one layer of large, polygonal, papillose, thin-walled parenchyma cells covered with faintly striated cuticle. The mesocarp is following the epidermis and it is formed of 2-4 layers of small compact cells enclosing vascular bundles, the rest of the mesocarp are groups of radiating large

colorless parenchyma cells enclosing the secretory cavities filled with dense brown contents which are called vittae. The endocarp is composed of elongated red thin-walled cells which are surrounding the seed testa some lignified cells are projecting forming a secretory canal. The testa is composed of one or two layers of thin-walled cells that contain brown pigments. The endosperm of the seed consists of almost rounded parenchyma cells having intercellular spaces. The cells contain

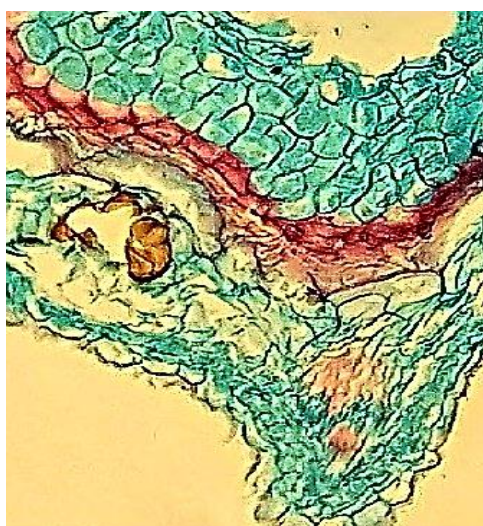
aleurone grains and crystals of calcium oxalate. Parwaiz *et al* (2010) stated that towards the outer side of the vittae, towards epicarp, the cells of the mesocarp are radially elongated, comparatively longer than the other

mesocarp cells, which is a characteristic of the genus. The vascular bundles are circular in outline but the phloem and the xylem are crushed and not sectioned well.



A.

b.



**Pate (4):** Transverse section of *Ammi visnaga* fruits a. X40 b. x100

### 3.3. *Pimpinella anesum* fruits

**Origin:** dried ripe fruits.

**Color:** greyish brown

**Surface:** glabrous

**Shape:** cremocarp.

**Taste:** aromatic sweet

**Odor:** aromatic

**Dimensions:** 3-5 millimeters long, 1-2 mm wide and 5-7 mm in diameter



Plate (5): Morphology of *Pimpinella anesum* fruits

### 3.2.5. *Pimpinella anesum* fruits

The transverse section of *P. anesum* (anise) fruit is oblong in shape (plate 6); the epidermis is formed of one layer of small rounded papillose cells, covered with thick cuticular layer. The mesocarp is following and it is formed of many layers with many small vascular bundles, oil vittae are small brown color cavities scattered within the mesocarp, endocarp is 2-3 layers of small sclerenchyma cells surrounding the testa which is one layer of red cells. The endosperm is filling the

internal region of the section except in the central part in which is found small cotyledons. Crystals and fixed oil are found scattered within the cells of the endodermis. Salim *et al* 2016 found that the anatomy of anise seed exhibits the nominal histological structures of anise seed likes the oil vittae, hair, epidermis, mesocarp, endocarp, cuticle, endosperm, sclerenchyma, crystals and fixed oil which provide histological structures for identification of Sudanese anise seed.

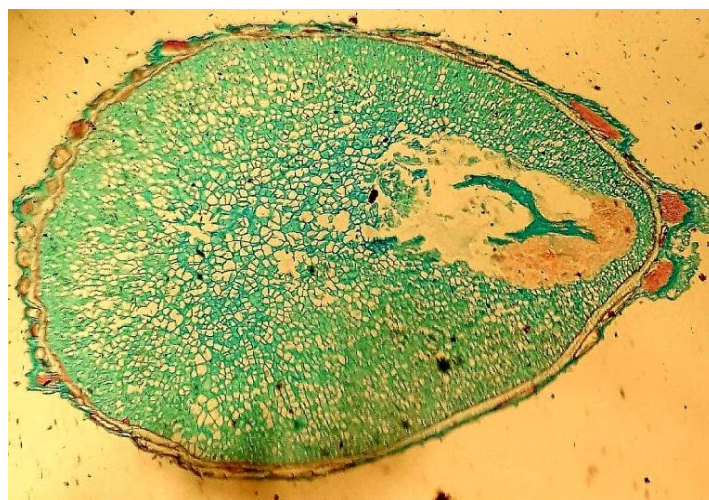


Plate 6: Transverse section of the seed of *P. anesum*

### 3.4. Physiochemical analysis:

The moisture % , ash % , water soluble ash % , acid insoluble ash % and alcohol soluble extractive % ( table 4) of the studied plants parts from Khartoum, From the results it had been found that *A. visnaga* has large values of

ash and acid insoluble ash which mean that it is rich in minerals. All the studied plant fruits show large values of alcohol soluble extractives which mean that they are rich in chemical constituents. Moisture percent is low in all the plants because they were sold dry.

**Table 4: Physiochemical analysis results**

Sample	Moisture%	Ash%	Water Soluble ash%	Acid Insoluble Ash%	Alcohol Soluble Extractive%
<i>Acacia nilotica</i>	6.6891	4.7392	0.1062	0.289	32.374
<i>Ammi visnaga</i>	4.4065	37.8383	0.071	22.5508	10.582
<i>Pimpinella anisum</i>	6.6314	6.6049	0.1594	0.2543	14.446

**Conclusion:**

This study is important and lays down parameters for standardization and authentication of the studied plants with the help of which adulteration and substitution can be proved.

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