

## Powder and physico-chemical analysis of *Amaranthus gangeticus*

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### Abstract:

*Amaranthus gangeticus* is an under-exploited medicinal plant. Its biological screening is in progress, the present paper shows its specific microscopic powder characteristics and few physical constants. As the powder contains fibers hence it was also subjected to fiber analysis to lay basis for possible utility.

**Keywords:** *Amaranthus gangeticus*, powder microscopy, physical constants, fiber analysis.

### Introduction

*Amaranthus gangeticus* (Amaranthaceae), which is native to the tropical countries. This is an erect annual herb reaching a maximum height around 1.2 meters. The leaves are about 14 cms long on large individuals, the ones those higher on the stem having a lance shape, while those lower on the plant are diamond or oval in shape. The plant is monoecious with individuals bearing both male and female flowers. The inflorescence is a large, dense cluster of flowers. The fruit is a capsule less than 2 millimeters long with a "lid" which opens to reveal a tiny black seed. The leaves are sources of vitamins A and C. It is helpful in treating mouth and throat inflammations and sores.

They are also rich in iron. A tea made from its leaves is used as an astringent. It is used in the treatment of intestinal bleeding, dysentery and diarrhoea. It is also used as anthelmintic. It is often used as flavouring agent.<sup>1</sup>

So far, there is no data regarding powder and fiber characteristics of this plant of therapeutic potential. Therefore the present communication reveals the powder microscopic features and also fiber analysis in addition to establishment of physico-chemical properties.

### MATERIALS AND METHODS

Collection and identification of plant: The plant was collected from Kusnoor village (Gulbarga district), Karnataka in the month of March and was authenticated by Dr. Srinath Rao, chairman, P.G. Department of Studies and Research in Botany, Gulbarga University, Gulbarga, Karnataka. The plant was thoroughly cleaned to remove adherent soil and other impurities, the leaves of *Amaranthus gangeticus* (AG) were shade dried and made into a coarse powder by rubbing in the palms.

### Powder microscopic features and fiber analysis:

The powdered drug was treated with phloroglucinol-HCl solution, glycerin iodine solution to determine various diagnostic characters such as nature of vessels,

#### Powder microscopy (Fig. 1 & 2)

The powder of the leaf shows fragments of lamina, parenchyma cells, crystals and mucilage masses.

The leaf fragments have reticulate veins and crystal masses (Fig. 1). The druses are surrounded by dense mucilage and appear as circular thick masses. The veins are distinct, thin and straight. They form wide rectangular *vein-islets* which are oriented more or less along same angles. The *vein-terminations* are also evident, they are long, slender and unbranched or branched once (Fig. 2:a).

Druses are also seen scattered in the powder. They are seen embedded in mucilage substance (Fig. 2:a).

Isolated epidermal fragments are seen having circular, anomocytic type of stomata (Fig. 2:b).

#### Crude fiber is determined by Dutch method<sup>2</sup>

Physico-chemical properties like total ash, acid-insoluble ash, water soluble ash, moisture content,<sup>3</sup> pH and specific gravity<sup>4</sup> are determined.

#### Evaluation for *Amaranthus gangeticus* (AG) leaf :

- 1) Total ash = 23.6 % (dry)
- 2) Acid-insoluble ash = 3.6 % (dry)
- 3) Water soluble ash = 4.7 % (dry)
- 4) Moisture content (loss on drying ) = 1.8 % (dry)
- 5) Crude fibre = 6.35 % (dry)
- 6) pH = 9.8
- 7) Specific gravity = 0.1797

(Values expressed as mean, n = 3)

#### pH

The finely powdered material was suspended in distilled water with occasional mixing. After 2 hours, the suspension was filtered and the clear solution was measured for pH using digital pH meter.

#### Specific gravity<sup>4</sup>

The finely ground leaf powder of the plant was filled in specific gravity bottle and weight was determined. Then, the weight of same volume of water was determined. The specific gravity was determined by using the following equation.

$$\text{Specific gravity} = \frac{\text{Weight of powder}}{\text{Weight of water}}$$

### RESULTS AND DISCUSSION

Powder microscopic features, fiber analysis and Physico-chemical properties like total ash, acid-insoluble ash, water soluble ash, moisture content, pH and specific gravity are determined. Depending upon climatic conditions and season the above parameters may vary. It is a plant of great medicinal value.

### CONCLUSIONS

Salient features that are specific to the plant were recorded during powder analysis. These parameters can be used for identification and authentication of the plant material from other related varieties.

### SCOPE FOR FUTURE STUDY

As it is a medicinal plant, hence isolation of its phytoconstituents are needed to screen various organ protective potentials.

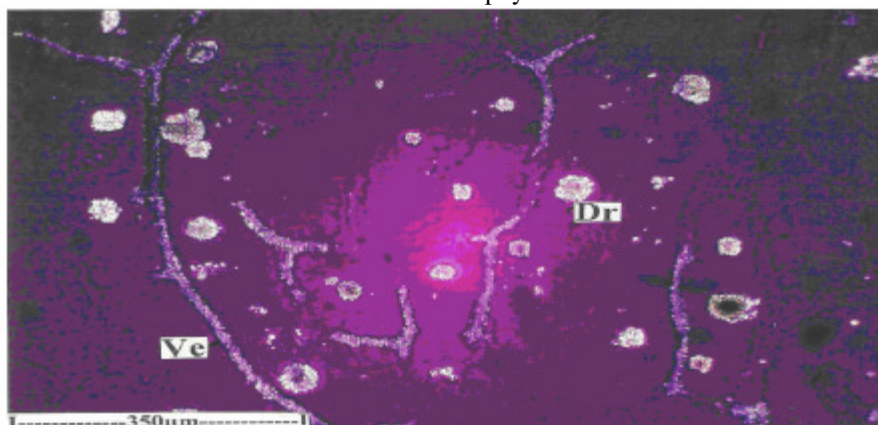
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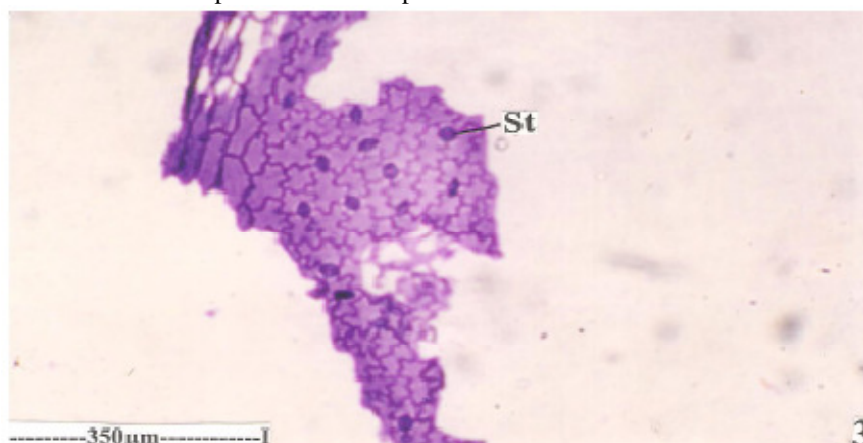
**Fig. No. 1. Crystal distribution in the leaf of AG [Under polarized light microscope]**  
Druses in the mesophyll tissue



[Dr – Druses; Ve-vein].

**Fig. No. 2. Powder microscopy of AG**

- a. A large broken piece of lamina showing venation pattern
- b. A piece of abaxial epidermis with stomata.



[ St – Stoma; VI – Vein-islets; VT – Vein-termination]