Study of Apical meristem and Anatomy of common weed Vernonia cinerea (L.) Less. from Sabarkantha District (Gujarat)

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ABSTRACT

The present study deals with the anatomical study of the Vernonia cinerea (L.) Less. Synonym is Cyanthillium cinereum (Carl Linnaeus) H. Rob. belonging to the family Asteraceae, found in Sabarkantha district as a common weed in crop fields of Sabarkantha district of Gujarat state. The anatomical study of vegetative parts like; leaf, stem and root with the help of hand sectioning. Along with it, the study of Shoot Apical Meristem and Root Apical Meristem by dissection.

Keywords: Weed, Anatomy, Apical meristem
INTRODUCTION

Apical meristem, region of cells capable of division and growth in the root and shoot tips in plants. Apical meristems give rise to the primary plant body and are responsible for the extension of the roots and shoots. Unlike most animals, plants continue to grow throughout their entire life span because of the unlimited division of these and other meristems (Beck., 2010; Doerner, 2003). Morphological and Anatomical studies are concerned with the external and internal structure of plants. It is a source of fascination for correct identification of plant taxa (Bibi, et. al; 2014).

Plant growing at an undesirable place is called weed. Weeds cause enormous reduction in crop yield, wastage of resources and human energy and are also health hazards to human beings (Oza, 1973). Plants growing in a limited resources area are in competition for resources essential for their growth like water, light, space and nutrients etc. Weeds are often excellent competitors due to extensive root system and having high root-to-shoot ratio. Weeds produce an extensive amount of seeds often reduces the food value of cereal crops and interfere in harvesting (Yanga et. al; 2019). Their seeds may also go through dormancy to ensure its survival in the next growing season (Panchal & Patel, 2016; Patel & Patel, 2017). It also decreases the aesthetic aspect of the crop fields. Knowing the taxonomic status of weeds makes their management easier (Kamoshita et. al; 2014).

MATERIAL & METHODS

The whole plant of V.cinerea along with the roots was collected from the field. Apical meristem – Shoot Apical Meristem & Root Apical Meristem were studied through dissection. For this, the tip of the plant had been taken and the shoot apex was dissected out by removing the tiny leaves. Similarly, the root tip was taken for root apex. Transverse sections of fresh root, stem & leaf were taken using hand sectioning & were treated with safranin and fast green & the sections were examined under microscope and the microphotographs were taken with the help of digital camera.
A distinctive feature of plant development is that it is continuous. Development of the above-ground portion of the plant can be traced to a small meristem in the shoot apex. The shoot apical meristem is a distinct part of the shoot apex and a functional unit (Rudall, 2007). It can be defined by the exclusion of some molecular probes, whereas other molecular probes define specific zones within the apical meristem. The shoot apical meristem makes the plant through at least four functions: initiating organs, initiating tissues, communicating signals, and maintaining itself as a formative region. (Medford, 1992)

_Vernonia_ is the most commonly found weed plant. It is an annual herb generally found in every crop field such as Wheat, Cotton, Castor, Fennel. It is also found on the wastelands and along the roadsides (Singh et. al; 2014). It belongs to the family Asteraceae. It is an erect, rarely decumbent, annual herb grows up to 75 cm in height with slender, grooved and ribbed stem. Leaves are simple, alternate, variable in shape, broadly elliptic or lanceolate, membranous or coriaceous. Flowers are pinkish and purple, rounded or flat-topped corymbs. Fruits: oblong achenes, slightly narrowed base, white hairs on one side. Flowers and fruits appear during August-April.

**Apical Meristem:**

Shoot apical meristems (SAMs) are small groups of dividing cells that initiate all of the aerial parts of the plant. According to a widely accepted model, SAMs are composed of functionally distinct zones (Sussex & Steeve, 1967). The apical meristem together with one to three young leaf primordia, constitute the shoot apex (Cutter, 1965; Hollings, 1965). The shoot apical meristem produces stems, leaves, and reproductive structures (Doerner, 2003). The first image shows the vegetative shoot apex with leaf primodia. The second image shows the reproductive shoot apex with floral primordia.
Root apical meristems produce the root cap, which consists of lubricated cells that are sloughed off as the meristem is pushed through the soil by cell division and elongation in more proximal cells. The third image shows the root apex with the terminal root cap.

**Leaves:**

The transverse section of the leaf shows the following layers:

- Epidermis is present on both the surfaces, covered with cuticle, glandular and covering trichomes.
- It was followed by layers of collenchymatous cell at both the upper and the lower side.
- The midrib was composed of a large central vascular bundle and two lateral ones.
- The lamina had single-layered palisade cells and spongy parenchyma below it.

**Stem:**

The transverse section of the stem showed the following regions:

- The stem is circular in shape with the presence of ridge and grooves.
- Epidermis: It is the outermost single layer and covered with cuticle and multicellular trichomes.
- Cortex: It is differentiated into parenchyma, collenchyma and chlorenchyma. Collenchyma occurs in patches just below the ridges. Chlorenchyma forms a few layers below the epidermis in the grooves or between the two collenchymatous patches. Three to four cells deep parenchyma forms innermost region of the cortex.
- Endodermis: Distinct casparian strips are absent. The layer is almost indistinguishable after the secondary growth.
- Pericycle: It lies immediately outside the vascular tissues. It consists of 3 to 4 cells deep groups of sclerenchyma.
- Vascular Tissue System: Vascular bundles are radially arranged.
- Pith: It was composed of hexagonal to polygonal thin-walled parenchymatous cells with few containing calcium oxalate crystals.

**Root:**
The outline of the transverse section of the root is almost circular.
- Epiblema: It showed cork, consisting of tangentially elongated, thick-walled cells filled with reddish-brown contents.
- Cortex: It was composed of thin-walled, parenchymatous cells.
- Endodermis: It separates vascular tissue from the cortex. The barrel-shaped cells are closely packed.
- Pericycle: It follows the endodermis. The cells are thin walled and compactly arranged.
- Vascular tissue system: It consists of vascular bundles. The vascular bundles are radial and exarch. The xylem and phloem form equal number of separate bundles with protoxylem towards the pericycle (exarch).
- Pith: It is small and occupies the centre of the axis. The cells are parenchymatous. After the secondary growth, pith gets completely reduced due to the addition of secondary tissues. The secondary phloem contained scattered vascular bundle and medullary rays.

The present study provides us information on the microscopic features of *V. cinerea*. Results from microscopic studies with different plant parts may aid in the correct identification and standardization of a plant or its parts (Hagemann & Wolfgang, 1992; Ahmad et. al; 2009). Furthermore, adulteration and differentiation between species may also be feasible by characterization of different plant parts.

**REFERENCES**


https://en.wikipedia.org/wiki/Plant_anatomy


