

ANATOMICAL STUDY OF DIPLOTAENIA DAMAVANDICA (UMBELLIFERAE)

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The anatomical peculiarities of *Diplotaenia damavandica* Mozaffarian, Hedge & Lamond werer studied using estereomicroscope and optical microscope. They demonstrated the peculiar characters of *Umbelliferae* family. Stem and petiole characters are very close to *Foeniculum vulgare*.

The high amount of oleo-gum-resins are due to the presence of many secretary canals and cavities in all plant parts, especially central parts of stem, petioles and leaves. The noteworthy amount of essential oil is due to the presence of many gum canals in leaves and fruits.

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مطالعه تشریحی دیپلوتنیا دماوندیکا از تیره چتریان

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مطالعه ساختمان تشریحی گونه دیپلوتنیا دماوندیکا که بوسیله استرئومیکروسکوپ و میکروسکوپ نوری صورت پذیرفته، به خوبی خصوصیات اختصاصی تیره چتریان را نشان داه است. مشخصات ساقه و دمبرگ این گونه شباهت زیادی به خصوصیات این اندام در گیاه رازیانه (فونیکولوم ولگار) دارد. مقدار قابل توجه شیرابه گیاه بدلیل وجود مجاری و حفرات ترشچی در تمام بخشهای گیاه می باشد. وجود مقدار قابل ملاحظه اسانس گیاه بدلیل وجود کانالهای مربوطه در برگ و میوه است.

INTRODUCTION

Diplotaenia damavandica (*Umbelliferae*) is an endemic species to the flora of Iran, occurs in Damavand areas in a limited geographic range at an altitude of 2200 to 3400 m. near Damavand city, 75 km E. of Tehran (Hedge & al. 1987) with the local name of "KOZAL" (Aynehchi 1986). Contact of skin with the fresh plant, following exposure to sunlight, causing photosensitization of the skin (Amin & Salehy Surmaghy 1995). From the first investigation on this species appears that it is a new source of xanthotoxin (Aynehchi 1986, Aynehchi & al. 1995). The composition of essential oil of the leaves of *D. damavandica* was investigated by Glass capillary gas chromatography and gas chromatography-mass spectroscopy and 37 compounds were identified, (Salehy Surmanghi & Amin 1996). The species was recently described and there seems to be no paper on the anatomical characters of the species. The main aim of this paper is to describe anatomical characters of the species.

MATERIALS AND METHODS

The plant materials were collected from

Damavand area at an altitude of 2200-2700 m, preserved in glycerin- alcohol (1:1) solution freshly and washed with distilled water. The voucher specimens (Kuh-e Gangi ca. 5 km on the road from Damavand to Firuzkuh, 75 km E. of Tehran, 2700 m, July 1994, Amin 6498) are deposited in the Herbarium, School of Pharmacy Medical Sciences, University of Tehran. Materials were sectioned with a hand sliding microtome and the sections were cleared with sodium hypochlorite, diluted acetic acid and stained in methylen blue and brown bismark solutions. Leitz optical photo-microscope (OPM) and Leitz estereo-photomicroscope (ESPM) were used for observing and photography of the structural characters of the ordaining tissues.

OBSERVATIONS

Root. Transversal section of the root, under ESPM, showed a rounded seciton with thin layer and dark brown colour of the cortex, a zone of parenchymatous tissue and a central part of collenchyme including vascular bundles and medullary rays, Figure 1A. The structural characters under OPM, showed the vertically cork cells, suberoids

and fellogen, in secitonal view. The secretary canals appear in parenchymatous layer and the vascular bundles were observed in the central parts of the roots, Figure 1B.

Leaf. Transversal section of the leaf under ESPM and OPM, showed a narrow bladder like segment with sparse 1 celled hairs just on the main veins., Fig. 1C. Epidermal cells were followed by longitudinal parenchymatous cells and 5 canals just in 7 parallel reverse positions. The compacted vascular bundles are just under the secretary canals and associated with sclerenchymatous tissue, Figure 1C. Epidermal cells were thick walled, anomocytic and anisocytic stomata with 3-4 subsidiary cells were appeared on both surfaces, Figure 2A. Sandy crystals occur in epidermal cells, Figure 2B.

Stem. Transversal section of the stem, under ESPM, showed ribbed section with a thin epidermal layer and parenchymatous tissue in the central parts, Figure 2C. Two alternative arrangements of vascular bundles and secretary canals appear just in the beneath of the epidermis. The xylem portions of the bundle are united to one another by interfasciclr, mechanical elemetns. Secretary canals, present in the

inner part of the primary bark, also occur at the periphery of, or scattered in the piths. Central portion formed with rounded parenchymatous cells, bearing many secretary cavities. Vessesls appeared in two rings, surrounded by sclerenchymatous tissue. The character of the stem is very close to *Foeniculun vulgare* (Metcalf & Chalk 1950).

Petiole. In transverse sections, exhibiting a considerable range of vascular bundles widely arranged in crescents, regular circles and medullary stands present within the crescents, Figure 3A. Secretary canales, present in the pericycle and cortex of the petiole, just on the tops of vascular bundles. Central portion formed with rounded parenchymatous cells and clustered crystals, bearing secretary cavities. The character of the petiole is very close to *Foeniculum vulgare* (Metcalf and Chalk 1950).

Vessels. Vessels are in very small clusters, spiral, reticulate or parallel arrangements.

Fruit. Transversal section of the fruit exhibits a typical shape with 5 ridges (2 lateral and 3 dorsal). Vascular bundles arranged at the ridges and the secretary canals (vittae) present between the ridges; 4 vittae on the dorsal and 2 or 4 vittae on

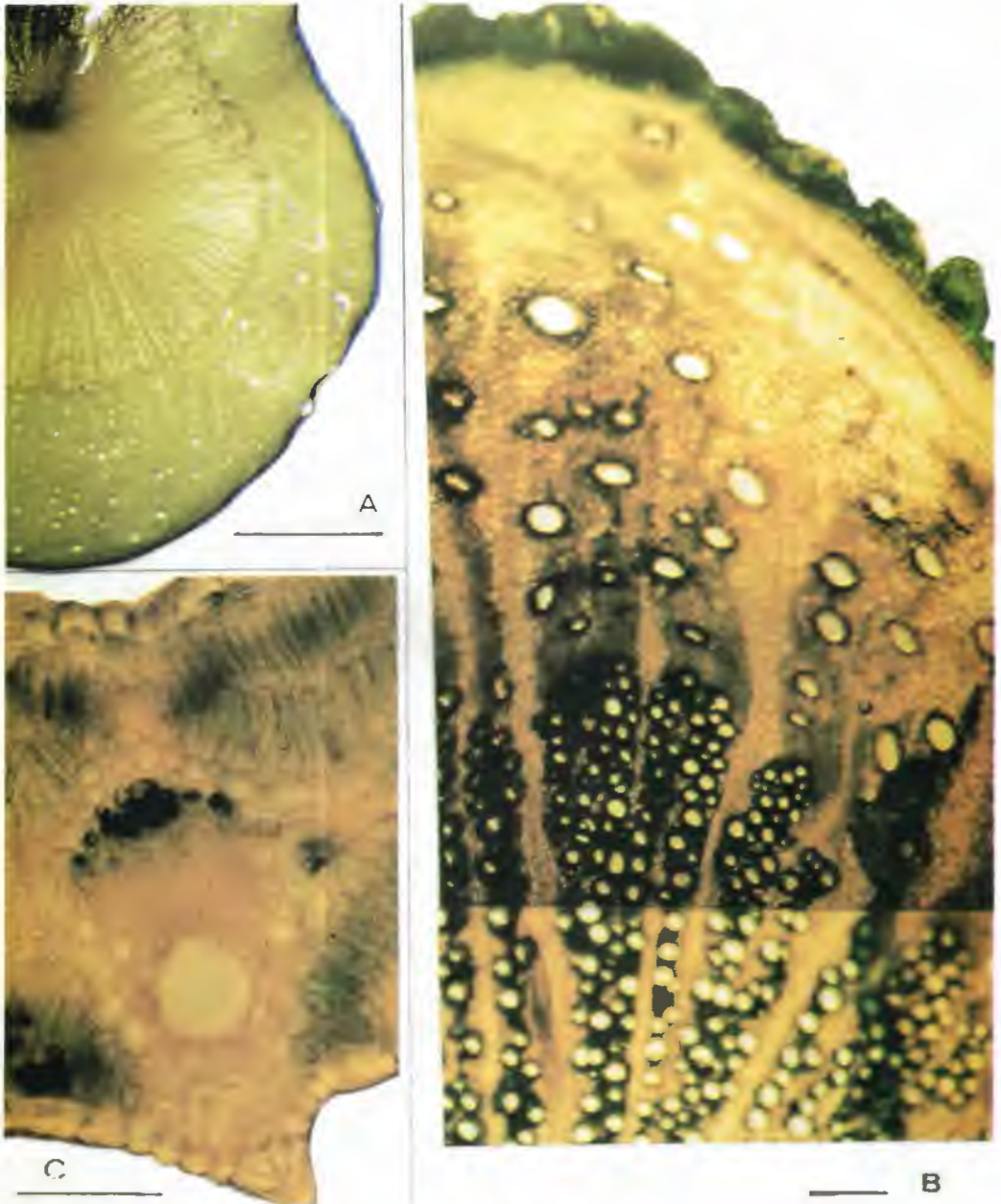


Fig. 1. *Diplotaenia damavandica*. -A & B. Root, transversal section (bar.=5 mm and 1 mm). -C. Leaf, transversal section showing one cell hair on the midrib (bar= 50 μ m).

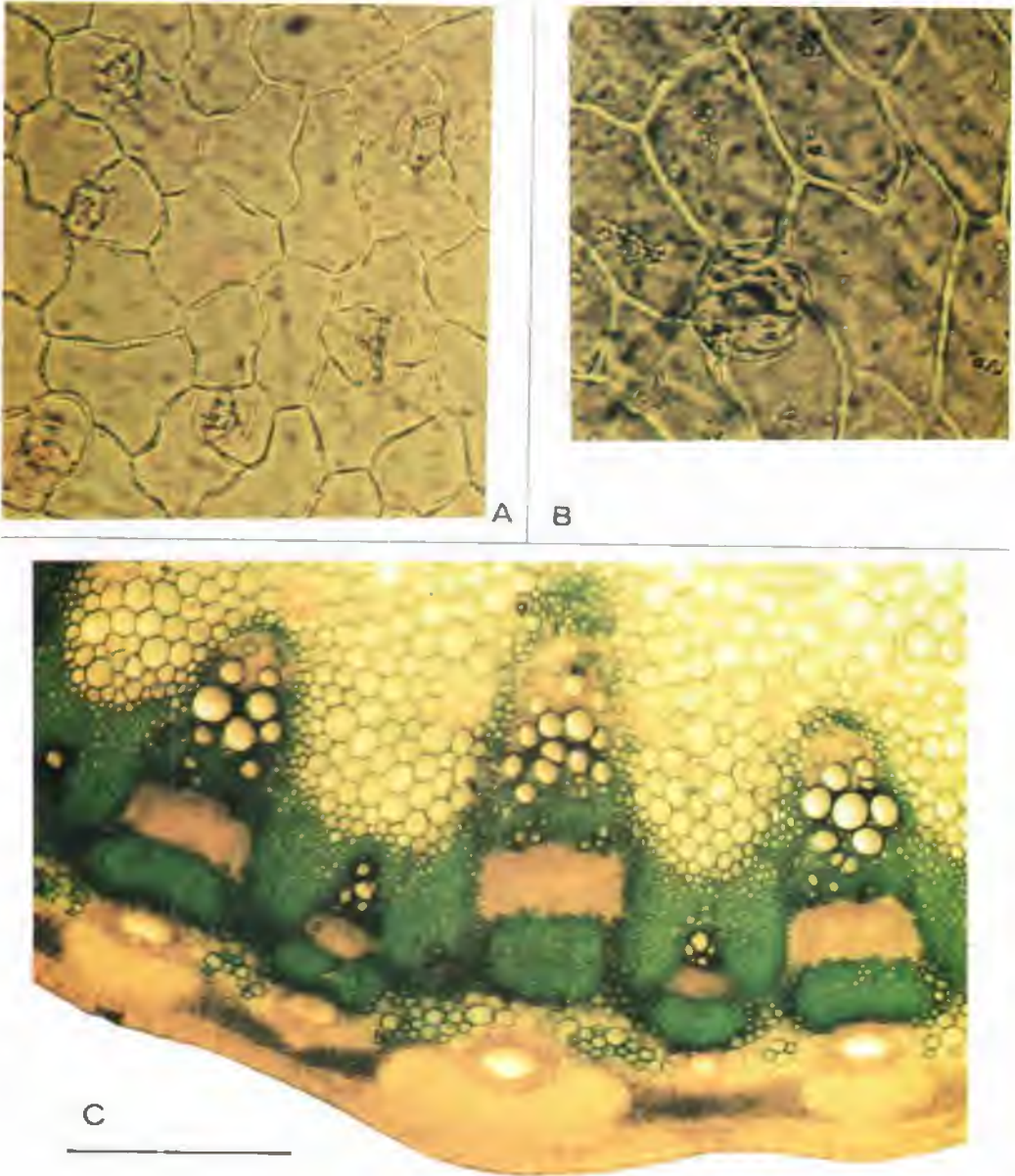


Fig. 2. *Diplotaenia damavandica*. -A. Leaf, epidermal cells showing anomocytic and anisocytic stomata. -B. Leaf, epidermal cells showing sandy crystals. -C. Stem, transversal section showing two alternative arrangements of vascular bundles (bar= 100 μ m).

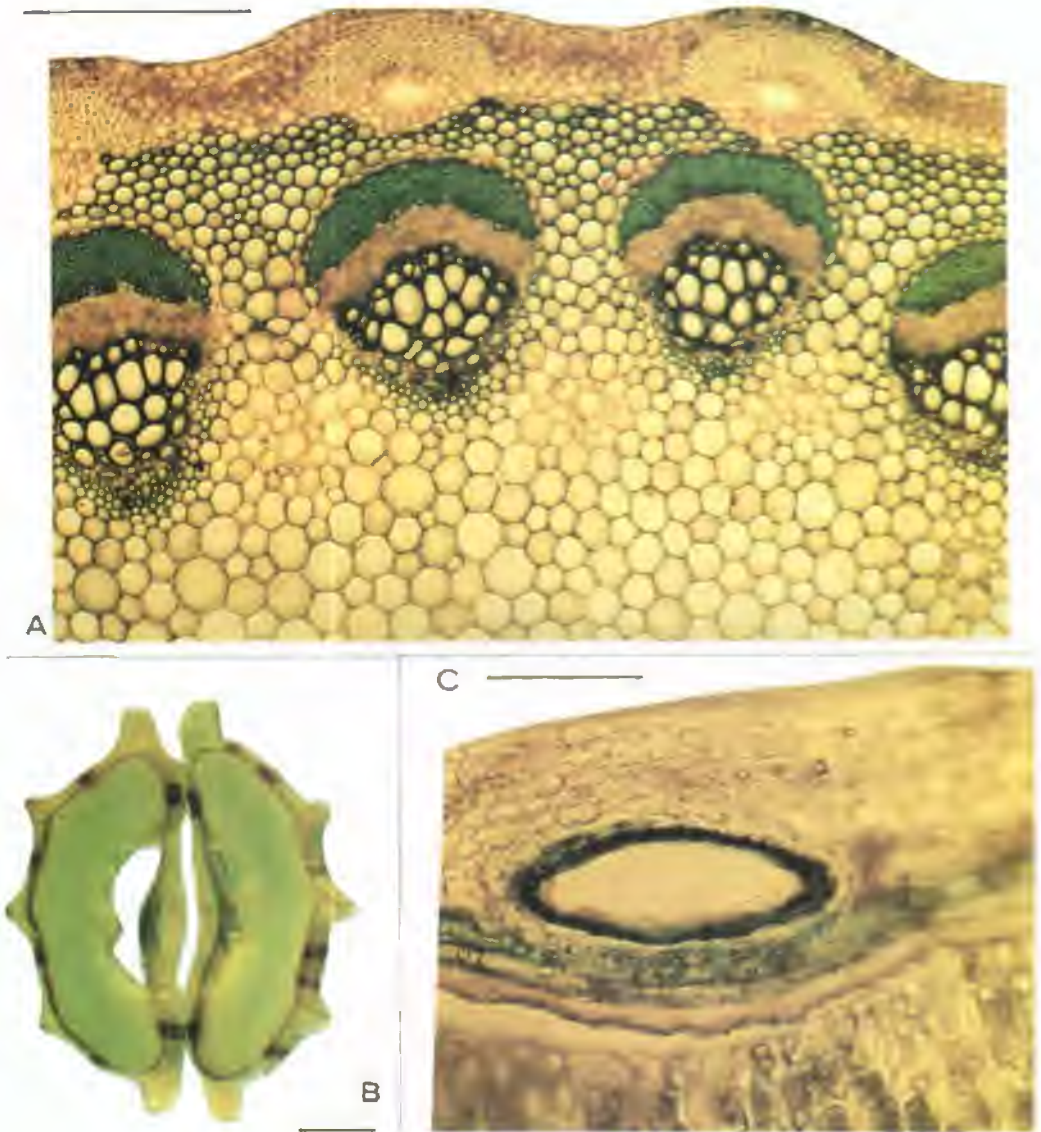


Fig. 3. *Diplotaenia damavandica*. -A. Petiole, transversal section exhibiting a considerable range of vascular bundles widely arranged in crescents (bar= 100 μ m). -B & C. Fruits, transversal section showing 5 ridges and 4 vittae on the dorsal and 2 or 4 vittae on the commissural surfaces, in B (bar= 1 mm), a dorsal vittae and endocarp cells bearing aloren particles in C (bar= 50 μ m).

the cummisural surfaces are appeared, Figure 3B. Inner epidermis appears beside the epidermis of testa as a ring of colenchymatous cells. Endocarp very clearly arranged in compacted and unequal cells, bearing aloren particles, Figure 3C.

RESULTS AND DISCUSSION

As there is no previous anatomical report on *Diplotaenia damavandica* in the literature, this study is the first report. Anatomical investigation of the species showed typical characters of stem and petiole, very close to *Foeniculum vulgare*. The study showed that, the high amount of oleo-gum-resins of plant, are due to the presence of many secretory canals and cavities in all parts of plant, especially in the central part of stems, petioles and leaves. The noteworthy amount of essential oil of this plant is due to the presence of many gum canals in leaves and fruits. The presence of a rich amount of oleo-gum-resin in roots are due to the presence of many large cavities in the

parenchymatous layer of the root. There are few hairs only on the main veins of lower surface of the leaves, also the presence of the trichoms are not significant.

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