

HISTO-ANATOMICAL STUDY ON THE **Nigella Damascena* L. (RANUNCULACEAE) SPECIES

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Abstract. The paper contains the histo-anatomical study of the root, stem and leaf's rachis of the * *Nigella damascena* species. The root has circular contour in cross section and secondary structure resulted from the activity of the both lateral meristems (cambium and phellogen). The stem has a circular contour in cross section and primary structure with: epidermis, angular collenchyma in the ribs, collenchyma between the ribs, vascular bundles, and pith. The leaf's rachis has the shape of "V" letter presenting a characteristic structure: epidermis covered by a thick cuticle, angular collenchyma, vascular bundles, and fundamental parenchyma.

Key words: * *Nigella damascena* L., histo-anatomical study.

Rezumat. Studiu histo-anatomic asupra speciei **Nigella Damascena* L. (Ranunculaceae). Lucrarea cuprinde studiul histo-anatomic al rădăcinii, tulpinii și rahisului foliar provenite de la specia * *Nigella damascena*. În secțiune transversală, rădăcina are contur circular și structură secundară, datorită felogenului și cambiului. Tulpina prezintă contur circular și următoarele țesuturi: epidermă, colenchim angular, fascicule libero-lemnoase, parenchim medular. Rahisul foliar are forma literei "V", fiind delimitat la exterior de epidermă, acoperită de o cuticulă groasă și cuprinzând în poziție hipodermică colenchim angular, iar în parenchimul fundamental numeroase fascicule libero-lemnoase.

Cuvinte cheie: * *Nigella damascena* L., studiu histo-anatomic.

INTRODUCTION

The * *Nigella damascena* L. (*Ranunculaceae*) species, love-in-a-mist, is a floristic element naturalized and cultivated in Romania. It is a honey-bearing plant, with blue flowers, spontaneous in Syria and South of Europe, frequently cultivated as ornamental (CIOCĂRLAN V., 2000; TOMA CLAUDIA-CRINA, 2004). Considering the chemical composition, this species contains a diversity of active principles: volatile oil, saponosides, tannin, polyphenols, alkaloids, fatty acids, heteroglycans, carotenoids (ISTUDOR VIORICA, 2001; TOMA CLAUDIA-CRINA, 2004).

The aerial parts of this species are used for their carminative, stomachic, diuretic, vermifuge and aphrodisiac properties, for the treatment of some digestive diseases (anorexia, gripes, flatulence, and intestinal parasites), oedemas and sexual male dysfunctions. The seeds are used sometimes for the flavouring of various kinds of cheese (cottage-cheese) and cookies. The volatile oil from the aerial parts presents anti-inflammatory and antihistaminic action, recommended in asthma and asthmatic bronchitis (ISTUDOR VIORICA, 2001).

MATERIAL AND METHODS

Cross-sections through the root, stem and leaf's rachis of the *Nigella damascena* species, collected in June 2006, from the Vladimirescu village, County of Arad, have been made using the anatomic razor. The cross-sections were washed with distilled water, and then treated with Javel water. The staining was made using the Genovese reagent (Congo red and chrisoidine), which put in evidence the cell walls: red for the cellulose, yellow or orange for the lignine, and golden-yellow for the cutin (ANDREI & PARASCHIVOIU, 2003; TOMA & GOSTIN, 2000; TOMA CLAUDIA-CRINA, 2004). The examination of the cross sections has been made using an AMPLIVAL microscope with a SONY DSC-P52 photographic digital camera, at different objectives, i.e.: $\times 4$, $\times 10$, and $\times 40$.

RESULTS AND DISCUSSIONS

The interpretation of the cross sections has been made in the manner of the recognized authors (TOMA & RUGINĂ, 1998; TOMA & GOSTIN, 2000).

The root structure

The root presents circular contour in cross section and secondary structure (Figs. 1–3).

The cork has big cells, slightly tangentially elongated, with suberized walls.

The phellogen has small cells, with thin cellulosic walls.

The phellogen presents big cells, uniformly disposed, without intercellular spaces.

The conducting tissues form two concentric rings. At the external part there is a thin phloem ring, formed by sieve-tubes, companion cells and phloem parenchyma.

The cambium consisted of 2–3 layers, tangentially elongated.

The secondary xylem represents the most developed tissue of the root presenting big vessels.

They are a few primary small vessels in the axle of the root. The medullary rays are multicellular, one-seriated, and slightly lignified.

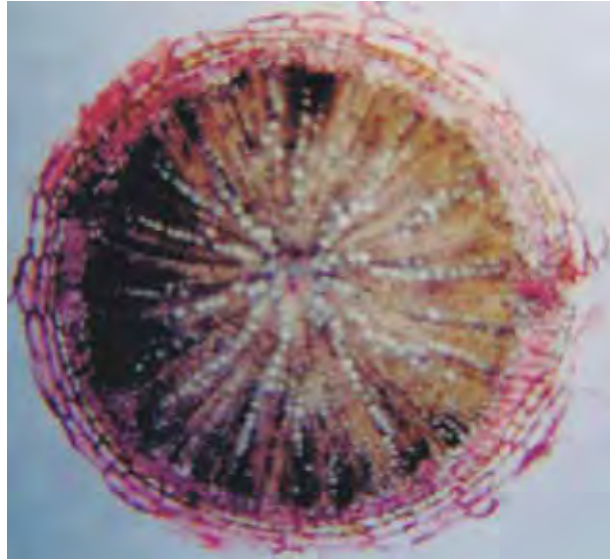


Figure 1. Cross section through the root, ob. $\times 4$ [Secțiune transversală prin rădăcină, ob. $\times 4$]

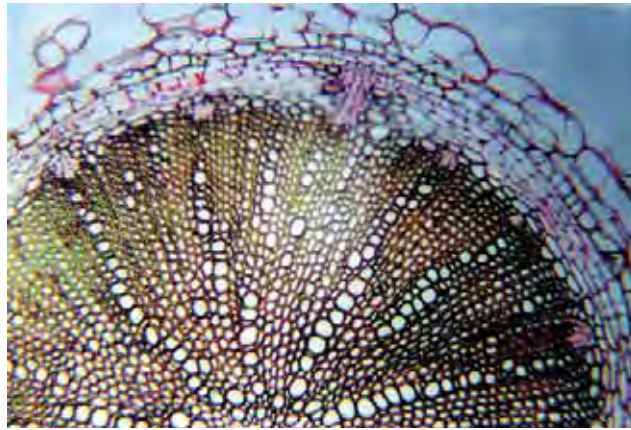


Figure 2. Cross section through the root, ob. $\times 10$ [Secțiune transversală prin rădăcină, ob. $\times 10$]

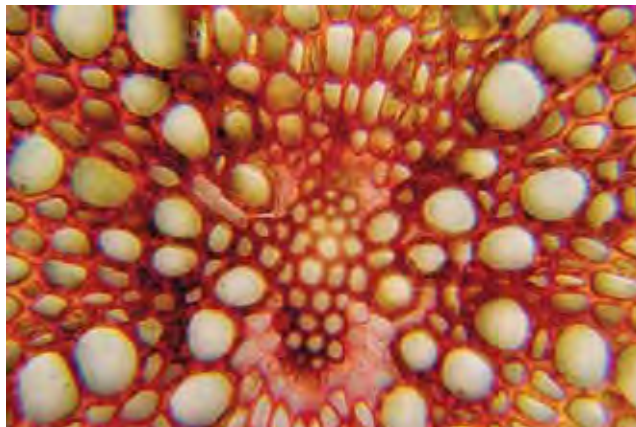


Figure 3. Cross section through the root, at the central cylinder level, ob. $\times 40$ [Secțiune transversală prin rădăcină, la nivelul cilindrului central, ob. $\times 40$]

The stem structure

The stem has a circular contour, in cross section and primary structure (Figs. 4–6).

The epidermis is consisted of isodiametric tangentially elongated cells, which present thick periclinal walls, the external one being covered by a thick cuticle. At the rib's level, under the epidermis, we can observe 4–5 layers of angular collenchyma, and 3–4 layers of collenchyma between the ribs.

The conducting tissues are organized in numerous vascular bundles of collateral open type, disposed on a circle. At the periphery of the phloem, cordons of sclerenchymatous fibres are present. Into the libero-ligneous fascicle the ligneous tissue, made from 2–3 vessels of big calibre, with a small amount of cellulosic xylem parenchyma, few

ligneous vessels with small calibre and ligneous parenchyma predominate.

The pith is parenchymatous cellulosic, presenting a big central aeriferous cavity resulted from the disorganization of some cells.

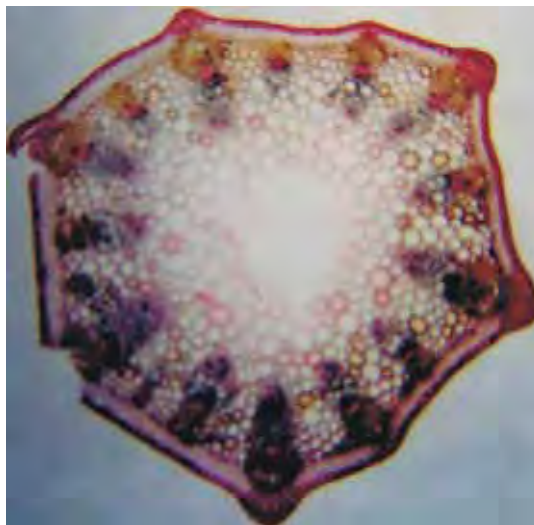


Figure 4. Cross section through the stem, ob. $\times 4$ [Secțiune transversală prin tulpină, ob. $\times 4$]

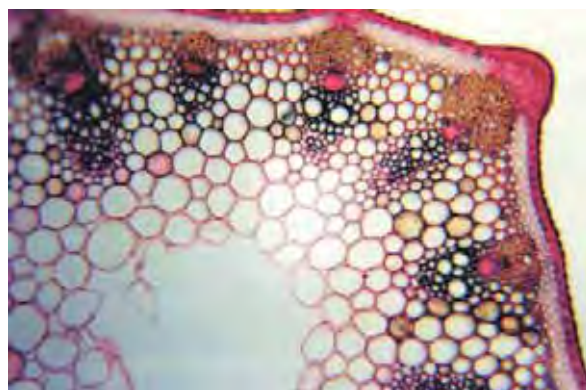


Figure 5. Cross section through the stem, ob. $\times 10$ [Secțiune transversală prin tulpină, ob. $\times 10$]

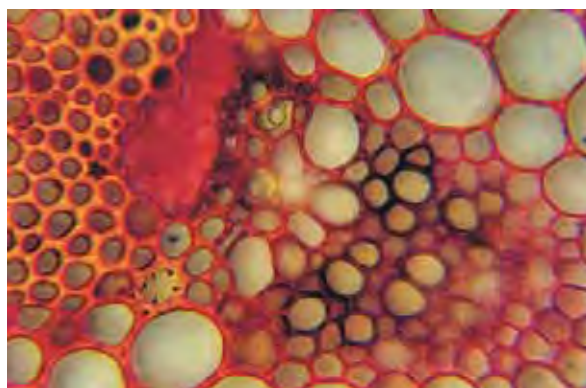


Figure 6. Cross section through the stem, ob. $\times 40$ [Secțiune transversală prin tulpină, ob. $\times 40$]

The structure of the leaf's rachis

In the cross section, the leaf's rachis has the shape of "V" letter (Fig. 7) and is delimited by an epidermis, consisted of isodiametric cells with thick periclinal walls; the external walls are covered by a thick cuticle.

In front of the median vascular bundle, under the lower epidermis, we can observe 4–5 layers of angular collenchyma.

Under the lower epidermis, 3–4 layers of collenchyma are present.

In the fundamental parenchyma, numerous vascular bundles with various sizes may be observed (Fig. 8).



Figure 7. Cross section through the leaf's rachis, ob. $\times 10$ [Secțiune transversală prin rahisul foliar, ob. $\times 10$]



Figure 8. Cross section through the leaf's rachis, ob. $\times 40$ [Secțiune transversală prin rahisul foliar, ob. $\times 40$]

CONCLUSIONS

The root of the **Nigella damascena* species has circular contour in cross section and secondary structure resulted from the activity of the both lateral meristems (cambium and phellogen).

The stem has a circular contour in cross section and primary structure with: epidermis, angular collenchyma in the ribs, collenchyma between the ribs, vascular bundles, and pith.

The leaf's rachis has the shape of "V" letter presenting a characteristic structure: epidermis covered by a thick cuticle, angular collenchyma, vascular bundles, and fundamental parenchyma.

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