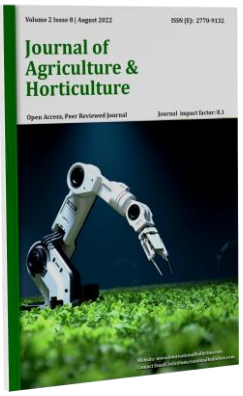

ANATOMICAL STRUCTURE OF THE SEED OF MEDICINAL PLANT ALLIUM MOTOR (ALLIUM TSCHIMGANICUM B. FEDTSCH)

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Abstract

The article presents results of the study of the anatomical structure of the seed of the Allium motor plant (Allium tschimganicum B. Fedtsch) belonging to the bows (bulbous) family (Alliaceae J.G. Agardh). The seed consists of outer and inner layers: seed coat, cotyledon, endosperm. The outer layer (seed coat) contains melanin and forms a strong melanin shell. The seed coat protects all cells and tissues, the endosperm contains essential oils and embryo. The embryo is cylindrical in shape and equal in size to the endosperm. The endosperm consists of parenchyma tissue that is densely packed and full of essential oils. The results of the study show that the studied objects are adapted to the conditions of the living environment. Diagnostic signs: densely arranged parenchyma cells, endosperm having 55% of the seed size and 45% of the seed size is the embryo, the presence of essential oils glands are characteristic diagnostic signs.

Key words: *Allium tschimganicum B. Fedtsch*., seed, Allium motor, embryo, parenchyma, cell, endosperm, essential oil, seed radicle, melanin, cotyledon.

Introduction

Current demand requires the cultivation of multifaceted (food, medicinal, spice, dye, technical) plants and creation of their raw material base. At the same time, it is possible to include Allium motor plant (Allium tschimganicum B. Fedtsch) among such plants. Because this plant is particularly noteworthy for its medicinal properties, that is, it is rich in many vitamins, and for this reason, it is widely used as food by the local population.

In recent years, many studies have been conducted on the *Allium* genus, including information on the systematics, taxonomy, biology, morphology and introduction of representatives of the genus, which was cited in the research of foreign scientists R.M. Fritsch, 1990; V.A. Cheremushkina, 2004; G.A. Volkova, 2007; L.A. Tukhvatullina, L.M. Abramova, 2011. Information on the growing areas, introduction and distribution of the Allium genus in the vegetation cover common in Uzbekistan, is available in “Flora of Uzbekistan” (2016) source and the works of F.O.Khasanov (2008). However, these studies cannot fully reveal the morphological, anatomical, biological and reproductive characteristics of *Allium* species in natural conditions. Accordingly, the study of characteristics of representatives of this group in natural and introduced conditions, and the determination of their viability and factors

affecting to this viability, reproductive characteristics, development of measures to protect populations of species in need of protection, and preservation them in ex-situ conditions are of significant scientific and practical importance.

The productivity of plants and the quality of the product in agriculture depend on the quality of the seeds used for planting. A seed is considered a living organism, and a plant develops from its radicle. Therefore, the seed for planting will embody the biological, economic and varietal characteristics of the future plant. For this reason, since the history of agriculture, great attention has been paid to the quality characteristics of seeds. The internal structure of the vegetative organs of the object has been studied [10, 11], but the internal anatomical structure of the seed has not been sufficiently studied yet [12, 13, 14, 15].

Allium motor (*Allium tschimganicum B. Fedtsch*) plant is a herb that belongs to wild bows family. It grows naturally mainly in Piskom, Chotkal foothills of the western Tien-Shan mountain range [1].

Allium motor plant is especially valued for its richness in various vitamins. It contains vitamins C, B, B_2, PP, E and provitamin A, which are useful for the human body. In addition, information can be found in the literature about the presence of sugar and protein substances and many macro and microelements in the plant [2].

In recent years, taking into account the fact that the information in the literature about the seeds of the Allium motor plant is different, we found it necessary to study the information about the seeds of this plant in detail.

Materials and Methods

Experiments were conducted in the Medicinal Plants department of Tashkent State Agrarian University during the years 2021-2023.

In the research, the seeds of the Allium motor (*Allium tschimganicum B. Fedtsch*) plant were fixed in 70% ethanol according to the generally accepted method, and the fixed material was studied in cross-section [Trankovsky, 1979]. In the study of the anatomical features of the seed, temporary preparations and the MOTIC B1 microscope were used to prepare a cross-section of the seed by hand.

The preparations were dyed with safranin. Cells and tissues were measured using a micrometer MOB-15. Quantitative measurements of several traits of the seed, the thickness of the seed coat, radicle and endosperm were carried out in a generally accepted way [Dospekhov, 1985].

Statistical analysis of the data was calculated using a personal computer (MS Excel) using generally accepted methods. Photomicrographs were taken using a digital camera, and mathematical analyzes were performed using a MOTIC microscope.

Results and Discussion

A seed is a generative organ of plants and performs the functions of propagation and protection from adverse external conditions; it usually develops from the seed pod after fertilization [1, 2, 3, 4, 5]. The seed consists of an embryo, seed coat and often reserve nutrients (endosperm). Cotyledon (embryo) develops at the expense of reserve nutrients; these substances can accumulate in the endosperm and perisperm. In the seeds lacking endosperm and perisperm, reserve nutrients (protein, fat, starch, sugar, vitamins) accumulate in cotyledon. The seed coat is formed from the wall of the seed pod. The term of seed germination is different and it depends on the storage conditions of the seed.

The object of the research is Allium motor onion (*Allium tschimganicum B. Fedtsch.*) plant and its seed's anatomical structure has been studied (fig.1, 2).

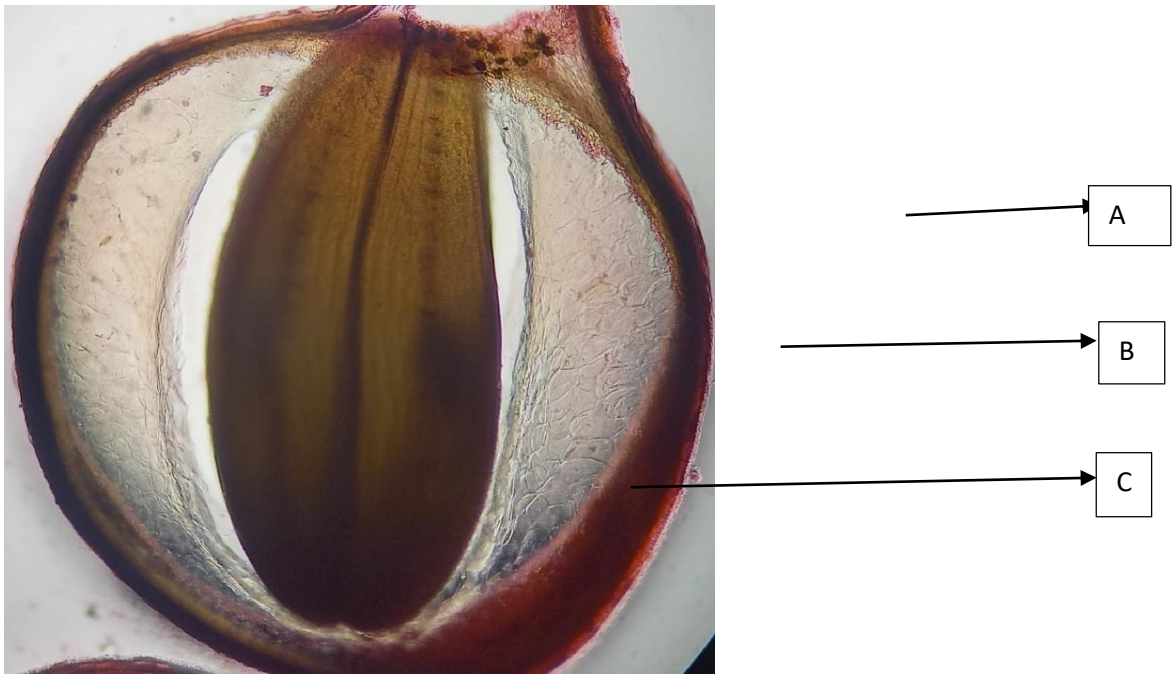
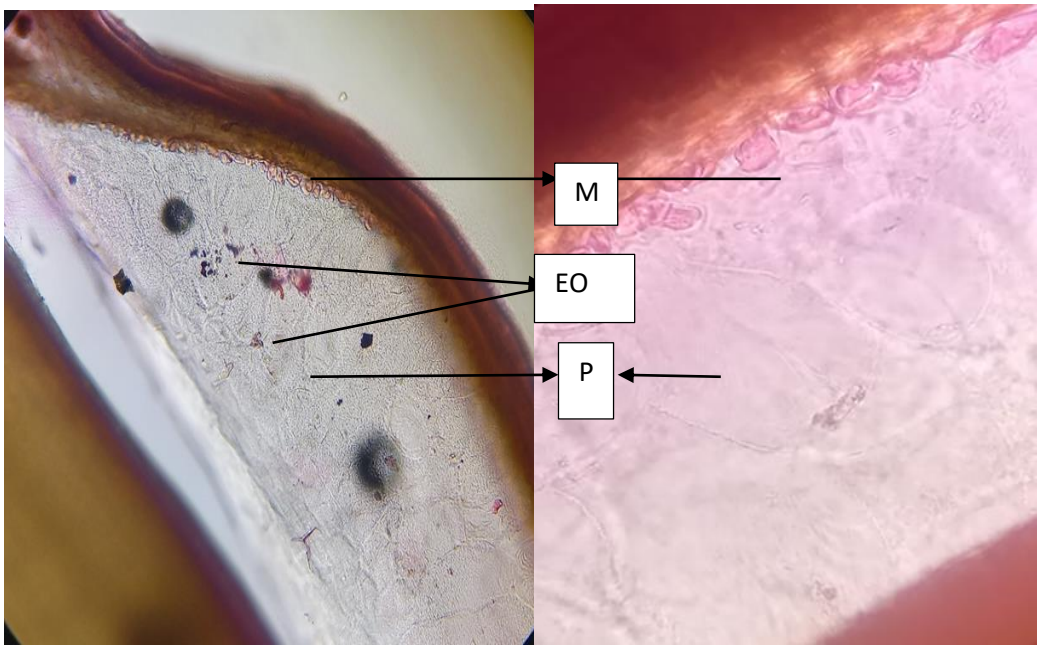


Figure-1: Internal structure of the seed of Allium tschimganicum B.Fedtsch.:
A – seed coat, B – endosperm, C – cotyledon.



A B

Figure-2: Internal structure of the seed of Allium tschimganicum B.Fedtsch.:
A – seed coat, B – seed endosperm: M – melanin, EO – essential oils, P – parenchyma.

The thickness of the seed coat is generally 10-15% (table-1).

Table-1

Anatomical parameters of seed structure of *Allium tschimganicum*

№	raits	parameters, µm
1	eed diameter	19,2±0,7
2	eed coat thickness	2,3±0,1

3	ndosperm thickness	8,6±0,3
4	otyledon thickness	7,5±0,3

The seed consists of outer layer (seed coat) and aleurone layer, the embryo and endosperm. The outer layer contains melanin, which forms a strong melanin coat. The outer integument protects the underlying cell structure called parenchyma, while the endosperm contains essential oils and large nuclei. The embryo is cylindrical and equal to the endosperm by size. The endosperm consists of parenchyma tissue that is densely packed and full of essential oils. The results of the study show the ability of the studied objects to adapt to the conditions of the living environment.

Diagnostic signs: densely arranged parenchyma cells, endosperm having 55% of the seed size and 45% of the seed size is the embryo, the presence of essential oils glands are characteristic diagnostic signs.

The structure of the seeds of Persian onion and giant onion obtained from the Tashkent Botanical Garden was studied, and the following diagnostic features and traits of this species were described: the seed consists of inner and outer coats, the presence of melanin, and the endosperm consists of parenchyma cells [13].

In the literature, the effect of pre-sowing seed treatment on the structure of the onion crop has been studied, onion seeds have a strong endosperm which contains essential oils, so the fertilization period is highly dependent on soil moisture, i.e., the reasons why the oil does not transmit moisture, and also on the quality of the seed. Also, it was recommended to pay attention to seed soaking and soil moisture in seed treatment to obtain good yields from onion [18].

Scanning electron microscopy (SEM) studies were conducted to study the seed radicle and internal structure of ten varieties of onion. SEM observations showed the presence of cracks and fissure in the seed coat in all varieties. Cracks were more observed near the hilum zone. The largest part of the elongated embryo is located under the cracked seed coat. Fungal infection was observed in mother seeds, especially in mother seed cracks. Seed coat structure, embryo condition, and seed coat microflora have been found to be factors affecting onion seed viability [19].

The salinity tolerance of onion seeds was studied in pots by artificially salting with sodium chloride, sodium sulfate. Onion seed yield decreased by 6% due to increased soil salinity. Seed yield was reduced by up to 50% in the non-saline control. The weight of a thousand seeds did not change under saline conditions. It was found that salinity had no negative effect on seed germination [20].

Conclusion

Thus, a plant seed consists of an outer and an inner coat, an embryo and an endosperm. The outer layer contains melanin, which forms a strong melanin coat. The outer integument protects the cell structure called parenchyma, the endosperm contains essential oils. Allium motor plant seeds have a strong endosperm, and the germination of the seeds depends on the soil moisture and the quality of the seeds. That is, it was suggested that germination is delayed due to the fact that essential oils do not transfer moisture to the embryo.

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