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The anatomic characteristic of a *Sedum acre* L, caustic from various ecological conditions of South and the Central Kazakhstan

The purpose of the this work was comparative studying of a morphological-anatomical structure of vegetative organs of *Sedum acre* L. from various conditions of growing. When comparing the cuts received from various ecological growth conditions it is visible that in the conditions of the Central Kazakhstan the leaf of a *Sedum acre* L. in a cross cut differs in the smaller size of cells, powerful development of a cuticle. It isn't revealed special distinctive signs in the conductive system. It is result of that soil climatic conditions of Southern Kazakhstan that are optimum for growth and cultivation of a *Sedum acre* L. Thus, as a result of carrying out the morphological-anatomical analysis of vegetative organs of *Sedum acre* L. from various growth conditions it is established that with the general signs in their structure along there is more and less expressed distinctions which are explained by differences of growth place climatic factors.

Key words: introduction, adaptive signs, Central Kazakhstan, Southern Kazakhstan, *Sedum acre* L, vegetative organs, cuticle.

In recent years, interests in different types of the family of *Crassulaceae* are increased (*Crassulaceae* DC.) (from birth *Orostachys* L, *Sedum* L, *Hylotelephium* L, *Sempervivum*, etc.), which are used in medicine, food industry, and as ornamental plants for phyto [1, 2]. The representatives of the family of *Crassulaceae* are among leaf succulents. Due to the peculiarities of the biology of these species they are well adapted to life in a difficult environment and are presented in a wide range of habitats from riparian forests to rocky steppes. High adaptive capacity to survive of *Crassulaceae* native species in the steppes of southern Kazakhstan and on rocky outcrops of the slopes of the mountains, opens up wide possibilities for their use in conditions where traditional decorative plants suffer from lack of moisture.

The object of the research is sedum (*Sedum acre* L.) from the family of *Crassulaceae* (*Crassulaceae*) (Figure 1).



Figure 1. Appearance of sedum

There are many folk names of this plant: the young island skripun, zhivuchka, pletochkoy, stone pepper, bird bread, warty grass. Sedum — a perennial plant with stems densely leafy, small fleshy, dark green leaves related to succulents. It prefers dry open areas and sandy soil: coastal sand, rocky and crushed debris, limestone, field margins, railroad, and masonry of old buildings. A necessary condition is the lack of higher plants. Long grasses turn into competitors for sunlight. Without the sun's rays stonecrop cannot survive.

According to the literature grass sedum is an irritant, antimalarial, diuretic and stimulating effect, increases peristalsis. Furthermore, it relaxes the uterine musculature and increasing blood pressure.

The aim of our study was a comparative study of the anatomical structure of vegetative organs of caustic treatment of various environmental conditions in the Southern and Central Kazakhstan.

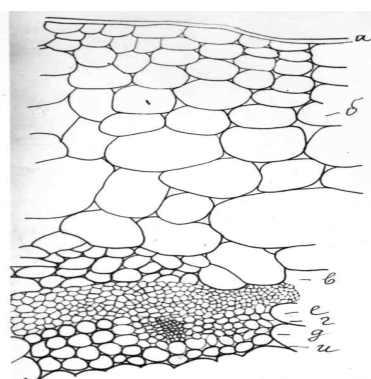
The studies were conducted at the Department of Botany at the Karaganda State University named after academician Ye.A. Buketov.

For the study vegetative parts were used in fixed 70 % freshly alcohol (stem, leaf in flowering stage). Anatomical studies of objects were carried by the standard technique [3–5], by preparing temporary and permanent preparations.

The obtained anatomical sections of the aerial organs (leaf, stem) of the studied species give an idea about the features of its internal structure, as we have noted differences in the size, the shape of the individual elements of that total in their structure with other plants, also allows you to set some morph biological features of the object.

In the study of anatomy stem sedum assembled in Almaty it was revealed that the stem in cross-section consists of one epidermal cell number, which are covered with cuticle. Cross sections of the stem, made at the base through the middle part and the tip have the same structure. The outline of the stem is round.

The stem has a single-layered epidermis, which is the end of 1 year or second year of life is subjected to suberization. During the epidermis should parenchyma, consisting of 7–8 layers of parenchyma cells. These cells have a rounded-oval shape and perform water capacity function (Figure 2).

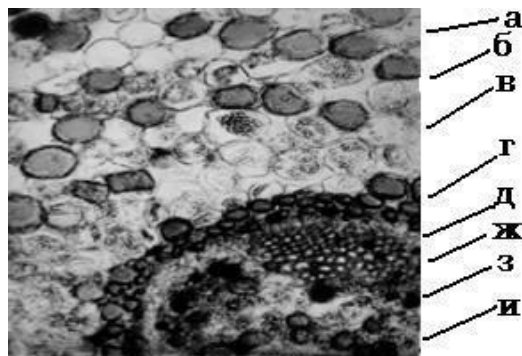


а — epidermis, б — parenchyma, в — sclerenchyma, г — phloem, д — xylem, е — cambium, и — core

Figure 2. The anatomical structure of the stem sedum (Almaty)

The conductive open-system consists of the phloem of the stem in the form of a closed ring of the xylem, phloem covering ring. Cambium is expressed very weakly. Next is 3–4 straight-sclerenchymatous belt. Sclerenchyma cells border on cells of the cortical parenchyma. The central part of the stem cells of the core occupied by 6–8. Large-core. Shape rounded cells.

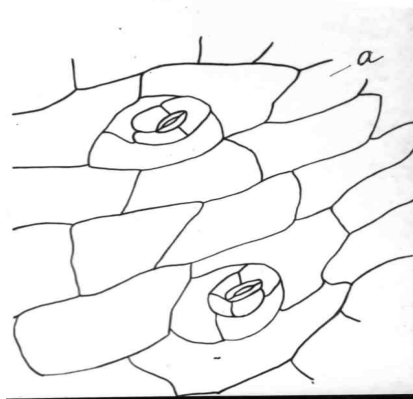
These photomicrographs (Figure 3) sedum of the conditions of Central Kazakhstan have the same structure, no differences were found by us. But it should be noted that the core cells are smaller and parenchyma cells from the periphery compacted to the center and reduced in size, it is connected with climatic conditions of growth.



а — the cortical parenchyma, б — alkaloids, в — secretory containers, г — sclerenchyma, д — phloem, ж — cambium, з — xylem, и — core

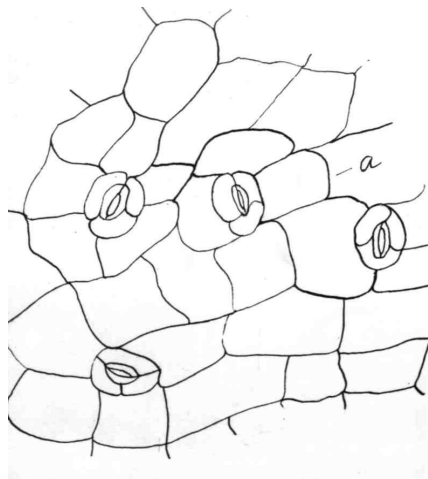
Figure 3. Micrograph of stem sedum

In comparison of leaf epidermis from different environmental growing conditions we have identified the following differences: epidermal cells in a Southern Kazakhstan (Figure 6, 7) conditions as the lower and upper large sizes are different, the number of stomata has more elongated cells, and tortuosity was revealed on the walls of the lower epidermis, which we found in the epidermis of the leaf under the Central Kazakhstan (Figure 4, 5).



A — the cells of the epidermis

Figure 4. The upper leaf epidermis sedum (Karaganda)



A — the cells of the epidermis

Figure 5. The lower epidermis of the leaf sedum (Karaganda)

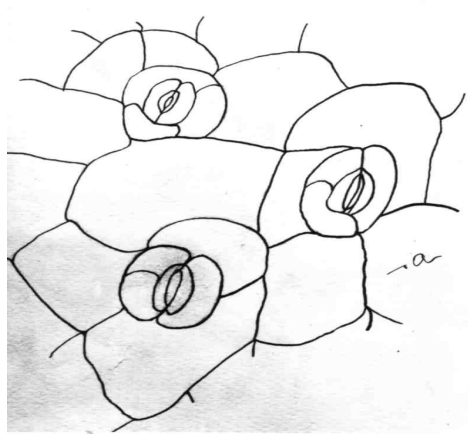
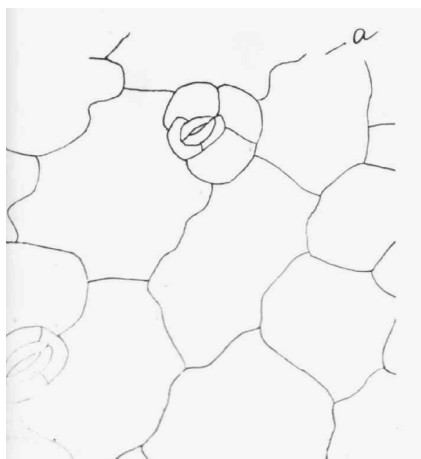


Figure 6. The upper leaf epidermis sedum (Almaty)



A — the cells of the epidermis

Figure 7. The site of the lower epidermis of the sheet sedum (Almaty)

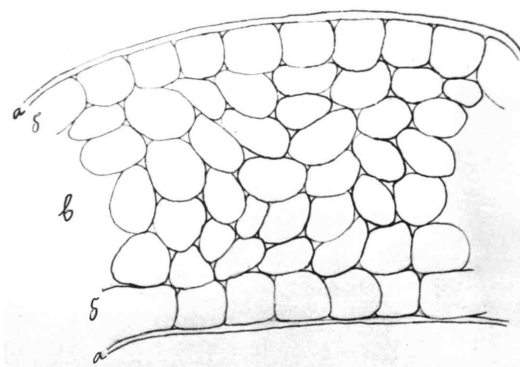
To investigate the upper leaf epidermis, the epidermis has been taken with a dissecting needle. The pieces are then transferred to a mixture of the epidermis and glycerol alcohol.

The epidermis cells have a straight round shape, there are stomata. The stomata type — lentiform, still thickened. Two identical crescent-shaped cells arranged symmetrically. About stomatal cells have paradiatsitnoe — cross-cell parallel arrangement. Pair of cells arranged along a plane, the other two pairs short in their polar parts (Figure 8).

The lower epidermis of the leaf — cells are large and has the stomata, but in smaller numbers than on the top. The stomata type is the same. But about stomatal cells have a different arrangement. They are characterized by anizotsitny type arrangement [7], unequal cell. When different values of cells are mixed around the meridional plane. Lower epidermis consists of cells with respect slightly winding circuits. It should be noted that the hairs are not found on either the upper or the lower leaf epidermis.

Probably it has influence on dwelling in dry conditions little moist and rocky — stony soils, faces a lack of water.

A cross section of the sheet has a number of distinguishing features on the anatomical structure in comparison with other plants (Figure 8).



а — cuticle, б — epidermis, в — mesophyll, д — lower epidermis

Figure 8. A cross section of the sheet sedum (Karaganda)

The cross section of the leaf epidermis consists of a single layer of cells with a thin cuticle. Leaf mesophyll presented parenchymal cells, filled with chlorophyll grains. Differentiation in the columnar and spongy tissue is not. Mechanical tissue sheet are not developed. A hair or other formations were not detected in the epidermis.

Table presents quantitative sedum anatomical structures from different conditions.

Table

Quantitative indicators of anatomical structures from different sedum conditions

| Plant height (cm) | Sheet | | | | | Bine | | | | Root | |
|--------------------------|------------|----------|--|--|--------|------------|----------------------|--------|--------|--------------------------|-------------------------------|
| | length, cm | width cm | the number of layers of the parenchyma | the number of stomata to 1 mm ² | | main | | side | | maximum indentation (cm) | width at the root collar (cm) |
| | | | | lower | higher | length, cm | number of internodes | length | number | | |
| Sedum 18 cm Alma-Ata | 0,6 | 0,4 | 6 | 14 | 14 | 16 | 60 | 9 | 18 | 10 | 0,7 |
| Sedum 17 cm Karaganda | 0,4 | 0,2 | 6 | 10 | 12 | 12 | 52 | 7 | 10 | 11 | 0,4 |
| Sedum 18 cm Karkaralinsk | 0,3 | 0,1 | - | 6 | 8 | 9 | - | 6 | 10 | - | - |

As can be seen from the table when comparing quantitative anatomical structures sedum in the conditions of Southern and Central Kazakhstan, the leaves, stems, underground parts have certain differences.

For example, if the conditions of Southern Kazakhstan number of stomata per mm² equally both the top and the bottom of the epidermis (14 and 14), in terms of their Central Kazakhstan less than 10–12, and copies of the natural flora of stomata are small amount (6–8). Sheet sedum from various environmental conditions has the same number of layers of parenchyma cells. Their shoots in the number of lateral shoots has some differences. In the context of South Kazakhstan is 18–20 and 10 in Central Kazakhstan.

When comparing the different sections of the environmental conditions of growth it can be seen that in the conditions of Central Kazakhstan sheet sedum in cross-section has a smaller size cells, a powerful development of the cuticle. The special distinguishing features were not found in the conduction system. This is the result of the soil-climatic conditions of southern Kazakhstan that are most favorable for the growth and cultivation of sedum.

Apparently the negative impact of adverse weather conditions in Central Kazakhstan (drought, a small amount of precipitation in a year, temperature) is reflected in the growth and development of sedum. A natural conditions of plant collected in the foothills of Karkaralinsk has such low levels (e.g., small number of stomata, small cell size, a small number of lateral shoots) because there is no maintenance, both in culture, i.e. watering, fertilization, tillage, etc.

Thus, as a result of anatomical analysis of vegetative organs of caustic treatment of various growth conditions we found that in addition to common features in their structure has a number of more or less pronounced differences that are explained by the difference of climatic factors of growth space.

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Әр түрлі экологиялық ортада Орталық және Оңтүстік Қазақстан жағдайында өсірілген *Sedum acre* L. анатомиялық сипаттамасы

Мақала мақсаты әр түрлі экологиялық ортада өсірілген күйдіргі бозкілем (*Sedum acre* L.) вегетативтік мүшелерінің анатомиялық құрылыстарының ерекшеліктерін зерттеу болып табылады. Әр түрлі экологиялық ортада өсірілген күйдіргі бозкілемнен жасалған кесінділерді салыстырғанда Орталық Қазақстан жағдайында өсірілген жапырақтың көлденең кесіндісінде жасуша көлемі ұсақ, бірақ кутикула қабаты өте қалың дамыған. Бра өткізгіш жүйесінде айрықша өзгешеліктер байқалмады. Бұл Оңтүстік Қазақстанның ауа райы мен топырағының күйдіргі бозкілемнің өсіп, дамуына және оны мәдени түрде өсіруге қолайлы әсер ететіндігін көрсетеді. Осылайша, әр түрлі өсу ортасындағы күйдіргі бозкілемнің вегетативтік мүшелеріне анатомиялық талдау жүргізудің нәтижесінде біз олардың құрылымындағы жалпы белгілермен қатар, өсу ортасының, климаттық факторларының әр түрлілігімен түсіндірілетін азды-көпті көрнекті айырмашылықтардың болатынын анықтадық.

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Анатомическая характеристика *Sedum acre* L. из различных экологических условий Южного и Центрального Казахстана

Отмечено, что целью настоящей работы является сравнительное изучение-анатомического строения вегетативных органов *Sedum acre* L. из различных условий прорастания. При сравнении полученных срезов из различных экологических условий произрастания, подчеркнуто в статье, видно, что в условиях Центрального Казахстана лист одноклеточный в поперечном срезе отличается меньшим размером клеток, мощным развитием кутикулы. В проводящей системе особых отличительных признаков не обнаружено. Это результат того, выделено в статье, что почвенно-климатические условия Южного Казахстана наиболее благоприятны для произрастания и культивирования одноклеточного. В результате проведения морфолого-анатомического анализа вегетативных органов одноклеточного из различных условий произрастания установлено, что наряду с общими признаками в их строении имеется ряд более или менее выраженных различий, которые объясняются разными климатическими факторами места произрастания.

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