st: редька зимняя круглая черная – 304, чернавка – 420

По массе корнеплода гибридные комбинации были от 100 до 919 гр. Корнеплоды, со средней массой более 400 гр и диаметром более 10 см считаются нетоварными, однако при выращивании в ЛПХ наоборот отдают предпочтение крупным корнеплодам.

Как видно из таблицы, не проблема создать гибрид редьки черной, превосходящий по урожайности лучшие сорта (около 50% гибридных комбинаций превзошли стандарт Чернавка). К тому же выращенные сорта показали очень плохую выравненность как по массе, так и по форме и даже по цвету. Все эти недостатки призван решить F1 гибрид, поэтому полученные линии следует отбирать до получения чистых линий, и каждый год проводить оценку по гибридам с их участием.

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УДК 581.6

IDENTIFICATION OF THE LEAVES OF *AMARANTHUS HYPOCHONDRIACUS* L. AND *AMARANTHUS TRICOLOR* L. BY MICROSCOPY

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Abstract: *The present work analyzes some anatomical structure regularity of leaves of Amaranthus hypochondriacus L. variety Krepish and Amaranthus tricolor L. variety Valentina. Differences in anatomical structure of leaes were studied.*

Keywords: *Amaranthus hypochondriacus L.*, *Amaranthus tricolor L.*, anatomical structure, leaf, petiole.

There are several species of the genus *Amaranthus*, whose raw material is leaves [1]. *Amaranthus hypochondriacus* leaves are green and used as leaf vegetables in salads [2]. *Amaranthus tricolor* leaves are burgundy in color and are used as leaf vegetables and with black tea leaves. *A. tricolor* leaves contain red-violet pigment betacyanin. It is a strong angioxidant and has immunostimulating properties [3,4]. In *A. hypochondriacus* leaves betacyanin is absent. Their antioxidant properties are much less pronounced compared to leaves *A. tricolor*. A biologically active food supplement enriched with antioxidants is obtained. Usually, crushed fermented leaves of *Amaranthus tricolor* and *Camellia sinensis* (L.) Kuntze are mixed. *A. tricolor* and *A. hypochondriacus* often grown nearby like vegetable amaranths.

It is harder to distinguish the dry crushed leaves than fresh. In addition to external signs, the plant anatomy can serve as a criterion allowing to establish through a microscopic examination the specific diagnostic features. We compared the anatomical diagnostic features of dried crushed leaves of .*A tricolor* and a possible impurity - leaves of *A. hypochondriacus*. The micropreparations were analyzed according to the requirements of the common article from the Russian State Pharmacopoeia XIV edition [5]. In order to identify the lignified elements, the cross sections of the leaf petioles were treated with a few drops of alcohol solution of phloroglucinol and a drop of 25% solution of HCl.

The mesophyll on the abaxial side of leaves of both species is differed from the mesophyll on the adaxial side due to a strong development of intercellular spaces and the photosynthetic apparatus features. A layer of spongy mesophyll can be developed under the epidermis from the abaxial side of a leaf blade of the large leaves).

When observing the leaf blade from the surface of epidermal cells, it is visible on the adaxial side with sinuous walls - straight on abaxial. Stomata are surrounded by about 3 - 4 epidermal cells. Stomatal apparatus is of anomocytic type.

In mesophyll, in the cells between the veins, the CaC_2O_4 crystals occur in great abundance. These cells are characteristic for the Amaranthaceae family and being the large cells, and as usual each of them contains one druse of CaC_2O_4.

In the parenchymal cells of the medium and large lateral veins *A. hypochondriacus* CaC_2O_4 can occur as crystal sand. They are numerous very small crystals. CaC_2O_4 crystals in the leaf parenchyma of *A. tricolor* are druses-shaped.

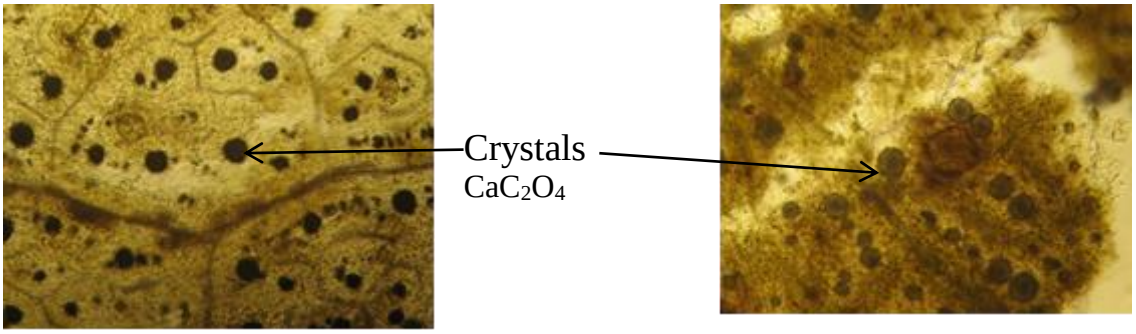

Figure 1, 2. Numerous crystals of CaC_2O_4 in leaf mesophyll in A. *hypochondriacus* (1) and *A. tricolor* (2). Magnification 240x.

A. hypochondriacus leaf is green, *A. tricolor* leaf is crimson in colour due to the presence of betacyanin, the mesophyll cells pigment.

Observing the slides of *A. tricolor,* the mesophyll coloration produced by betacyanin is disappeared after boiling in NaOH solution and water. It remains only in larger veins. The cuticle overlying epidermis occurs in *A. hypochondriacus* leaf folding. Trichomes are the capitate hairs with a multicellular stalk and a unicellular head. Often a trichome stalk can be bent. Similar trichomes in the leaf epidermis of *A. tricolor* are absent.

In the petiole cross-section in *A. hypochondriacus* and *A. tricolor* two side cord of chlorenchyma was noticed. In contrast with the mesophyll of the leaf blade, the chlorenchyma of the leaf petiole consists of more or less isodiametric, loosely arranged cells. The same structure is found in the stem chlorenchyma.

The vascular bundles are immersed in the parenchyma and are located on the distal part of the petiole along the arch. A groove is visible. Sometimes the epidermis of the petiole contains trichomes and stomata. They are located in the distal part of the petiole. Their structure is the same as that of leaf stomatal apparatus. Petiole base has neither chlorenchyma nor stomata. Collenchyma forms a continuous ring under the epidermis.

The druses are found in the cross section of the *A. tricolor* petiole. The stem of *A. hypochondriacus* has a bundle structure. The vascular bundles are collateral, they lie in several layers under the ribs. The lignification of the xylem tissue was shown by alcoholic phloroglucinol solution staining and concentrated HCl to raspberry color. The pith of the stem is represented by the large parenchymal cells. In the cross section of an *A. tricolor* stem the non-bundle structure is obvious. The supporting tissue – collenchyma – is located beneath the epidermis cells, then a layer of parenchyma comes. Below the cylinder of the secondary phloem, the cambial layer and a solid cylinder of secondary xylem are situated. In the parenchyma of the pith one can see the common solitary vascular bundles.

A flower of amaranth has the subulate-acuminate bracts with a main secondary vein. Capitate hairs with the multicellular stalks and a unicellular head are located at the edges. Lateral inflorescence is represented by a double polynomial dihaziy united in a cymoidal inflorescence. Apical inflorescence is an open brakteose tierce. The epidermis of the bracts possesses numerous trichomes. They are capitate hairs with the multicellular stalks and the unicellular heads. The head and stalks of the cells are often broken off.

Leaf blades of bracts apex contains far fewer inclusions of CaC_2O_4 than the leaf blades of the foliage leaves and the cataphylls. Bracts are shown to have the elongated epidermal cells with the straight walls. Epidermal structures are especially diverse in the stems of different species of Amaranthaceae. They are described in detail and can be used to diagnose the species. Only one type of trichomes has been found on the bracts in the samples of both *A. hypochondriacus* and *A. tricolor* - in the form of swollen epidermal cells.

The anatomical structure of leaf, stem and inflorescence of two species of Amaranthus was studied. The diagnostic features, which make it possible to distinguish the *Amaranthus tricolor* from the *Amaranthus hypochondriacus* were detected. They are: druses CaC_2O_4 in leaf and petiole parenchyma, absence the

capitate hairs with unicellular head and multicellular stalk in the petiole epidermis. In the contrast with the *Amaranthus tricolor* the structure of the *Amaranthus hypochondriacus* stem is bundle.

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УДК 635.62

ИНТРОДУКЦИЯ МОМОРДИКИ В УСЛОВИЯХ ТАМБОВСКОЙ ОБЛАСТИ

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Аннотация: *Статья посвящена вопросу интродукции момордики в условиях Центрального Черноземья. Авторами проведена оценка хозяйственно-биологических признаков двух видов момордики. Изучены сроки прохождения фенофаз развития, урожайность, масса плодов.*

Ключевые слова: *интродукция, малораспространенные овощные культуры, Момордика кохинхинская, Момордика харантия, урожайность, масса плодов.*