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THE ROLE OF PHOTOSYNTHETIC PIGMENTS IN GESNERIACEAE PLANTS AT LOW TEMPERATURES

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Adaptation of plants to various, including stressful, environmental conditions is one of the central problems of modern theoretical and practical biology. The analysis of structural and metabolic changes occurring in cells during and as a result of adaptation contributes to the understanding of the ways and nature of the evolutionary process. Global climate change, increasing anthropogenic pressure on the biosphere, accompanied by a decrease in the agroecological reliability of crop production, is of particular importance to this issue [1]. Low temperatures are among the most common stressors that cause damaging effects on the plant organism. This is especially true for tropical species. The survival of plants in such conditions is determined by their ability to low-temperature hardening, which results in increased resistance to low temperatures.

The mechanisms of low-temperature resistance formation differ significantly between different plant species, including the *Gesneriaceae* family. Gesneriaceae is a large family of dicotyledonous plants. These are perennial grasses, vines, shrubs, and small trees, many species of which have been actively used in landscaping in recent years [3, 4]. We have not found any data in the literature on the variability of chlorophyll content in the leaves of individual species and varieties of Gesneriaceae when kept at low positive temperatures. Therefore, an initial examination of two species of *Streptocarpus* Lindl. and two species of *Primulina* Hance for chlorophyll content in summer was carried out in order to compare them with those in autumn. It was found that the chlorophyll content of Primulina leaves is on average almost 3 times higher than that of *Streptocarpus*.

The metabolism of carbon is generally dependent on the activity of photosynthesis, which in turn is related to the pigment content. The key role is played by chlorophylls a and b and their combined quantitative effect. We studied the a+b parameter in tobacco plants. Chlorophylls a and b are molecules responsible for converting light energy into chemical energy. These pigments are in the ratio (a:b) 3:1. The peculiarity of the pigments' structure is that chlorophyll a has a methyl group in the porphyrin ring, and chlorophyll b has an aldehyde group. Chlorophyll a plays a key role, and chlorophyll b plays an auxiliary role, contributing to the expansion of the spectrum of absorbed light. It is clear that these pigments serve the reactions of the submolecular level. It is this level of activity, in our opinion, that should contribute to a significant amount of variability in the a+b parameters. This determines the universality of the photosynthesis process. The analysis of the a+b parameter in tobacco plants revealed significant variability both within and between genotypes. Thus, the difference between the genotypes was in the range of 1 to 2,3 times. In terms of absolute value, no differences between experimental and control genotypes were observed.

The preservation of photosynthesis at low positive temperatures is an important factor in cold hardening and subsequent plant survival at low temperatures. It is believed that in cold-sensitive plants, it is photosynthesis that is suppressed in the first place. In cold-tolerant plants, the photosynthetic rate at temperatures around 0°C significantly exceeds the respiratory rate, which leads to the accumulation of large amounts of sugars in their cells [2, 6, 7]. Sugars are the main source of energy and a precursor for the synthesis of substances with a protective effect, which occurs during the hardening period at low positive temperatures. Provision of sugars to all organs and tissues of the plant is a very important condition for successful hardening of this plant to hypothermia.

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