



Physiological and biochemical features of some cultivars in essential oil rose (*Rosa* × *damascena* Mill.) growing *in situ* and *in vitro*

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Abstract: The results of physiological and biochemical features studies in some essential oil rose cultivars from Nikita Botanical Gardens collection under cultivation *in situ* and *in vitro* are presented. Studies of the intact plants were carried out in their growth dynamics. For the cleaning up of valuable cultivars, explants of studied plants were introduced to *in vitro* culture. Meristems 0.2-0.4 mm long were isolated from vegetative buds and placed to the modified Murashige and Skooge (1962) medium, supplemented with plant growth regulators. The culture was maintained under controlled conditions: temperature $24 \pm 1^\circ\text{C}$, light intensity $25.0\text{-}37.5 \mu\text{mol m}^{-2} \text{s}^{-1}$ and 16-hour photoperiod. The samples were tested after 9-12 months of the culture. Our results demonstrated that studied cultivars of essential oil rose had a high degree of adaptation both *in vitro*, and *in situ*. These properties are provided by xeromorphic structure of vegetative organs, high water-holding capacity of leaf tissue due to the bound water fraction. Formation of rose plants' protective response to the hydrothermal stress and further adaptation response were highly depended on various protective compounds (free proline, phenolic compounds, ascorbic acid) accumulation. Thus, in different rose cultivars the level and rate of protective compounds accumulation differed. Effects of hydrothermal stress resulted in catalase activity decrease while superoxide dismutase and polyphenol oxidase activity increased in the rose cultivars Festivalnaya, Lany and Raduga. These changes were associated with the ability of these cultivars to adapt to the quickly changing environmental conditions. Based on the research results we could recommend essential oil rose cultivars Raduga and Festivalnaya for mass cultivation in the regions with semi-arid climate and use in the essential oil industry.

Key words: essential oil rose, hydrothermal stress, water regime, photosynthetic activity, protector substances, oxidoreductase activity.