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Program and Abstracts

Frost tolerance of selected *Rosa* cultivars from the collection of Gene Bank at Research Institute of Horticulture in Poland during spring deacclimation under warming climate

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Climate warming and increasing temperature variation with risk of unseasonable warm spell may cause premature loss of cold hardiness (deacclimation) of plants grown in a temperate zones including garden roses. Shifting phenological patterns as earlier start to the growing season consistent with climate warming may increase the risk of subsequent freezing injury. The aim of the study was to determine cold hardiness of 10 garden roses belonging to different USDA plant hardiness zones during deacclimation. The experiment was carry out using 8-year old plants from field collection of garden roses located in Skierniewice, Poland (lat. 51°57'N), including 4 climbing roses ('Flammentanz', 'Florentina', 'Sympathie', 'That's Jazz') and 6 shrub roses ('Astrid Lindgren', 'Chopin', 'Louise Odier', 'Schwnensee', 'Uncle Walter' and 'Venrosa'). Freezing tolerance of upper and lower stems of current season's stems were evaluated two times during deacclimation period on control (+4 °C) and one subfreezing temperature (-18 °C) in the second decade of February and the first decade of March 2018 using the electrolyte leakage method. In addition, the assessment of overwintering of plants grown in the field collection was carried out for two consecutive years (2017 and 2018). At the first date, subfreezing temperature only caused a rather small increase in REL (relative leakage of electrolytes) values (averages 9.8 %) compared to control (averages 7.3 %), suggesting that selected *Rosa* genotypes not notable stressed at the lowest temperature reached by the freezer (-18 °C). At the second date, REL

values for control stems not exposed to subfreezing temperatures in freezer increased to 34, 30 and 32 % for lower stems of 'Chopin', 'Uncle Walter' and 'Venrosa', and to 41, 32, 46 and 34 % for upper stems of 'Chopin', 'That's Jazz', 'Uncle Walter' and 'Venrosa' respectively, which was probably due to warm spell followed by frost episodes with min. temperature -17.5 °C recorded on 2nd March. In the first decade of March a significant decrease in stem cold hardiness was detectable. However, lower stems of 'Flammentanz', 'Flórentina', 'Louise Odier', 'Schwnensee' and 'Sympathie' were the most tolerant to subfreezing -18 °C temperature in this time with REL values not exceeding 20 %. The greatest damage of the lower stems was noted for 'Chopin', 'Uncle Walter' and 'Venrosa' with REL values in the range 35-40 %. Upper stems of climbing Rosa 'Flammentanz' were the most tolerant (REL 12 %) and 'Chopin', 'That's Jazz', 'Uncle Walter' and 'Venrosa' were the most sensitive to subfreezing temperature -18 °C with REL values 40, 37, 48 and 38 % respectively. The correlation between electrolyte leakage at -18 °C using artificial freezing of stem sections and 2 years of replicated, field-based freezing injury data and overwintering garden roses were mostly very high.

Keywords: electrolyte leakage, freezing tolerance, Rosa.

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