Hardiness of Herbaceous Perennials 2013 –
Species Hardiness and Midwinter Deacclimation

Dr. Leonard Perry, Extension Professor, University of Vermont

Deacclimation

In January, when plants have been shown in previous studies to have maximum hardiness, two perennial species (Becky Shasta daisy and Route 66 coreopsis) were exposed to various periods of deacclimation including 1, 3 or 5 days of 16C (62F) for 8 hours during the day, returning to 4C (40F) at night; or 3 days at 16C. There were insufficient plants of coreopsis for the 1 day treatment. Plants were then immediately placed at -2C (28F) for 2 days to freeze solid, then after 6 replicate plants were removed, remaining plants were subjected to controlled freezing temperatures of -5, -8, -11, and -14C (23, 18, 12, 7F) for a half hour once they reached each, and then returned to a 3-5C (37-42F) greenhouse. In April, plant regrowth was assessed using a visual rating scale of 1-5 (1 = dead, 3-5 = increasing salable quality, specific traits assessed varying by cultivar). Such ratings have been shown in previous studies to be reflective of dry weights.

For coreopsis, there were no significant difference among freezing temperatures after 3 days at 16C or 5 days of fluctuating temperatures. The only significant differences among temperature treatments from either the control (no prior deacclimation to freezing) or 3 days of fluctuating temperatures with non-saleable (rated less than 3) plants at -14C. This relatively new and popular coreopsis, from this study, appears both hardy to low temperatures and possible affected by several days of deacclimation only at the lowest (-14C) temperature exposure. Becky Shasta daisy had plants rated significantly lower after -8 and lower exposures after all deacclimation treatments, and from the control, with most plants dead or mostly so. Plants exposed to -5 rated lower in all cases (3 range) than those after -2C (4 to 5 range). Those at two treatments were significantly different between these two temperatures, however, this may be an artifact due to higher standard errors of the mean (0.2 compared to 0.1 for other treatments). This popular daisy, from this study, appears hardy to only -5C, with no differences among these deacclimation treatments at either -2 or -5C.

Species hardness:

In early January and late February 2013, 6 perennial species were exposed to controlled freezing temperatures of -2, -5, -8, -11, and -14C (28, 23, 18, 12, 7F) and then returned to a 3-5C (37-42F) greenhouse. Two other perennials were similarly frozen in January only, due to insufficient numbers from prior plant losses. In April, plant regrowth was assessed using a visual rating scale of 1-5 (1 = dead, 3-5 = increasing salable quality, specific traits assessed varying by cultivar). Such ratings have been shown in previous studies to be reflective of dry weights.

In January, four species (Joanna Reed catmint, Arizona Apricot Gaillardia, Filigran Russian sage, and Lucky Star coneflower showed no differences among temperatures, hardy to the lowest one (-14C). Plants at low temperatures, however, did not survive for these species after February freezing. Plants frozen to -14C for all were dead, and those from -11C exposure were
significantly lower rated (unsaleable or below rating of 3) for catmint and the Russian sage. Arkansas bluestar or amsonia plants are both saleable after all freezing exposures, with no significant differences, on both dates except for those at -14C in January which were significantly lower rated than the -2 exposure plants.

For the other three species in January (Pow Wow Wildberry coneflower, Crown of Gold evening primrose, Redshift coreopsis), plants from -11 or -14C exposure were dead or most plants died. Other plants of the coneflower rated low, below saleable; other plants of both the evening primrose and coreopsis (exposed to -2, -5, or -8C) rated saleable (above 3) with no significant differences; those of the coreopsis rating highly at 4.7 or above. For these species in February, only coneflower plants at the top two temperatures were barely saleable with low ratings (3.3 or less); coreopsis plants were similar to January results, those at the top three temperatures rating highly and those plants dead at the lowest two temperatures.

(For more research and previous studies, visit the research section of Perry’s Perennial Pages, perrysperennials.info)

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