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Response of perennial weed root buds to artificial freezing¹

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Abstract:

The reduction of perennial weed densities under conventional tillage systems may be explained partially by lack of snow cover. Temperatures below the critical value for bud survival are more likely to be reached when snow cover is minimal. The objective of this study was to determine the tolerance of naturally hardened buds of perennial weeds to freezing temperatures. Roots of perennial sowthistle and Canada thistle, roots and crowns of leafy spurge, and rhizomes of quackgrass were collected in the fall of 1985. Sections of each were subjected to temperatures of -4, -8, -12, -16, and -20° C in a chamber-type freezer in January and February of 1986. The temperatures were dropped 1° C/hour until the desired temperature was reached and then was maintained for 2 hours. Sections were thawed at 1°C for 24 hours and planted in the greenhouse. Percent survival, vigor index and dry weight were determined and were compared to untreated checks. An estimation of the temperature required to kill 50 percent of the plant sections (LT₅₀) was determined by linear regression.

Survival of quackgrass was not reduced by temperatures warmer than -16° C; however, vigor index and dry weight of surviving plants were reduced by -12° C. Survival of root buds of perennial sowthistle and crown buds of leafy spurge was reduced at -16° C. Survival of leafy spurge and Canada thistle root buds was reduced by -12 and -8° C, respectively. Reduction in dry weight of surviving plants occurred at -16, -12, and -8° C for perennial sowthistle and leafy spurge crown buds, leafy spurge root buds, and Canada thistle, respectively. The LT₅₀ of perennial sowthistle, quackgrass, leafy spurge crown buds, leafy spurge root buds, and Canada thistle were -16, -20, -16, -12, and -6° C, respectively.

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