

IMPACT OF WATERLOGGING UNDER DIFFERENT TEMPERATURES ON HARDENING AND FREEZING TOLERANCE OF TIMOTHY (*PHLEUM PRATENSE*)

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ABSTRACT

Precipitation has generally increased in Norway during the last decades, and climate projection indicate a further increase in the future. The growing season has also become longer with higher temperatures, particularly in autumn. Previous experiments have shown negative effects of higher autumn temperatures and a temperature-dependent effect of waterlogging on hardening capacity of timothy. We studied effects of waterlogging on seedlings of timothy (*Phleum pratense*, cv. Noreng) under three constant temperatures: 3°C, 7°C, 12°C, and natural light in autumn in a phytotron at Holt, Tromsø (69.7°N). After temperature treatments, all plants were further acclimated at 2°C for three weeks. Freezing tolerance was determined as LT₅₀ and regrowth after seedlings were frozen at several predefined freezing temperatures in a programmable freezer. After freezing, survival and regrowth of new leaves was measured after three weeks at 18°C, 24h light in greenhouse. The higher temperatures had a clear negative effect on freezing tolerance. Waterlogging had no significant effect on frost tolerance of plants grown under 3°C, but had a negative effect under 7°C, and an even more pronounced negative effect under 12°C compared to non-waterlogged plants. The results indicate that waterlogging under higher autumn temperatures due global warming may have negative implications for hardening of timothy.

Key words: Flooding, winter acclimation, climate change, autumn temperatures

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