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Differential Response of Low Root Zone Temperature and Drought on Tomato Introgression Lines

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Abstract

Tomato (*Solanum lycopersicum* L.) is an economically important vegetable cultivated worldwide. It is a thermophilic crop and low temperature can hamper plant growth, development and total biomass production. Sub-optimal temperature also limits the tomato growing season and area and increases the cost for energy inputs especially in greenhouses. Developing a cold tolerant tomato variety with sustainable field performance is a big challenge of modern agriculture. Tomato breeding programs are nowadays concentrating on the detection of dominant quantitative trait loci (QTLs) and evaluating their performance with introgression lines under sub-optimal temperature conditions for tomato production.

The main objective of this study is to reveal the physiological basis of drought stress and chilling tolerance in tomato introgression lines which are supposed to carry QTLs with positive effects on plant vigour under low temperatures. Response of a chilling tolerant introgression line to low root zone temperature will be studied under well watered and drought conditions. We will investigate the effects of low root zone temperatures and drought stress on stomatal conductance, root and shoot abscisic acid content, leaf expansion rate, total green leaf area, percentage of wilted leaf area, biomass accumulation and partitioning.

Tube grafting will be done on four different combinations of genotypes and seedlings will be grown at two different soil temperatures (10°C and 25°C) under well watered condition and drought stress conditions.

Keywords: Cold tolerance, drought stress, Introgression lines, low root-zone temperature, QTLs, *solanum lycopersicum*, tomato

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