

Abstract

Plant response to water deficit and subsequent re-watering is fine tuned at the whole plant level. It differs not only between shoot and root, but also among particular leaves along a plant axis. We estimated the expression of proline metabolism-related genes and the activity of senescence-related promoter in roots and individual leaves of tobacco plants in the course of drought stress and recovery. Proline plays the dual role of an osmoprotectant and an antioxidant under water deficit. High proline concentration in the youngest uppermost leaves contributed to their protection from drought, which was associated with low degree of senescence. During recovery, elevated proline concentrations persisted and the senescence-related promoter was switched off in all surviving leaves. Two mutually exclusive scenarios were followed by tobacco leaves on recovery – restoration of photosynthesis and metabolism, or death, depending on the progress of senescence.