Assessment of Nitrate Reductase Gene Expression Pattern and Qualitative and Physiological Characteristics Under Oxidative Stress Conditions in Spinach (Spinacea oleracea L.)

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Spinach is one of the most important vegetables with high qualities that is widely cultivated in northern region of Iran. Environmental stresses are excessively grown up and they are serious threat in quality of cultivated spinach. These stresses generally cause dreadful damages in plant cells via increasing reactive oxygen species (ROS). In this study oxidative stress has been applied by using AgNO₃ (0, 1, 2 mM) spray, also pre-treatment of ascorbic acid (0, 20 mM) was used followed by AgNO₃ treatment. The measured traits included phenotypic performance, leaf area, dry mass, growth index, leaf protein, chlorophyll and oxidative cellular levels (LOX and TBARM assay) during sampling period (12, 24, 48 h) after sprayed treatments. The New Persian cultivar was used in greenhouse condition with 6 treatments in RBCD design with 4 replications. The results showed spraying ascorbic acid had no detrimental effect on studied traits. Whereas, sprayed of AgNO₃ caused some decline in the amount of most traits as well as some increase in the content of TBARM and LOX. Nitrate reductase gene expression relatively increased by ascorbic acid compared with control (water spray). Whereas, applying AgNO₃ significantly decline nitrate reductase gene expression. However, applying pre-treatment of ascorbic acid followed by AgNO₃ after 2 h retrieved mostly all studied traits.

Keywords: Cellular oxidation, Chlorophyll content, Growth parameters, Protein content, Spinach.

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