

A Relationship between Carbonic Anhydrase and Rubisco in Response to Moderate Cadmium Stress during Light Activation of Photosynthesis

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In our previous research, we showed that low Cd concentration increases the effectiveness of the processes leading to activation of ribulose-1,5-bisphosphate carboxylase/oxygenase (Rubisco). This stimulation was dependent on carbonic anhydrase (CA) activity and resulted in protecting Rubisco activity against Cd toxicity. The aim of the present paper was to test whether this mechanism has any influence on light activation of photosynthesis during the first 2 h of illumination. Both the “activation mechanism” of plant response to Cd-stress conditions and its full efficiency at low Cd concentration were confirmed. The CA-dependent light activation of Rubisco at low Cd level was correlated with accelerated attaining of the maximum Rubisco activity by these plants. The amount of Rubisco was also Cd- and time-dependent and varied from continuous accumulation in control plants till reaching the maximum level within 30 minutes for the high Cd concentration. An increase in CA activity that was found to be parallel to the decrease of the amount of CA suggested activation of the enzyme by low Cd concentration.