MULTIPLE FUNCTIONS OF CARBON AND NITROGEN IN PLANTS

Summary

The paper reviews recent progress in knowledge of multiple functions played by carbon and nitrogen in plants, of assimilation and metabolism of these elements and of their role as signaling molecules. Special attention is paid to the relationship between photosynthetic production of carbohydrates and their reoxidation in respiration yielding energy required for nitrogen assimilation. Integration of these processes takes place at intracellular, intercellular and interorgan levels. The role of vegetative storage proteins (VSP) and starch, as storage substances, as well as regulatory function of trehalose is presented, especially under stress conditions. Sugars and nitrogen metabolites (nitrate and ammonium) function as signals of plant current status of the C/N ratio at various level of its organization: from regulation of gene expression to growth rate of shoot and root. This allows quick modification of nitrate or amonia uptake and, in consequence, of the program of plant growth. Changes of environmental conditions affecting assimilation and metabolism of carbon and nitrogen may cause plant starvation and a disproportion in the C/N ratio. Plants must therefore regulate sophistically cross-talk between carbon and nitrogen metabolism to ensure their homeostasis.