

Abstract

In this project the effect of viral infection on the metabolism of nitrogenous compounds in tobacco plants (*Nicotiana tabacum* L. cv. Petit Havana SR1) was studied. The tobacco plants were infected with Potato virus Y, strain NTN, ELISA confirmed the presence of the virus. Enzymes that participate in C₄ plants in Hatch-Slack cycle phosphoenolpyruvate carboxylase (EC 4.1.1.31, PEPC), NADP-dependent malic enzyme (EC 1.1.1.40, NADP-ME), pyruvate, phosphate dikinase (EC 2.7.9.1, PPK) are present also in C₃ plants and are related to plant responses to stress conditions. As a result of viral infection, the activities of all these enzymes were increased. Infection caused by PVY^{NTN} decreased activity of nitrate reductase (EC 1.7.1.1, NR), an enzyme catalyzing reduction of nitrates to nitrites. The activity of enzymes catalyzing the synthesis of glutamine from glutamate and ammonium ions: glutamine synthetase (EC 6.3.2.1, GS) and glutamate synthase (EC 1.4.1.14, GOGAT) was enhanced. In addition to this main route of nitrogen fixation the plant can still use glutamate dehydrogenase (EC 1.4.1.2, GDH). This enzyme can also catalyze the opposite reaction, deamination of glutamate. The direction of response depends on environmental conditions. In this case a significant increase of oxidative-deaminating activity due to viral infection was found. The last studied enzyme was phenylalanine ammonium lyase (EC 4.3.1.5, PAL), which catalyzed deamination of phenylalanine to cinnamic acid. This compound is a precursor of a number of secondary metabolites, including defense substances. Effect of viral infection on this enzyme was more complex. At the beginning of infection, the activity of PAL was increased, in the later phase of infection the activity decreased. In this work, the influence of high temperature on the course of viral infection was studied. This experiment showed, that heat shock had a positive effect on plant defenses against the virus. These findings corresponded to the activity of studied enzymes, which were similar to that in control plants.

(In Czech)