

ABSTRACT

Plants have developed a number of ways how to minimise negative influence of the environment. As a consequence of stress action, plants carbohydrate metabolism is quite often influenced, esp. on the level of expression and activities of different enzymes and also several metabolites concentration.

One of key enzymes of carbohydrate metabolism is invertase. The aim of this work was to find out, whether the activity of its isoforms (cytoplasmic, vacuolar and extracellular) in tobacco plants is influenced by Potato virus Y (PVY). It was shown, that activity of cytoplasmic invertase was not affected, but the activity of vacuolar and extracellular isoform was enhanced during potyviral infection. Hence, it is likely, that vacuolar and extracellular invertases are related to plant antiviral defence.

The effect of PVY on other enzymes of carbohydrate metabolism and several metabolites content was studied. Activity of α -amylase and phosphorylase, starch-degrading enzymes, was strongly enhanced during potyviral infection. That is probably how plant cells get glucose, which is a key source of energy and metabolites for biosynthesis of different compounds. It may also serve as a signal molecule. Activity of other hydrolytic enzymes, β -glucosidase and β -hexosaminidase, was also slightly increased.

There was no substantial increase in total carbohydrate content, neither glucose concentration was enhanced. Among all the metabolites tested in this study, the concentration which was most influenced was the one of glucose-6-phosphate, which was fourfold higher in infected plants than in the healthy ones. Nevertheless it was found, that content of acidic proteoglycans and pectines, important cell-wall structures, was enhanced. In conclusion, Potato virus Y affects carbohydrate metabolism in tobacco plants by enzyme activities stimulation and, to a small extent, by low-weight carbohydrates and polysaccharides concentration modulation. (In Czech)