# Nutritional properties of tubers of conventionally bred and transgenic clones resistant to necrotic strain of potato virus ($PVY^N$)

Jerzy Juśkiewicz, Zenon Zdunczyk and Józef Fornal

*Institute of Animal Reproduction and Food Research of the Polish Academy of Sciences, Olsztyn, Poland,* glebczo@pan.olsztyn.pl

The potato cultivar Irga was transformed with viral genome sequences in order to improve its resistance to a necrotic strain of potato virus Y ($PVY^N$). The transgenic clones were produced at the Institute of Biochemistry and Biophysics, Polish Academy of Sciences (Chachulska, Krzymowska and Zagórski–Ostoja). Four lines of genetically-modified potato were used in this studies: R1 with a truncated gene coding $PVY^N$ polymerase in sense orientation, R2 – with the same viral gene in antisense orientation, NTR1 – with introduced fragment of cDNA of $PVY^N$ of $PVY^N$Wi isolate in sense orientation and NTR2 –with the same sequence introduced in antisense orientation. Tubers of transgenic clones were compared with non-transgenic somaclone from cv. Irga and three conventional cultivars Irga, Maryna and Ania. Potato tubers were autoclaved, dried and introduced to the rat diets (40%), which contained similar amounts of protein (levelled through a small addition of casein), fat, minerals and vitamins. Nutritional experiment lasted 21 days.

Genetical modification of potato had no effect on the chemical composition (e.g. crude protein, starch, dietary fibre content and amino acid composition of protein) and nutritional properties of autoclaved tubers (diet intake, animal growth, protein utilisation). Higher differences between chemical composition (especially in crude protein and starch content) and biological response of rats were determined in the case of diets containing tubers from conventional potato cultivars Ania, Maryna and Irga. Genetic status of potato had no effect on the mass of the caecum and caecal digesta parameters: pH, dry matter content and bacterial enzyme activity: α- and β-glucosidase, α- and β-galactosidase, and β-glucuronidase. The improvement of potato resistance to $PVY^N$ by genetic transformation had no negative effect on the ecosystem of the caecum of rats, activity of serum enzymes (aspartate and alanine aminotransferase, alkaline phosphatase, lactate dehydrogenase and creatine kinase) and non-specific defense mechanism (lysozyme and ceruloplasmine level, number of bacteria taken up per cell and the percentage of the phagocytic cells in the serum). The results obtained indicate that transgenic potatoes with genetically improved resistance to $PVY^N$ are substantial and nutritional equivalent to the non-transgenic cultivars.