

Utilisation of epigenetics in plant science studies

Miroslav Baránek

*Faculty of Horticulture, Medeleum-Institute of Genetics and plant breeding, Mendel University ,
Lednice, Czech Republic*

e-mail: miroslav.baranek@mendelu.cz

Abstract

Epigenetics is a relatively new scientific field, which is currently enjoying a meteoric rise. It is possible to find break through articles dealing with aspects of epigenetics in cancer therapy, human diet and last but not least in plant sciences. As epigenetic regulators play the role chromatin remodeling factors and direct DNA methylation or demethylation apparatus, both of these pathways likely directed by small RNAs. DNA methylation is one way how the sessile organisms like plants can deal with changing environment around them. By modifying their expression patterns they can affect multiple aspects of plant growth and development.

The ambition of our work at the Mendeleum institute was to contribute to increase the level of knowledge in this area by two different approaches. First we measured DNA methylation changes in plants stressed by *in vitro* cultivation. It is shown that significant part of induced epigenetic changes is repeatedly established by particular planting/stressing conditions which was reflected in the fact that individuals with similar fate have shown significant degree of mutual epigenetic similarity. If the plants are no longer exposed to stress conditions, reverse epigenetic changes starts to happen and the treated plants return to the epigenome of maternal / unstressed plants. In fact our results describe the dynamics and reversibility of epigenetic landscape registered in plants stressed by *in vitro* cultivation.

Another part of our work was focused on re-arranging of epigenetic landscape by applying several artificial chemical compounds. Some of them were previously described as compounds having demethylating effect, some were newly developed and they are yet to be confirmed for their demethylating function. After the treatment of petunia seeds we observed changes in earliness of flowering, variations both in shape and color of the flowers as well as some changed leaf and stem morphology. Currently the experiment is heading towards its next phase, pollination of chosen samples and examination of the second generation of hybrids.