

Food safety is one of the priorities in public health protection and requires continuous development. It is particularly important to ensure safety of fresh food. This applies especially to fruits and vegetables as they are consumed directly and in the largest quantities without any processing. This is a source of exposure to poisoning with harmful or toxic substances, such as pesticides. These compounds, commonly known as plant protection products, are of enormous importance for increasing the effectiveness and quality of food production. The problem with pesticides is the fact that they do not only destroy bad things, but also good ones. Despite of numerous advantages, they are thought to belong to the most hazardous and toxic substances, which pollute the environment and their fate and functioning remain unknown to a considerable extent. Their health effects can range from simple irritation of the skin and eyes to more severe effects such as affecting the nervous system, mimicking hormones causing reproductive problems, and also causing cancer. Apart from toxicity, they are characterized by the ability to accumulate and by their mobility.

It has not been examined yet which of the pesticides used and approved for use by the Ministry of Agriculture and Rural Development penetrate through the peel and which are adsorbed on its surface only. No monograph, report or publication describing pesticide ability to penetrate through plant peels and permeating into the pulp have been published yet. The main objective of the undertaken research, which is aimed at verification of the possibility of permeation (sorption) of contemporarily used pesticides (differing in the molecular mass and physicochemical properties) through the peel (epidermis) into the acceptor fluid, simulates the matrix of fruit and vegetable samples. The research is scientific novelty and it fits into the trends of food contamination prevention and removal of pesticide residues from fruits and vegetables after their application or reduction of their content.

The gained knowledge will make it possible to define which pesticides, when used for specific crops, penetrate through the peel (epidermis) and which are adsorbed only on their surface. Compounds, which do not permeate into the pulp and fulfill their function in accordance with their intended use, do not constitute a hazard for consumers. They can be removed effectively by washing, peeling, thermal processing or other processes. Compounds penetrating through the peel to deeper layers of the pulp accumulate and cause food contamination and they should be monitored in accordance with legal regulations. Moreover, the research results will enable the preparation of a recommendation list of active substances for specific plant species, the application of which is safe and does not pose a health hazard. The research results will be the basis for the assessment of the time of exposure to plant protection products to prevent their absorption. Additionally, it will be possible to estimate the highest permissible concentration of the active substance with a single treatment, which will not constitute a risk of contamination and will fight pathogens effectively at the same time. The research will be innovative with very significant conclusions from the point of view of health protection and of cognitive value for agriculture.