

## CEREAL ROOT EXUDATES AND THEIR ALLELOPATHIC ACTIVITY

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A growing interest in allelopathy has been observed over the past decades as allelopathic effect has not only the theoretical but also practical value. Numerous published data indicate a possibility of application of allelopathy in biological pest and weed control, which aims at plant protection against pests and weeds and improvement of plants resistance to diseases. The growth and development of plants in natural or formed ecosystems is frequently modified by physical and chemical processes due to influence of neighboring plants.

The present studies were aimed at describing the allelopathic interspecies interactions in a mixture crops. It is assumed that dominance of a certain crop species in a field may be explained by their strong allelopathic potential against neighboring species.

The preliminary inter-crop influences were researched in a laboratory tests performed on Petri dishes. These tests allowed determination of allelopathic effects of tested grain species on the energy and the germinating ability of seeds of other grain crop species, as well as on the length of root and aerial parts of their seedlings. Four grain crop species were tested including barley, oat, wheat and Triticale.

Second experiment was performed in pots where crops were planted next to each other and their inter-crop effects were observed. The pots with single species served for the control purposes as a model pure one crop stands. The germination, seedling growth and root and aerial parts lengths were measured.

A series of experiments were carried out in accordance with RERS (Root Exudates Recirculating System) system, in order to collect and determine the biological activity of substances exuded from roots. Tests were performed in a glass pots filled up with heat-sterilized quartz sand. One donor plant pot and acceptor plant pot were used in one set. In some combinations exudates from donor plant pots were passed through XAD-4 resin column to remove allelochemicals, before they reached acceptor plant. Collected allelochemicals were analyzed by HPLC (total phenolics concentration) and a dominant constituents were separated and their structures established with spectral (MS, NMR) techniques.

Results of the experiments showed that some crop species when grown in a mixture with other crops affect their germination energy and seedling growth. Interspecific interactions of various crops resulted from the allelopathic properties of substances released by germinating seeds and roots of growing seedlings. It was found that phenolic content varied for different species and their concentration correlated with allelopathic potential of donor species. The prevailing component of phenolics mixture was benzoic acids. Its concentration was highest in the exudates from Triticale roots.