Qualitative and quantitative changes of allelochemical compounds in Brassica napus L. residues decomposing in the soil

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Abstract

Complex studies of allelochemical compounds released by oilseed rape during vegetation and during decomposition of crop residues in the soil are necessary to understand and scientifically explain the allelopathic effect of oilseed rape on agroecosystem. The aim of this study was to analyse the composition of allelochemical compounds in winter oilseed rape and the different morphological plant parts residues (threshing remains, stubble and roots) after harvesting as well as to reveal the quantitative and qualitative changes resulting from the different residues' decomposition in the soil within different periods (3, 7, 14, 19 and 26 months) and estimate the influence on weed germination.

All winter oilseed rape residues after harvesting had inhibitory influence on the germination of *Galium aparine* L., after three months of this crop residues decomposition in the soil the highest inhibitory influence was on the germination of *Sinapis arvensis* L., after seven months – on the germination of *Sonchus arvensis* L. A phytochemical analysis revealed that the total content of phenolic compounds in investigated crop residues decomposing in the soil significantly decreased after three months. As decomposition of these residues continued, the content of total phenolic compounds increased and reached the highest value after 19 months, except for the threshing remains. Qualitative and quantitative analyses of glucosinolates revealed that the content of these allelochemical compounds was significantly higher in the rape stubble compared with the threshing remains, where aromatic glucosinolates prevailed. The highest content of volatile organic compounds was determined in winter rape residues after seven months, except in the threshing remains. The results of this investigation suggests that winter oilseed rape residues decomposing in soil are distinguished by their allelopathic properties and therefore have an impact on agroecosystems in the following two-year period.

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