

The Allelopathy of Autotoxic Compounds in Peanut Continuous Cropping Obstacle and Mitigation Mechanism

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In China, some of peanuts are produced in a solo peanut cropping system without rotation with other crops. The autotoxicity of peanut root exudate is one of the obstacles that preventing continuous cropping. In order to alleviate the autotoxicity, we isolated and identified 7 peanut root exudates, including myristic acid, palmitic acid, stearic acid, benzoic acid, nonanoic acid, 3-tert-butylphenol and 4-p-tert-butylphenol. The effects of autotoxic substances on seed germination rate, peanut yield, leaf and root development were carried out in this experiment. 3-tert-butylphenol and 4-p-tert-butylphenol were identified as the two major autotoxic substances that had great influence on the growth and peanut and were associated with the clarification of autotoxic mechanism preliminarily. We also investigated the effects of different treatments on peanut growth and development, yield, quality, leaf enzyme activity and soil microbial diversity through pot experiment with the mitigation substances and pool experiment with rotation. The results indicated that application of mitigation substances such as activated carbon, carbon-based fertilizer or take measures of peanut-wheat-maize rotation systems could dramatically reduce the autotoxicity of peanut root exudate.