Amino acid fingerprint in the rhizosphere of Pisum sativum in response to water stress

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Résumé en anglais	In cropping systems, legumes release substantial amounts of nitrogen (N) into the soil, via rhizodeposition, and constitute a sustainable source of N, instead of synthetic N fertilisers (Fustec et al. 2010). More frequent or/and intense droughts and floodings, due to climate change and intensification of agriculture, may affect N rhizodeposition (Preece & Peñuelas 2016). However, the effects of water stress on this process are poorly documented. A part of N derived from root exudates, mainly in amino acids (AAs) form, is suspected shape and regulate rhizosphere microbial community, thus playing a potential role in maintaining plant health in case of abiotic stress (Moe 2013). We hypothesized that root AA exudation could change significantly, according to water availability, and would help to understand N metabolism changes in plant-rhizosphere interactions. Because studying exudation from plant grown in unsterilized soil is challenging (Oburger et al. 2013), we have measured the rhizosphere AA fingerprint (RAAF), as the result of interactions between AA exudation and rhizospheric environment. In addition, plants were stem-labeled (cotton-wick) with 15N-urea for 72 h to provide direct evidence of a link between root AA and exudation in the soil. The RAAF was measured in Pisum sativum rhizosphere, under either a water deficit or a water excess for 72 h. Water deficit decreases biomass accumulation in shoots but not in roots. Then, water deficit had no significant effect on total AAs released into the rhizosphere but, it significantly modified the composition of RAAF, with a preferential increase of proline, alanine and glutamate and a rise in isotopic enrichment of AAs derived from oxaloacetate in tricarboxylic acidic cycle (asparagine, aspartate, threonine and isoleucine). These results support the idea that, under the early stages of water deficit, recently assimilated N is rapidly translo-cated to the roots, and part of it is exudated in AAs. Most of the exudated AAs are known to have a specific role in increasing the water holding capacity around the root and to favour the establishment of positive interactions with plant-growth promoting bacteria (Apostel et al. 2013, Hinsinger et al. 2003). A study aimed at establishing a better understanding of the relationship between microorganisms and AA release under water deficit is now necessary.
URL de la notice	http://okina.univ-angers.fr/publications/ua18154 [11]

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