



Root system responses of *D. glomerata* and *M. sativa* to water stress in pure or mixed stands

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Climatic projections indicate that Europe should face a significant change in seasonal rainfall distribution, with up to 25% less precipitations in Summer by the end of the 21st century.. The yield of grasslands, that make for a large part of Belgian agricultural system, would be amongst the most affected by these new scenarios of water deficit. The overall goal of the ForDrought project, launched at UCLouvain in 2012, is to improve the performance of forage crops to cope with climate change.

The specific objectives of this study were to observe the responses of root systems of grassland plants exposed to a water deficit and to assess the value of plant species association. The species studied were *Dactylis glomerata* and *Medicago sativa*.

Large pits were dug on the border of experimental plots of pure and mixed composition, exposed or not to a one-month long summer drought, to carry out different root system observations. The number of roots in each pit were counted following the trench profile method. In addition, roots were extracted from vertical and horizontal soil cores and root DNA was analysed to determine the specific root distribution of each species. The parcels were harvested and yield measured four times over the course of one year. Finally, the soil profile and the depth of the ploughpan for each plot were also determined.

The results showed that a water deficit had an impact on the root density of both species. However, this impact differed between species: *Medicago* had more roots when exposed to the deficit while *Dactylis* tended to produce fewer roots.

The genetic analysis turned out to be biased against *Dactylis* which could not be detected when it was mixed with *Medicago*, despite many protocol adjustments were implemented to circumvent the problem.

The yield was negatively impacted by water deficit, for all plots. The association of species did not produce any clear effect on the yield. However, the soil observation showed that the ploughpan was abnormally thick in all of plots, which may have limited the expression of the species specificities and of the differences between pure and mixed stands.