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The potential of adaptive drainage to control salinization in Polder context

Ali Mehmandoost Kotlar^{1,4}, Bert Everaer², Guillaume Blanchy¹, Dominique Huits², and Sarah Garré^{1,3}

¹Flanders Research Institute for Agriculture, Fisheries and Food (ILVO), Melle, Belgium (ali.mehmandoostkotlar@gmail.com)

²Inagro, Roeselare, Belgium

³KULeuven, Leuven, Belgium

⁴Universite Catholique de Louvain, Belgium

The past dry summers of 2018, 2019 and 2020 have indicated the sensitivity of Flemish agriculture to drought. In the Flemish polders, this resulted not only in crop water stress, but also in increasing soil and water salinity levels due to the high evaporative demand and the occurrence of salt water lenses in the subsurface. Due to the increasing occurrence of weather extremes as a consequence of climate change, farmers will need to deal with both too little and too much freshwater in the future. Compared to conventional drainage systems, adaptive drainage can secure food production and lower the irrigation need by only draining water when it is strictly necessary and thereby leaving more opportunities for water retention and groundwater recharge.

In the project OP-PEIL, we will investigate the impact of adaptive drainage on water fluxes and availability, water quality as well as on the cropping system itself (crop growth, disease pressure, yield and quality) during 3 years. We will use geophysical techniques to monitor the impact of adaptive drainage on the fresh/salt water interface in the drained field, as well as in the nearby landscape. Finally, we will set up numerical experiments using water balance models (e.g. SWAP-WOFOST and DRAINMOD) and the available historical climate, field management, and soil hydraulic properties data will be performed to evaluate more extensive climatological scenarios. By the end, this four-year project will raise awareness of farmers and stakeholders about the impact of adaptive drainage on agricultural practices in the Flemish Polders in Belgium.