

NuReDrain Highlights and Achievements – Update November 2018

Plants need nutrients, such as nitrogen (N) and phosphorus (P), to grow. Therefore, nutrients are used in agriculture. The excess of nutrients end up in the water and deteriorate the water quality. The NUREDRAIN project wants to tackle this problem by testing filter technologies which can trap N and P.

Filters need to be filled with a material which can adsorb P or remove N. These materials have been provided by Nuredrain partners from Belgium and Denmark or have been purchased. A series of lab tests revealed which materials are suitable for an efficient P removal. Noteworthy is the fact that filter materials used to remove low concentrations of P can later on be reused to remove high concentrations of P.

Several filter materials have already been tested in the field. Iron coated sand, a waste product from drinking water production, was tested to adsorb P. In drainage water, the material was able to remove 59 to 92% of P. In water discharged from greenhouses, the material was able to remove 99% of P. Granules derived from iron sludge from drinking water production, has been used in a filter set up filtering surface water from a water reservoir for drinking water production. Initially, a 85% P-removal was obtained. Later on, the filter system was clogged due to algae blooms in the surface water. Prefiltration and backwash of the system is currently investigated.

With respect to N removal, the 'moving bed bioreactor' is currently being tested in the field. The reactor contains bacteria which convert nitrates to nitrogen gas. In drainage water, N-removal varied between 30 and 73%. However, it remains a challenge to install a MBBR in remote areas and keep it operational at low temperatures.

Saturated filter materials are intended to be reused as fertilizers. A pot trial with Azalea revealed that P is strongly adsorbed to the Fe-based filter materials. As such, P cannot be released and taken up by the plant and plants show an inferior quality. However, substituting 30% of the substrate with saturated filter material was beneficial for Boxwood plants because less Liverwort was prevailing. Several pre-treatments are currently being tested on the saturated filter materials to facilitate the P release and to explore various valorization routes.