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.

The Nuredrain project considers 3 N removal technologies: 1/ a MBBR (= moving bed bio reactor); 2/ a ZVI (= zero valent iron) filter and 3/ a mobile constructed wetland.

Greenhouse effluent has been treated with a DIY MBBR (= do-it-yourself moving bed bio reactor) filter. An average removal efficiency of 65% could be achieved. Also drainage water can be treated with an MBBR. The configuration of the MBBR filter for drainage water depends of the flow and N concentration. Average removal efficiency varies between 60 and 95%. The ZVI filter also results in a successful N removal being on average 94%. The mobile constructed wetland has been installed along a ditch. The microbial community is currently developing in the biofilm. N removal results are expected in the near future.

The Nuredrain project also considers 4 P removal technologies: 1/ a P filterbox; 2/ a sediment filter combined with a reactive filter; 3/ an inline drain P filter and 4/ a filter column.

Drainage water treated with the P filterbox achieves a 80-100% P removal. The associated filter material used is ICS (= iron coated sand). This filter material has also been tested for P removal in greenhouse effluent. ICS showed to be a very good P adsorbent as 99% P could be removed. When a lot of sediments are present in the drainage water, it is recommended to trap the sediments first. A hydroseparator has been trialed for this in Denmark but pump failure caused problems, also on the subsequent reactive filter. This sediment trapping is currently been trialed again in the ongoing drainage season. Also drainage water in Germany can be very rich in amorphous organic matter. This requires a prefilter to be installed before the inline drain P filter. As in Belgium the dissolved P is adsorbed onto ICS. The overall P removal amounts up to 83%.

Around 40% of P can be desorbed from saturated filter material. The resulting P quantity is too low to be economically viable for P recovery. Desorption is nevertheless interesting to recover the filter material as such. ICS filter material saturated with P can also be used as a substrate (30%) for some plants (e.g. Chysanthemum and Chlorophytum).

Techno-economic evaluation of 3 nutrient filter systems revealed that these technologies are more cost effective as compared to current measures. This result will strengthen the discussion with national authorities.

Handy men and women can try to build themselves a MBBR by following the guidelines in the DIY MBBR manual. This manual is available in English and Dutch.