LET TILE DRAINAGE WATER IRRIGATE MEADOWS / INTERRUPT ARTIFICIAL DRAINAGE

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Description

Phosphorus is mainly transported to surface water by water transport. The pathway of the water flow can be changed in such a way that phosphorus rich components in solution will be reduced. Depending of the main pathway of P losses (e.g. overland, subsurface, artificial drains etc) and the main P component in soil solution (particle P material, colloids, inorganic soluble P, organic soluble P) specific measures will reduce the P losses. In this specific fact sheet the impact of changing the flow of artificial drainage will be discussed in more detail (idea ventilated in the questionnaire)

Rationale, mechanism of action

In areas where P losses are also, or mainly, caused by artificial drainage water (via tile drains), management measures are also possible by changing the pathway of the water flow via tile drains completely to overland flow and irrigate meadows or riparian areas. This means that the tile drainage should be forced up on meadows by cutting them at the edge of riparian areas in stead of running underneath directly to the stream channels and ditches. In flat areas the water should be pumped up via a collected drain and in hilly areas this can be done by natural forces (let the drain come out at the surface in a certain low land area. However, in this last case the water flow have to be reduced via a perforated distribution pipe/tube across the meadow or riparian area. The general idea of this measure is that polluted water with phosphorus (particulate and soluble) is filtered by a meadow or a riparian area and (http://www.unl.edu/nac/aug94/rip-crop-2.html) and (Tanner et al., 2005). This option is visualized in figure 1.

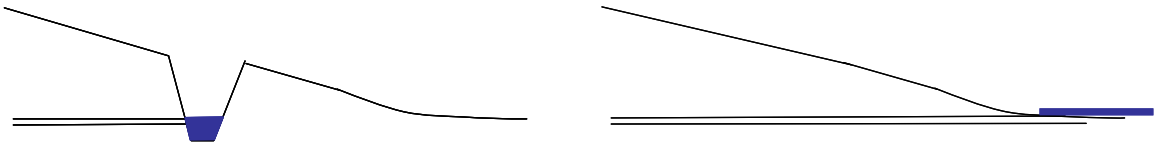

Figure 1. Schematic visualization of the impact of measure "irrigate artificial drainage water over meadows" on the water flow

Applicability

The measure can be constructed in fields where artificial drains contributes to the diffuse pollution of the surface waters and where meadows or riparian areas are located nearby the field and the streams.

Effectiveness, including certainty

The effectiveness of changing the water flow from below the riparian area into the riparian area will have an impact on the P losses to surface water. The effective of filtering of phosphorus will depend on the efficiency of the riparian area or the meadow (and this is discussed in another fact sheet). However, also the construction needed to

shift the water from below the surface to the surface incl. the further distribution of the artificial drainage water over land is very important in order to reduce the flow rate.

Time frame
Changing the artificial flow to overland flow will have an impact on the travel time and therefore on the timeframe. The reduction of contribution of tile drains will be directly effective. Also the extra overland flow will lessen the nutrient losses at short term (within a year).

Environmental side-effects / pollution swapping
It is not expected that there will be negative side effects of this measure.

Relevance, potential for targeting, administrative handling, control
The option can be relevant for those fields that mainly cause the diffuse P losses via artificial drains to surface waters at local scale. However, fields where this types of combinations occur (tiled drained and nearby riparian soils) do not occur often.

Costs: investment, labor
The main costs are caused by labor (cutting the artificial drains) and the installation of a water distribution tube and the maintenance of the construction. No special investments are necessary.

References
Tanner C.C., Nguyen M.L., Sukias J.P.S. (2005) Nutrient removal by a constructed wetland treating subsurface drainage from grazed dairy pasture. Agriculture, Ecosystems & Environment 105:145-162. http://www.unl.edu/nac/aug94/rip-crop-2.html