

Development of model for macropore flow of plant protection products in soil

Theme: Risk assessment procedures for pesticide registration

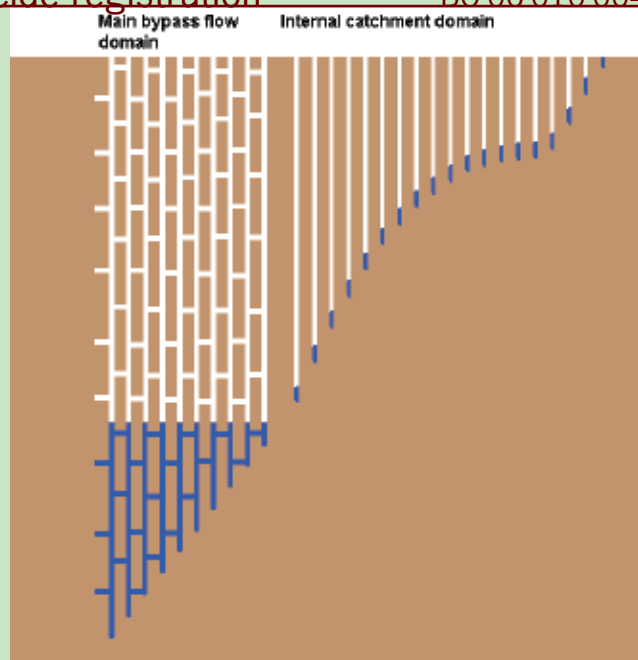
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Problem

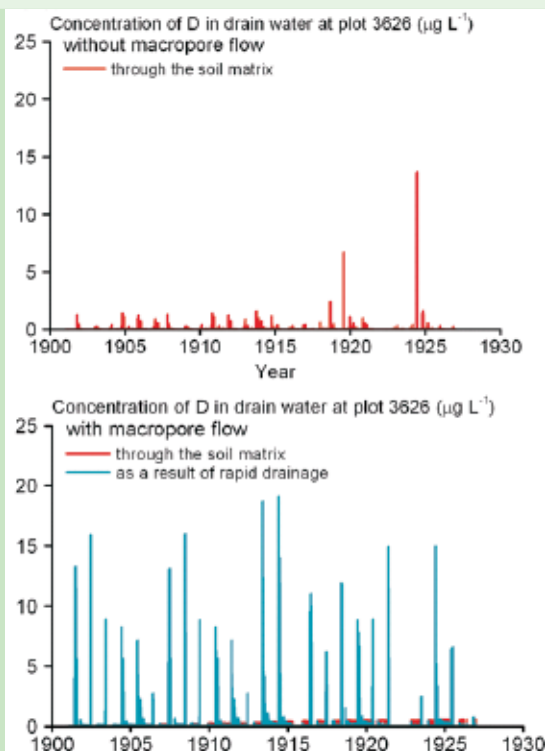
- The current exposure assessment of aquatic organisms in the Netherlands is based on input via spray drift only and ignores input via leaching from drain pipes. This is scientifically not justifiable
- Cracking clay soils are expected to represent realistic worst case conditions for leaching from drain pipes
- No model was available that could describe adequately leaching in such soils including flow through macropores

Approach

- A model for preferential flow of water was developed (i.e. part of the water flow model SWAP). Main assumption is that the macropores in the soil can be divided into a bypass domain and an internal catchment domain (see figure)
- Coupled to this, a module for preferential flow of solutes was developed (i.e. part of the PEARL model describing behaviour of plant protection products in soil)
- The coupled SWAP-PEARL model was parameterised for the area of arable land in the Netherlands



Schematic representation of the macropore model: the macropores in the main bypass domain reach into the groundwater whereas the macropores in the internal catchment domain stop at shallower depths.



Results

- Simulations indicate that including macropore flow leads to a distinct increase of the concentrations leaching from the drain pipes (see comparison in figure)

Future use in risk assessment

- In 2009 calculations will be made for the area of drained arable land in the Netherlands. On the basis of this a 90th percentile worst-case soil profile will be selected
- This soil profile will become part of the so-called NL interim scenario for exposure of aquatic organisms that will be introduced in Dutch registration of plant protection products early 2010

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