

Release of mecoprop from polymer-modified bitumen roof membranes – modeling the transport behavior of mecoprop during soil passage
taking into account the specifications of the Mecoprop PG test plan

Final report on the DIBt research project

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Summary

Polymer-modified bitumen roof membranes for green roofs contain, as root penetration protection, mecoprop esters, which are gradually released as carboxylic acid (mecoprop, MCPP). The release of MCPP from roofing membranes was investigated in the DIBt-funded research projects P 52-5-20.88.2-1497/15 and P 52-5-20.88-1999/16. In order to estimate the MCPP concentration in the groundwater after soil passage, the transport behavior of mecoprop during soil passage was modeled. The modeling was done using MS Excel and taking into account the specifications of the DIBt Mecoprop project group and the results of the research projects mentioned above as input parameters. With a flow rate of 0.87 mm/d and a constant half-life of 30 d throughout the soil up to the assessment site (1 m deep), the mecoprop concentration remains several orders of magnitude below the de minimis threshold of crop protection products and biocidal products of 0.1 µg/L for both continuous and discontinuous input at a depth of 1 m. The modeling yields a low influence of dispersion and an even lower influence of sorption on the maximum concentration of mecoprop at a depth of 1 m. An approximation formula was established for continuous input. The approximation formula can be used to easily calculate the maximum acceptable input concentration of mecoprop. To estimate the influence of half-life, a depth profile was implemented for it in the model. The model with a non-constant half-life shows that the de minimis threshold may be exceeded if the model's mecoprop degradation layer is too thin (< 20 to 30 cm). Further research and studies are recommended in order to clarify which soil layers ensure effective mecoprop degradation in reality and which soil layers display only low mecoprop degradation rates. In addition, in near-surface soil layers, a possible negative influence of high mecoprop concentrations on flora and fauna must be considered.