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## Flow rate dependent transport of Fluopyram in saturated sandy soil

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Velum<sup>®</sup> is a novel contact nematicide with Fluopyram (FL) as active ingredient. Knowledge on its adsorption and transport characteristics is essential for both agricultural and environmental considerations. The main objective of this study was to quantify the transport characteristics of FL in a sandy soil from a non-cultivated area in Arava region, Southern Israel, with a special focus on the behavior in soil after drip application. In this regard, soil column transport experiments under saturated water flow conditions were conducted. In addition to FL, the transport experiments were performed with a bromide tracer. Four factors were examined: (i) pulse concentration, (ii) water flux (ii) pulse size and (iv) interrupted flow. Equilibrium adsorption isotherms were measured by batch experiments. The established breakthrough curves (BTCs) were analyzed with the convection–dispersion equation (CDE) in its chemical equilibrium and non-equilibrium forms. In addition, the validity of a two-site kinetics model was evaluated. All models were examined with and without a term, assuming irreversible sorption. The bromide BTCs were adequately fitted by analytical solutions of the equilibrium CDE using the CXTFIT code, suggesting that physical equilibrium is prevailing. The FL BTCs were fitted with two-site sorption and two kinetic sites models using HYDRUS-1D code. The experimental mass balance analysis demonstrated that the bromide mass was fully recovered, while only part of total FL applied was recovered, in particular, at low flow rate. The comparison between non-interrupted and interrupted water flow demonstrated that at a given flow rate, during the pulse input, the two BTCs are identical. However, following the flow interruption (60 hours), when the flow resumed, a sharp decrease could be observed in FL concentration. Thereafter, the two BTCs are re-converged, exhibiting similar desorption behavior. Possible explanations for FL transport characteristics seems to be low kinetics desorption and/or irreversible adsorption. Additional quantitative insights from the numerical analysis will be presented and discussed based on the goodness of fit and optimized parameters of each model.