COMPARISON OF PISTON FLOW AND PARTIALLY MIXING SALT FLOW MODELS

THESIS SUBMITTED

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ABSTRACT

In this study modelling of the root zone salt profile was studied by using theoretically based models. The main objectives of this study were to compare and calibrate piston flow and partially mixing salt flow models. Validity of these models with observed field data was also studied.

These two models were programmed, using Fortran algorithm and were processed. Improvement was made in the piston flow equation as it did not give satisfactory results. It was observed that the original piston flow equation underestimates the EC profile compared to the observed data and is ineffective for different field samples. The main cause of prediction by piston flow model was that it gave more leaching than the field capacity of the soil which is not possible. Hence the model was improved by incorporating a factor F in the original piston flow equation to control the quantity of leaching water. For F equal to 1 the improved piston flow model works as original piston flow model while for values less than 1 the same model works as partially mixing salt flow model. The factor was optimized and the results were found satisfactory as compared with to observed data. The results of the partially mixing salt flow model matched well with the observed data.

The values of K_d parameter for slightly saline and moderately saline silty clay soils was varied from 0.40 to 0.54 for the PMSF model. The calibrating factor F varied from 0.15 to 0.20 and 0.06 for slightly saline silty clay soils respectively. For strongly saline silty clay soil K_d was found from 0.28 to 0.30 and value of F was from 0.16 to 0.02. The mass balance of different fields was checked by using PMSF and IPFM models. The results were found within acceptable range.