Evaluating Performance of WASP Model to Simulate Drain Water Quality of Paddy Fields of Unit F4 of Guilan Irrigation and Drainage Network

M. Hasanpour, M. Navabian [1]*, and M. Esmaeili Varaki

MSc. Student of Water Engineering Department, Faculty of Agricultural Sciences, University of Guilan.
mahsa_hasanpoor7148@yahoo.com
Associate Professor of Water Engineering Department, Faculty of Agricultural Sciences, University of Guilan and Department of Water Engineering and Environment, Caspian Sea Basin Research Center, University of Guilan, Rasht, Iran.
Navabian@guilan.ac.ir
Associate Professor of Water Engineering Department, Faculty of Agricultural Sciences, University of Guilan and Department of Water Engineering and Environment, Caspian Sea Basin Research Center, University of Guilan, Rasht, Iran.
Esmaeili@guilan.ac.ir

Abstract

The purpose of this study was to evaluate WASP7.3 model in simulation of drainage water quality of paddy fields in Nodeh and Nopashan villages of Someh Sara township located in F4 unit of Sefidrood irrigation and drainage network. To evaluate the model, drainage discharge and drain water quality at nine sections of drainage and nine drainage inlets and outlets were measured and introduced to the model. Model sensitivity analysis showed that in simulation of salinity and nitrate, drainage discharge was effective, while in simulation of orthophosphate and ammonium, in addition to drainage discharge and diffusion coefficient, phosphate dissociation coefficients in water column (orthophosphate), nitrification rate, and temperature coefficient of nitrification (ammonium) were more sensitive. Results showed that discharge, nitrate, orthophosphate, ammonium, biological oxygen demand, dissolved oxygen, and salinity were simulated with normalized root-mean-square error of, respectively, 0.166, 0.176, 0.143, 0.283, 0.148, 0.179 and 0.156. According to the results, the accuracy of the model simulation in the study area was classified as acceptable for all parameters, except for ammonium, and is recommended for simulating drain water quality. Due to the limitation of the model to obtain the number of discharge functions of the input and output sources to the drainage channel, application of the model in the main paddy field drainage canals that have fewer inputs than field drainage, can improve the simulation results.