Impact of Irrigation and Fertilization Management Strategies on Nitrate Leaching: Using SWAT Model

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Abstract

Chemical fertilizers have important role in modern agriculture, and in the other hand led to rigid environmental pollution. Urea fertilizer is one of the most widely used and least expensive nitrogen fertilizers in Iran. Since it is high solubility in water a significant of it, if irrigation or precipitation is heavy, easily washed and led to change to change the quality of groundwater, rivers or seas. Hence, in this study the effects of deficit irrigation and fertilization on pollution using SWAT for Tashk-Bakhtegan basin (land area between Dorudzan dam and Khan Bridge) were simulated. This model by comparing model outputs with actual observations of hydrological, crop yield (wheat, barely, corn and rice) and nitrate by using SUFI2 algorithm in SWAT_CUP software were calibrated and validated. Then the calibrated model used to evaluate different management strategies (e.g. irrigation and fertilizer amount). When the impacts of different levels of urea (0 to 70 percent reduction in urea application) were modeled, yield of these crops reduced between 1 to 27, 0.8 to 24, 0.42 to 21 and 0.47 to 9 percent for wheat, barely, corn and rice, respectively. However, these tends to decline nitrate leaching 16-81, 18-80, 15-85 and 12.5 to 83.6 percent, respectively for these crops. Therefore, by comparing yield and nitrogen loss changes, this result can conclude that a significant reduction in nitrogen loss by minimum cost on yield can achieved by optimize fertilizer application.

Keywords: Calibration, Validation, Simulation, Leaching, Nitrogen.

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