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COMPARISON OF THREE MODELS SIMULATING THE DYNAMIC CHANGES OF NO_3^--N AND NH_4^+-N IN SOIL UNDER THE INFLUENCE OF CLIMATE CHANGE

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Abstract

In this paper, three models (CENTRY, DAISY and DNDC) were used to simulate the dynamic changes of nitrate nitrogen (NO_3^--N) and ammonium nitrogen (NH_4^+-N) in soil in the Taihu Lake region of China when CO_2 concentration and temperature rise under climate change conditions. Three models were compared for their simulation of NO_3^-- N and NH_4^+- N content in soil, and the most suitable model for the study area was determined. Winter wheat (Triticum aestivum L.) was cultivated during the study period at two CO_2 concentration levels (350 ppm ambient and elevate to 500 ppm) and two temperatures (ambient and 2 °C above the ambient). The results showed that precipitation, soil pH, amount of N fertilizer and mean annual temperature had most substantial effects on soil NO_3^--N content. Although all three models provided satisfactory results, there are certain differences in the simulated values of the three models. NO_3^--N content always displayed a greater difference in all three models than NH_4^+-N content. DAISY model shows the most significant corresponding relationship (with the highest R^2) with the observed values in the whole growth period of winter wheat. Therefore, this model may be more suitable for studying climate change scenarios in the region, as it is generally consistent with observed field data.

Key words: ammonium nitrogen, climate change scenarios, comparison of three models, nitrate nitrogen

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