Assessments of Soil and Water Resources Utilization and Changes by Logistic Model Analysis in Heilongjiang Agro-ecosystem, China

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Soil and water resources are the two major resources for agro-ecosystem, which influence its sustainability and developments.To explore the impact of changes and developments of Heilongjiang agricultural ecosystem on water and soil resources utilization,this research evaluated and predicted the K value and trends in crop water consumption, as well as planting area of this agro-ecosystem under current scientific management practices, by Logistic Model and RMSE analysis model.The results show that the K value of crop total planting area in Heilongjiang croplands is about14.3 million hectares, and the K value of agricultural total water supply is about 31.6 billion cubic meters. The K value of rice per unit yield is about 7,030 kg/hm2, while the K value of grain crops in this aspect is about 5,275 kg/hm2, and the K value of crop total yield capacity reaches 75.32 million tons. Meanwhile, the simulated results and statistical records of agricultural total water supply, crop total planting area and crop per unit yield match well so as to get the minimum and maximum value of determination coefficient (R2) 0.89 and 0.98 respectively. Moreover, almost all the Root Mean Square Error (RMSE)are less than 10%, with a very significant correlation at the level of 0.01.The Logistic model can relatively simulate the trend and utilization changes of soil and water resources in Heilongjiang agro-ecosystem accurately in past two decades.