Rice fertilization management plays an important role in rice yield and quality; however, making automatic fertilization plans according to the rice life cycle is difficult. This study proposes a rice fertilization recommendation model using a knowledge graph and a case-based reasoning method. To build the recommendation model, an initial fertilization scheme was first obtained by retrieving information from a knowledge graph. It was further enriched through operating vectors of all entities and relations in the knowledge graph obtained using the PairRE model. Next, *k* historical cases similar to the target event were retrieved using the fertilization scheme, attributes of the target event, and entity vectors of the knowledge graph. Finally, the fertilization rates for the target were predicted according to the *k* cases. The results showed that by employing the proposed model, the error rate of the fertilization scheme was approximately 19.5% and the prediction accuracies for N, $P_2O_5$, and $K_2O$ were 95.69%, 79.04%, and 81.67%, respectively. The model not only improves the accuracy of recommendations but also has strong interpretability and high practical value, and can be easily replicated and applied in the design of agricultural recommendation systems.