Simulating growth and development of winter rape in Yangtze river valley

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This paper describes the development and testing of a winter rape module for the Rapeseed Cultivation Simulation: Optimization-Decision-making System. Model parameters describing phenology, leaf area development, organ forming, crop net photosynthesis, biomass production and partitioning, demand, uptake and retranslation of nitrogen, shoot number and root growth and water utilization were assembled from the literature and growth analysis experiments conducted in Yangtze river valley. The model were tested again of independent datasets from Yangtze river valley, which varied in terms of nitrogen supply, sowing date, and plant rate, and variety. Grain yield ranging from 75gm^{-2} ~375 gm^{-2} were simulated. Then, the optimization model involving how to determine the optimum season, the optimum LAI, the optimum total shoot numbers, the optimum plant rate, the optimum rate of fertilizer, the optimum soil moisture management, the optimum yield, were established according to the decision-making theories, of which integrated with optimization principle for rapeseed cultivation. Finally, these optimization models were taken as dynamic objects in the following decision-making function: 1.Decision-making for winter rape cultivation in normal years. 2. Increasing winter rape yield according to the best-suited local condition. 3.Computer simulation test. 4. Evaluating climatic suitability for new varieties of winter rape, and 4.Decision-making for winter rape cultivation in the current year. We discuss features of the model that require further development.