S I M U L A T I O N   O F   R I C E   P H Y S O L O G I C A L   T R A I T S   I N   D I F F E R E N T   N I T R O G E N   F E R T I L I Z A T I O N   A M O U N T   A N D   S P L I T T I N G   B Y   O R Y Z A   2 0 0 0   M O D E L

Davood Barari Tari[1], Ebrahim Amiri[2], Jahanfar Daneshian[3], Amir Hossein Shirani Rad[3], Ali Moumeni[4], Fulu Tao[5]

1. Department of Agronomy, Ayatollah Amoli Islamic Azad University. Amol. Iran.
2. Department of Agronomy, Lahijan Islamic Azad University. Lahijan. Iran.
3. Scientific Member, Seed and Plant Improvement Institute. Karaj. Iran.
4. Scientific Member, Iran Rice Research Institute. Amol. Iran.
5. Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing 100101, China

Corresponding Author: Davood Barari Tari   Email: d.barari@iauamol.ac.ir

I N T R O D U C T I O N

A new method to investigate different cultural management effect on rice traits is crop simulation. Simulation modeling can complement, analyse and extrapolate epirical results from field experiment. In 2001, a new version in the ORYZA model series was released that improved and integrated all previous version in to one model called ORYZA 2000 for rice simulation [1]. The objectives of this research was calibrated and evaluate ORYZA 2000 performance for a shirodi variety with different nitrogen fertilization methods

M A T E R I A L   A N D   M E T H O D S

In order to investigate ORYZA 2000 model on rice traits at different nitrogen fertilization Level, a field experiment was carried out in Iran Rice Research Institute from 2011 to 2012. Design was laid out in factorial in basis of Randomized Completely Block Design with three replications. Variety used was shirodi. Factors were nitrogen amount in four levels (40, 80,120 and 160 kg N ha^{-1} and control) and nitrogen splitting in four levels (T_1: 50% in base + 50% in tillering stage, T_2= 33/33% basal +33/33% tillering stage+ 33/33% in panicle initiation stage, T_3=25% basal+37/5% in tillering stage +37/5% in panicle initiation stage T_4: 25% in basal + 25%. tillering stage + 50% in panicle initiation). ORYZA 2000 performance was evaluated by looking at the absolute and normalized root mean squared error (RMSE) between simulated and measured values, calculated as: [1,2]

$$RMSE_a = [1/n \text{ £}(y_i - x_i)^{0.5}] \qquad RMSE_n = 100 \times \{ [1/n \text{ £ } (y_i - x_i)]^{0.5} / \text{£ } y_i / x_i \}$$

ORYZA 2000 was calibrated according to Bouman and Van Laar (2006) [2]

RESULTS AND DISCUSSION

The model was calibrated using data for the 2011 growing season, and the data for 2012 growing season for model validation. Results showed that absolute root means square error (RMSE$_a$) in calibration and validation phase were 411 and 423 kg ha^{-1} respectively in grain yield simulation. Also in this trait RMSE$_n$ in calibration and validation phase section were 11 and 6 percent respectively. According to results there is not a significant differences between simulated and observed grain nitrogen amount at 5% probability level. In total plant nitrogen simulation phase absolute root means square in calibration and validation section were 10 and 13 . RMSE$_n$ in calibration and validation of model related to total nitrogen simulation were 0.08 and 0.09 respectively. In base of graphical and statistical

results showed that ORYZA 2000 simulated grain yield, total biomass, grain nitrogen and leaf area index in appropriate range.

K E Y W O R D S : Rice, Nitrogen, Simulation, ORYZA 2000.

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