4363

PREDICTING CROP PRODUCTIVITY AND ADAPTING THE RICE PLANT TO CHANGING CLIMATES: THE IMPORTANCE OF MODELING

Lafarge, Tanguy A.[1]; Luquet, Delphine[1]; Baron, Christian[1]; Heinemann, Alexandre[2]; Rebolledo, Maria-Camila[1]; Julia, Cecile[1]; Muller, Bertrand[1]; Rouan, Lauriane Soulie[1]; Jean-Christophe[1]; Dingkuhn, Michael[1]

[1] Centre International de Recherche en Agronomie pour le Développement, Montpellier, FRA; [2]EMBRAPA, Santo Antonio de Goias, BRA

Climate change scenarios are predicting, by the end of the century, an increase in air temperature from 1.1 to 6.4 ℃ and in air [CO_2] from 600 to 1500 ppm, associated with more frequent submergence and drought events in the rice-growing regions. Considering that rice is a staple food consumed by 3 billion people, it is essential to predict the impact of such climates on rice production and select genotypes adapted to future environments. The lack of (i) compatibility between climatic and crop models, (ii) characterization of future target population of environments, and (iii) formalization of interaction between climate factors on plant morphogenesis, gives crop modeling a central role for addressing these challenges. The crop model SARRAH has been successful in identifying relevant sites for rice breeding programs and matching plant types with environment characteristics in Brazil. This model was also applied for predicting crop productivity of distinct cereals in many villages in four Western African countries by determining the part of climate and rainfall involved in grain yield variability. The crop model EcoMeristem, designed to account for the effect of environmental factors on plant morphogenesis at the organ level, is already used as a phenotyping tool for rice under drought. It will soon formalize the effect of the microenvironment on organ temperature and grain yield formation. These two models are already relevant tools to address crop adaptation and response to climate change. In the near future, they will allow conceptualizing and evaluating ideotypes under various climate scenarios.