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"Solidarity in a competing world — fair use of resources"

Phenological Response of Lowland Rice Genotypes to Environmental Conditions - Case of Ambohibary, Madagascar

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Abstract

Rice is the most important cereal in the world and one of the main staple foods for millions of people in sub-Saharan Africa. It constitutes a strong component of food security and poverty alleviation in Africa. However, Africa's rice production has not been able to meet the increasing in demand and there is a huge gap between consumption and local production. AfricaRice and its partners have developed a decision-support tool called "RiceAdvice" to improve farmers' decision making in irrigated and rainfed lowland rice production systems. RiceAdvice provides users with information on best-bet cropping calendars; with emphasis on good agricultural practices in general, in particular soil fertility management. To incorporate rice phenology as a function of varietal choice, air temperature and day length into the current version of RiceAdvice, detailed physiological field experiments, so called "Rice Garden Trials" are conducted in Ambohibary, in Central West Madagascar. This area, at high altitude (1500 m asl) is prone to cold stress and climatic hazard. Therefore, data collected will be used to estimate growth duration and timing of specific development stages for each variety, as well as expected yield loss due to cold and heat stress, through use of crop simulation models. Rice Garden trials were established using existing and new cold-tolerant varieties, some popular varieties grown in different countries across Africa, and some new varieties developed by AfricaRice (ARICA's). 100 genotypes are selected including: 5 check and 95 test varieties. They were sown in November 2015, January and February 2016. For each sowing month, an augmented design with 5check cultivars and 5 replicate blocks was installed. Each plot is 1.92 m^2 large, with a density of 25 hills m^{-2}. Besides phenological observation during the crop cycle, yield and its components were measured, and spikelet sterility was determined. The main results: (i) Crop duration of lowland rice cultivars changes at different sawing dates; (ii) Genotype and sowing dates are contributing to observed variability in crop duration and grain yield (iii) Morpho-physiological traits contributing to cold tolerance that should be used to improve rice phenological and growth models (RiceAdvice) and adapt cropping calendars.

Keywords: Cold sterility, cropping calendars, decision-support, food security

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