Phenological responses of irrigated rice in the Sahel

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Worldwide rising temperatures are already being observed and are expected to increase within the next decades. In the Sahel cool periods cause yield losses due to spikelet sterility in late sown rice and thus Sahelian rice production systems might benefit from increasing temperatures. Higher temperatures during the vegetative phase will lead to shortened crop duration and during the reproductive phase higher temperatures during cool periods might reduce sterility. For the hot periods negative effects on biomass production and increased sterility due to heat stress are expected. The complexity of those phenomena requires well validated crop models able to precisely assess development and yield according to genotype and climate for predictive conclusions and adaptive decisions (choice of genotype, sowing date) under changing climatic conditions.

In the early 90s for a wide range of germplasm phenology was observed and yield components were determined in staggered planting dates at AfricaRice's Sahel station in Ndiaye, Senegal. Based on this, a model (RIDEV) was developed by Dingkuhn et al. (1995) to estimate duration and sterility for multiple rice varieties in the Sahel as a function of sowing date. Until now, it has been used by the operational services. However, differences between crop cycles observed in farmers' fields and assessed by RIDEV have been reported. This could be explained either by model deficiencies, varietal evolution and/or climatic changes.

Presently in Ndiaye (coastal-semi-arid) and Fanaye (continental-semi-arid), 10 strongly contrasting rice varieties are grown year-around in monthly-staggered planting dates in order to determine duration, leaf appearance rate and sterility under current climatic conditions. Those varieties include some of the formerly observed genotypes as well as heat- and cold-tolerant reference varieties. Results will be used to improve RIDEV thus allowing for predictions of crop responses to climate change. Preliminary results with a focus on derivation of photo-thermal constants will be presented for the first completed year and compared to results from former years.

Keywords: modelling, RIDEV, Climate Change

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