Intra-annual genotypic patterns of growth and water use of irrigated rice in the Sahel

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With an increasing world population, the demand for rice as one of the most important staple crops is growing. Rice production can be increased either by intensification of existing or by exploitation of new and less favourable land resources. At the same time, rice production is confronted with climate change and increases in temperatures as well as more frequently occurring weather extremes are expected. In order to overcome the challenge of climate change as well as an increasing demand for rice, locally adapted varieties are needed, which are able to meet the given climatic conditions.
Rice production in the Senegal River Valley strongly depends on intra-annual climatic variation with a hot and dry period from March to July, a short wet season from August to October, and a cold and dry period from November to February. During the hot season, heat sterility as well as high water losses due to extreme vapor pressure deficits are common. The cold season is characterized by low development rates and high yield losses due to cold sterility. These variable conditions are ideal for studying genotype-by-environment interactions in order to assess genotypic traits with regard to their suitability to specific environments.
For the ongoing study, 10 contrasting genotypes were selected representing the large variation in the global gene pool in terms of duration, water use, and heat and cold tolerance. In bi-monthly planting dates, irrigation water input, evapotranspiration, plant development and yield were observed at 2 climatically different sites under flooded and non-flooded conditions in order to identify genotypic traits supporting water limited rice production as well as stable high yields under rather unfavourable thermal conditions. Varietal responses in terms of water use and yield will be presented and the related traits and their beneficial characteristics for specifically targeted environments discussed.

Keywords: Irrigated rice, temperature stress, water use efficiency, climate change

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