

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

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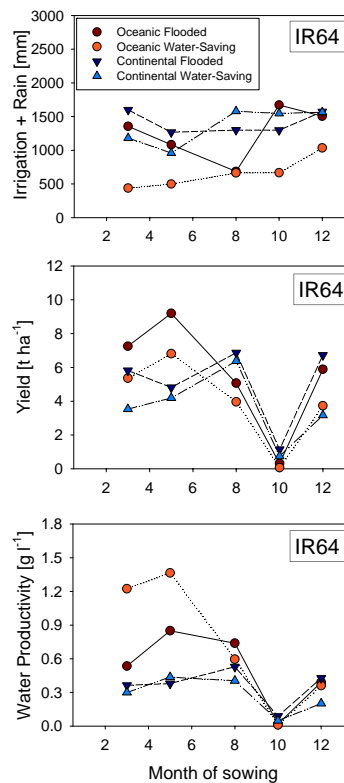
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Introduction

With an increasing world population, the demand for rice as one of the most important staple crops is growing. 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. 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. 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.



Results and Discussion

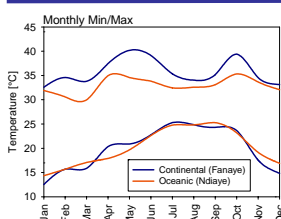
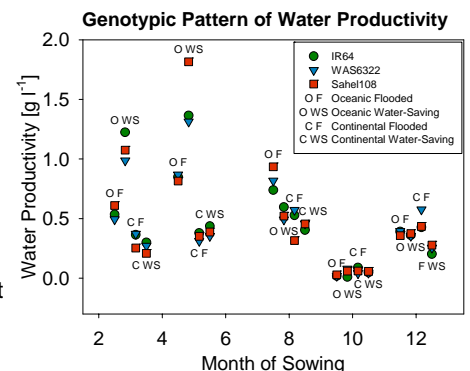


- At continental climate site no significant water-savings
- ⇒ Low ground-water table and high percolation rates
- High water-savings at oceanic climate site, apart from rainy season (August) due to rain
- ⇒ High water-table and capillary rise
- Higher yield losses at oceanic climate site due to water-saving irrigation
- ⇒ Higher water-savings result in higher yield losses
- Yield failure in cold season
- ⇒ Cold sterility
- Higher water productivity at oceanic climate site
- ⇒ Impermeable soil
- Water-saving irrigation leads to very high water-productivity at oceanic climate site in the hot-dry season
- ⇒ No effect in rainy or cold season

Conclusions

- High water-savings go along with severe yield losses
- Water productivity can be increased by water-saving irrigation on impermeable soils
- Water productivity is highest in the late hot-dry season due to high yields and short duration
- Clear intra-annual pattern, but no genotypic differences among high yielding varieties
- Breeding for water-productive varieties should focus sowing dates in the first half of year due to higher potential and higher variability

- No clear differences between varieties were found
- ⇒ Intra-annual and site-specific reactions exceed genotypic pattern
- High variability for sowing dates in the first half of the year
- ⇒ With high temperature and short duration, higher productivity possible



Materials and Methods

For the ongoing study at the Sahel Station of AfricaRice, trials are conducted in Ndiaye (oceanic climate) and Fanaye (continental climate) in the northern part of Senegal. Irrigated rice is grown under flooded as well as under saturated soil conditions, in order to assess the potential of water-saving rice production in semi-arid areas. Yield and irrigation water input are observed in bi-monthly staggered sowing dates. Irrigation water input is measured with v-notched weirs.

