Deutscher Tropentag, October 8-10, 2003, Göttingen

"Technological and Institutional Innovations
for Sustainable Rural Development"

Salinity in Irrigated Rice — Differentiation between Environmental and Salinity Effects on Yield Gaps

Folkard Asch

University of Bonn, Plant Nutrition in the Tropics and Subtropics, Germany

Abstract

In many semi-arid environments, irrigated rice is grown along the major river systems as the only staple crop that is not rain fed. Semi-arid environments are characterized by a strong seasonality, normally a distinct rainy season and an off-season with little rainfall and extreme temperature amplitudes. Any crop grown in those environments needs to be adapted to the climatic conditions and often climate alone is responsible for large gaps between potential and actual yield. Salinity effects are known to be influenced by climate. Dry conditions and high vapor pressure deficits increase the stress for the crop, whereas humid condition mitigate stress effects. It has often been observed, that salinity induced yield gaps differ among the two major seasons. The aim of this study is to identify yield component traits, that are just affected by the climatic conditions, just by salinity or by a combination of both. Ultimately, knowing which of the parameters contributing to a salinity induced yield gap is affected by climatic conditions and which is not, leads to the selection of better adapted rice varieties to both moderately saline and sub-optimal climatic conditions. Yield and yield components of 54 rice varieties were studied under fresh-water and saline water irrigation for six seasons in the semi-arid conditions of Sahelian Senegal. Potential yield was calculated by season for both treatments on the basis of a 100 percent performance of all yield components. Climatic effects on yield were calculated from changes in yield gap composition from one season to the next, salinity effects were determined from changes in the yield gap composition between the treatment within one season. The results are discussed with regard to selection and breeding strategies.

Keywords: Breeding, climate effects, salt stress, selection tools, yield components

Contact Address: Folkard Asch, University of Bonn, Plant Nutrition in the Tropics and Subtropics, Karlrobert Kreiten Straße 13, 53115 Bonn, Germany, e-mail: fa@uni-bonn.de