Tropentag, October 9-11, 2007, Witzenhausen

"Utilisation of diversity in land use systems:
Sustainable and organic approaches to meet human needs"

Phenological Responses of Rice Genotypes to Varying Thermal Environments in Nepal

Suchit Shresta[1], Folkard Asch[2], Mathias Becker[1]

[1] *Soil Science Devision, Nepal*

[2] *University of Hohenheim, Institute for Crop Production and Agroecology in the Tropics and Subtropics, Germany*

Abstract

The rice-wheat crop production system in Nepal includes a pronounced Dry-to-Wet-Transition (DWT) fallow period between the harvest of wheat and the transplanting of rice. Early rains during this fallow period cause large amounts of soil N to be lost if the system is improperly managed. To exploit nutrient and water availability, this transition period can either be shortened, allowing a third crop to be grown, or extended to increase the time for rice production, by changing the planting date of the rice. Shifting the planting date in the system requires rice genotypes adapted to the new growing environment. Crop duration is influenced by plant development, which is known to be influenced by the photo-thermal environment. This study focused on deriving photo-thermal constants for phenologically not characterised rice cultivars and on applying the phenological model RIDEV to design cropping calendar options. Crop duration of tested genotypes was determined for dates different from the recommended one and the risk of yield losses due to cold sterility was estimated by simulation. 32 rice genotypes were planted at 8 dates in 15-day intervals starting 27th April 2004 at the experimental field of the Regional Agriculture Research Station, Lumle, Nepal.

Duration to flowering was shortest for planting dates in late May and early June. Chilling tolerant cultivars showed increasingly shorter thermal duration to flowering with advancing planting dates. Simulation of flowering dates with RIDEV yielded correct results only for the early planting dates. For later planting dates simulated flowering dates showed an increasing deviation from the observed. In most of the cultivars, Tmin below 18°C during this stages caused near-total spikelet sterility and a specific delay in flowering. However, the chilling tolerant cultivars Chomrong and Machhapuchre-3 showed below 40 % spikelet sterility even at Tmin = 15°C. The results of the field trial and the simulations with RIDEV imply that early planting of rice is a promising cropping calendar option to manage DWT fallow period for Nepal's mountainous rice production systems. The effect of early rice cultivation on the nutrient dynamics of the soil should be addressed in future research.

Keywords: Cold sterility, cropping calendars, high altitude cropping, modelling, rice-wheat-system

Contact Address: Folkard Asch, University of Hohenheim, Institute for Crop Production and Agroecology in the Tropics and Subtropics, Garbenstr. 13, 70599 Stuttgart, Germany, e-mail: fa@uni-hohenheim.de