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## Field drought screening technique for rainfed lowland rice

Boonrat Jongdee\*, Grienggrai Pantuwan, Shu Fukai, Phoumi Inthapanya and Ouk Makara

\* Bureau of Rice Research and Development (BRRD), Rice Department, Thailand

e-mail: [boonrat@brrd.in.th](mailto:boonrat@brrd.in.th)

The rainfed lowland rice ecosystem is the major food production system in the Mekong region, covering North and Northeast Thailand, Laos and Cambodia. In this ecosystem, drought is considered to be the main constraint for rice production, and development of drought resistant varieties will stabilize yield.



Previously, the field phenotyping technique was mostly conducted under 2 conditions, irrigated flood and drought conditions. For drought screening, rice was grown under flooded condition then water was drained out when drought stress was to be imposed. Genotypic variation for grain yield and traits related to drought tolerance could be determined.



Irrigated flood condition      Drought condition

We now consider there are 3 growing conditions that rice plants experience in drought-prone rainfed lowlands:

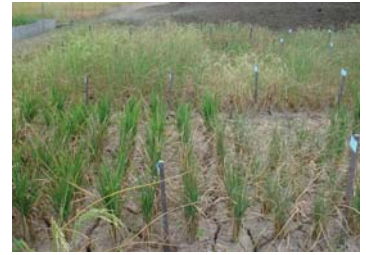
- 1) Flooded condition where soil is anaerobic
- 2) Aerobic soil conditions after disappearance of standing water
- 3) Drought conditions where lack of water affects rice plants.



Irrigated flood condition



Irrigated aerobic condition



Drought condition

The key point here is that growing condition changes from anaerobic to aerobic conditions causing changes in soil chemical properties such as decrease in soil pH and reduced available phosphorus in the soil. Genotypes with well adaptation to flooded (anaerobic) condition may not adapt well to aerobic condition. Thus, poor performance of this type of genotypes under drought condition may be because of their specific adaptation to anaerobic soil condition and lack of adaptation to aerobic conditions rather than the lack of adaptation to drought conditions as such. On the other hand, upland adapted genotypes may adapt well to aerobic soil conditions but perform poorly under anaerobic conditions.

*Thus, one of our hypotheses for this work is that well adapted genotypes in drought-prone rainfed lowland rice require traits that contribute to well adaptation to both anaerobic and aerobic soil condition as well as possessing appropriate drought tolerance characters.*