Research Project

Projet action incitative CIRAD 2022 CRESI

CRAZYRIZ : Is rice with low root aerenchyma better adapted to non flooded soils ?

Objectives

Rice provides 27% of the calories in low and middle-income countries and about 900 million of the world's poor depend on rice as consumers or producers. Among the world major crops, rice is a semi aquatic plant with a unique adaptation to wet environments. Lowland rice is grown in many Asian countries with heavy monsoon rainfalls with grain yields up to 15t/ha. When soil water content is below the field capacity, upland rice is grown and grain yields decrease down to 1.5-3.6 t/ha. Rice upland breeding programs have selected varieties with high transpiration efficiency and /or the capacity to explore large soil water reserves with deep root system but yield improvement remained low compared to lowland rice. Upland rice has also the potential to be integrated into sustainable cropping systems with less environmental impact and better resilience to shocks than lowland rice. In upland rainfed rice, farmers could plant a rice crop in rotation with other crops; therefore, rainfed rice could become a key component for regional food security. But, today, the future of upland rice seems compromised by its lack of competiveness. Our hypothesis is that rice roots do not efficiently extract water in drained soils because of a rice specific anatomy adapted to ponded fields. This project test the hypothesis that the modification of root anatomy in rice (with root traits similar to dryland crops) will allow rice to increase water use efficiency at the plant scale.

Duration

March 2022 – Dec 2023

Leader

Benoit Clerget, M.C.Rebolledo, S. Jaffuel (AGAP Institut, PhenoMEn)

C.Perin (AGAP Institut, DARS)

B.Parent (LEPSE, MAGE)

Geographical Dimension

France (CIRAD and INRAE) - Montpellier

Partners

INRAE

Funding

CIRAD

Keywords

Acclimation to enhanced [CO2], Acclimation, Proxy traits, Sink-source relationships, Photosynthesis, Water deficit.