

## **Plant response to a late heat stress can be modified by an earlier one: a case study on sorghum grain production.**

*Berger A<sup>1</sup>, Roque S<sup>1</sup>, Aguilar G<sup>1</sup>, Sotillo A<sup>1</sup>, Singer M<sup>1</sup>, Cornet D<sup>1</sup>, Terrier N<sup>2</sup>, Granier C<sup>2</sup>.*

1 UMR AGAP Institut, CIRAD, Montpellier, France

2 UMR AGAP Institut, INRAE, Montpellier, France

Climate change is now a reality and observable effects include higher temperatures with successive periods of heat waves. These events have consequences in plant development and grain production. Sorghum is an African native cereal known for its robustness. However, in the context of climate change, sorghum production can be affected by heat stresses during reproductive stage. Even if the effects of single heat stress were already described as having an impact on sorghum grain production, the effects of recurrent heat waves were not studied until now.

A preliminary study was performed in 2021 with two contrasted genotypes grown under four heat stress scenarios in controlled conditions, combining single and recurrent heat waves. The aim of this study was to analyze i.) the effects of these stresses on plant production ii.) the eventual impact of an early heat stress on a later one. In addition to yield components analyses, morphological, spectral and biochemical measurements were performed on sorghum panicles.

Yield components, morphological traits and grain quality were differently affected depending on the stress scenario. Furthermore, our results show that an early heat stress can attenuate or amplify the response of a later one, depending on the considered variable, the genotype but also the position of the first stress compared to the second one.

New experiments are currently investigated in RICOCHETS project (2023-2026). Our original approach combines dynamics multiscale analyses with samplings at key times (early stress/recovery periods/late stress). These results will contribute to broaden our knowledge on the response of plants to recurrent heat waves, which can be used in future plant breeding programs.