PROJECT: CVI_interX_photosynth

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PROJECT TITLE

Mapping photosynthetic parameters in a Cape Verde Arabidopsis intercross population

CONSORTIUM

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SUMMARY OF THE REPORT

Understanding how plants adapt to living in harsh environments is useful to clarify the mechanisms of the evolutionary process and to produce crops that can withstand severe conditions. Since traits are interconnected at the molecular and physiological levels, understanding only one or two dimensions of this adaptive process is insufficient. Rather, to understand how plants survive and thrive under resource limitation or harsh climates we must examine the multidimensional ways that these organisms adapted.

Arabidopsis thaliana is found throughout Europe and much of Eurasia and has been well-studied across much of this range. While the species distribution of *A. thaliana* also includes high altitude locations in mainland Africa and the associated offshore islands, natural populations from these locations are much less studied. We have been working on populations of *A. thaliana* from the Cape Verde Islands, which lie approximately 600 km off the coast of Senegal. These Cape Verde Islands encounter an environment with limited and highly variable precipitation so that plants must grow quickly and finish their life cycles when resources are available.

We previously conducted mapping for growth and photosynthesis traits in collaboration with Mark Aarts who hosts the Phenovator installation at Wageningen University. Here, we followed-up this mapping work in Cape Verde natural populations with mapping in a Cape Verde intercross population that allowed us to gain mapping resolution and power to detect causative variants. This project was also conducted in collaboration with Mark Aarts. This project extends a European Research Council project for which we sequenced the genomes of the Cape Verdean populations, monitored ecological parameters and evolutionary change in the field, and collected data for a range of phenotypes in-house and in collaboration with other researchers. The project therefore allows us to examine the ecological and physiological relevance of growth and photosynthesis traits as well as the relationship among traits. This project specifically allows us to overcome confounding due to population structure, increase mapping resolution, and understand the effects of natural alleles on multiple traits.