

**PROJECT TITLE**

Mapping growth and photosynthetic parameters in an Arabidopsis thaliana island model

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**CONSORTIUM**

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## SUMMARY OF THE REPORT

Understanding how plants adapt to living in harsh environments is useful not only to clarify the mechanisms of the evolutionary process, but also for producing crops that can withstand harsh conditions. But traits are interconnected at the molecular level, so that 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. In particular, photosynthesis, which is the central process by which plants produce energy, is linked to many aspects of plant physiology.

Much work has been conducted on Eurasian populations of the primary model plant, *Arabidopsis thaliana*. However, the genetic structure of this population is extremely complex and allelic and genetic heterogeneity are common, which impede efforts to localize causative variants. In an alternative approach, we have collected accessions and developed mapping populations from natural island populations from the Cape Verde archipelago. This is a very simple natural system, analogous to a mutational screen across the natural environment. These populations are ideal for trait mapping and evolutionary analyses because they have an extremely tractable history and clear climatic divergence from the ancestral habitat in Morocco.

Here, we map loci underlying variation in growth and photosynthetic parameters in collaboration with Mark Aarts, hosting the Phenovator installation at Wageningen University. For this, we used the panels of natural accessions we have collected in Cape Verde as well as two existing RIL populations (Cvi-0xLer-0 and Cvi-0xCol-0) and compare the results to those we have collected for other traits (flowering time, seed number). We identify several candidate variants and examine the genetic architecture of the individual traits.