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Determining Appropriate Phytometers for Cross-Campus Experiments in Ecological Population Genetics

We are interested in examining mutant phenotypes in *Arabidopsis thaliana* as it is a common model organism of plant biology due to its relatively short life-cycle and its remarkable diversity and plasticity. Due to these qualities, and *Arabidopsis*' status as a model organism, time and resources have been invested to create several "libraries" (of viable seed stock) of knock-outs. However, many knock-out mutant lines in these libraries have received little to no attention from plant biologists. One library in particular, the SALK library of T-DNA insertion knock-outs, is of particular interest. In an effort to exploit this resource and begin creating a database of phenotype data on a portion of this vast library, the multi-campus UNPAK project (Undergraduate Phenotyping of Arabidopsis Knock-outs) was proposed. The Callahan lab is working with the Rutter and Murren labs at the College of Charleston to propagate bulk quantities of seed by growing out plants in standardized growing conditions and phenotyping knock-out mutants in one or more carefully defined environments. We are only interested in lines with a single insertion, meaning a disruption to their genome in only one place. Tissue samples from all lines are being tested by another lab participating in the project. Data gathered by all labs will be shared with collaborating labs and eventually uploaded to public databases.

An attractive feature of *Arabidopsis thaliana* as a model system is its vast natural variety, consisting of many different wild ecotypes of *Arabidopsis* that can be found over most of Europe, Asia, and parts of North America. These natural ecotypes can be used as phytometers when grown with knock-out lines. Complimentary to the role of wild-type controls, these phytometer plant lines will be used to calibrate the cross-campus data and serve as a type of ecological "reality check" for an otherwise abstract laboratory approach to characterizing phenotypes. As growth conditions across treatments, campuses, and experimental trials cannot be replicated perfectly, these phytometers, planted with each round of plants are crucial to the success of the UNPAK project. The purpose of this particular, smaller project is to choose from the original 97 possible choices a final set of 11 phytometers that will be planted with all subsequent grow-outs and experiments. These 11 lines will be chosen using simple visual examination as well as descriptive statistics. Candidate phytometers will be chosen after excluding obvious phenotypic outliers (like overly large rosette diameter) or lines that germinate poorly or produce flowers and fruits too slowly. By the end of the Spring 2012 semester, the final phytometers lines will have been chosen to plant out in summer experiments.