**File S2**

**Supplemental Results**

***Rosette growth rates and growth patterns both affect spring diameter***

Our alternative models to explain coordinated variation in vegetative and reproductive traits (Figure 1a-c) include both resource acquisition and rosette branching as potential explanations for variation in pre-reproductive rosette diameter. Therefore, we investigated the extent to which variation in spring rosette diameter was a function of biomass accumulation (resource acquisition) vs. differences in rosette architecture. Spring diameter at the North Carolina site was positively correlated with reproductive shoots and siliques per shoot but negatively correlated with net reproductive season diameter growth, both in the population means and in the population and $F_2$ PC1 patterns. This result is inconsistent with the hypothesis that spring diameter is a measure of resource acquisition, in which case we predicted it would be positively correlated both with subsequent reproductive and vegetative growth (Figure 1a; Houle 1991; van Noordwijk and de Jong 1986). These results are instead consistent with the model in which pre-flowering rosette diameter growth is affected by rosette branching (Figure 1c).

We also found that the timing of pre-reproductive rosette growth was heterogeneous between populations, which also suggested that spring diameter has a developmental component. Spiterstulen plants showed a net reduction in rosette diameter over the winter while the other populations showed varying degrees of diameter increase (Figure 4). We observed that rosettes on Spiterstulen plants in particular had become extensively branched and compact over the winter (as seen for example in Figure 3, upper left). We have observed over the course of these studies that branched rosettes tend to produce shorter leaves, suggesting that increased overwinter vegetative branching might explain the overwinter diameter reductions.

However, the eight replicated blocks in the North Carolina field site differed substantially in mean spring diameter. The block mean values for reproductive shoots and siliques per shoot increased significantly with mean spring diameter ($P < 0.001$ for both traits). Thus, variation in pre-flowering rosette diameter also appears in part to reflect differences in resource acquisition associated with site productivity in each block.

Mayodan, Spiterstulen, and $F_2$ populations also differed significantly from each other in their responses to differences in block productivity ($P < 0.01$ for population x block productivity interactions for all traits). In Mayodan plants, vegetative and reproductive traits as well as PC1 were highly responsive to variation in block productivity, but Spiterstulen plants showed almost no response to block productivity, and $F_2$ plants were intermediate (Figure S1). This pattern of variation in response to block productivity was also reflected at the QTL level. Mayodan alleles in the LG2 QTL region were significantly more responsive to variation in block mean productivity than Spiterstulen alleles for PC1 and two of the individual traits, consistent with the population differences (Figure S2).