

Molecular regulatory networks of climate adaptation in the perennial model woodland strawberry



North-adapted woodland strawberry in Alta, Norway
Koskela et al. 2017. <https://doi.org/10.1111/nph.14734>

Woodland strawberry –a model for perennial climate adaptation

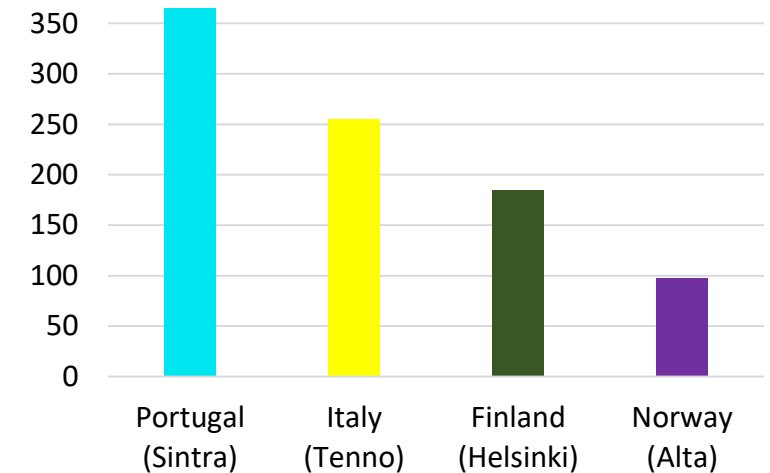
- Perennial plant with rapid growth cycle
- Small 220 Mb genome
- Easy genetic transformation
- Efficient clonal propagation
- Belongs to the Rosaceae family

Wide geographical distribution



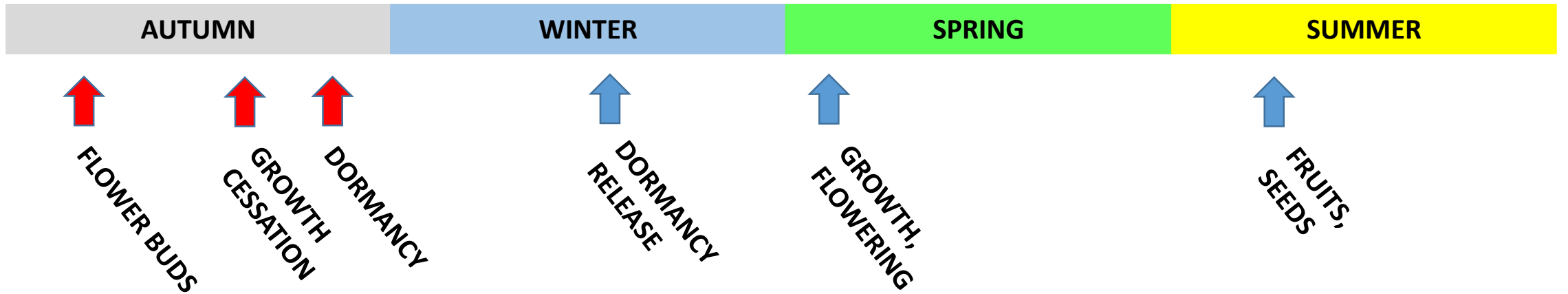
37-70°N

Length of the growing season in natural habitats



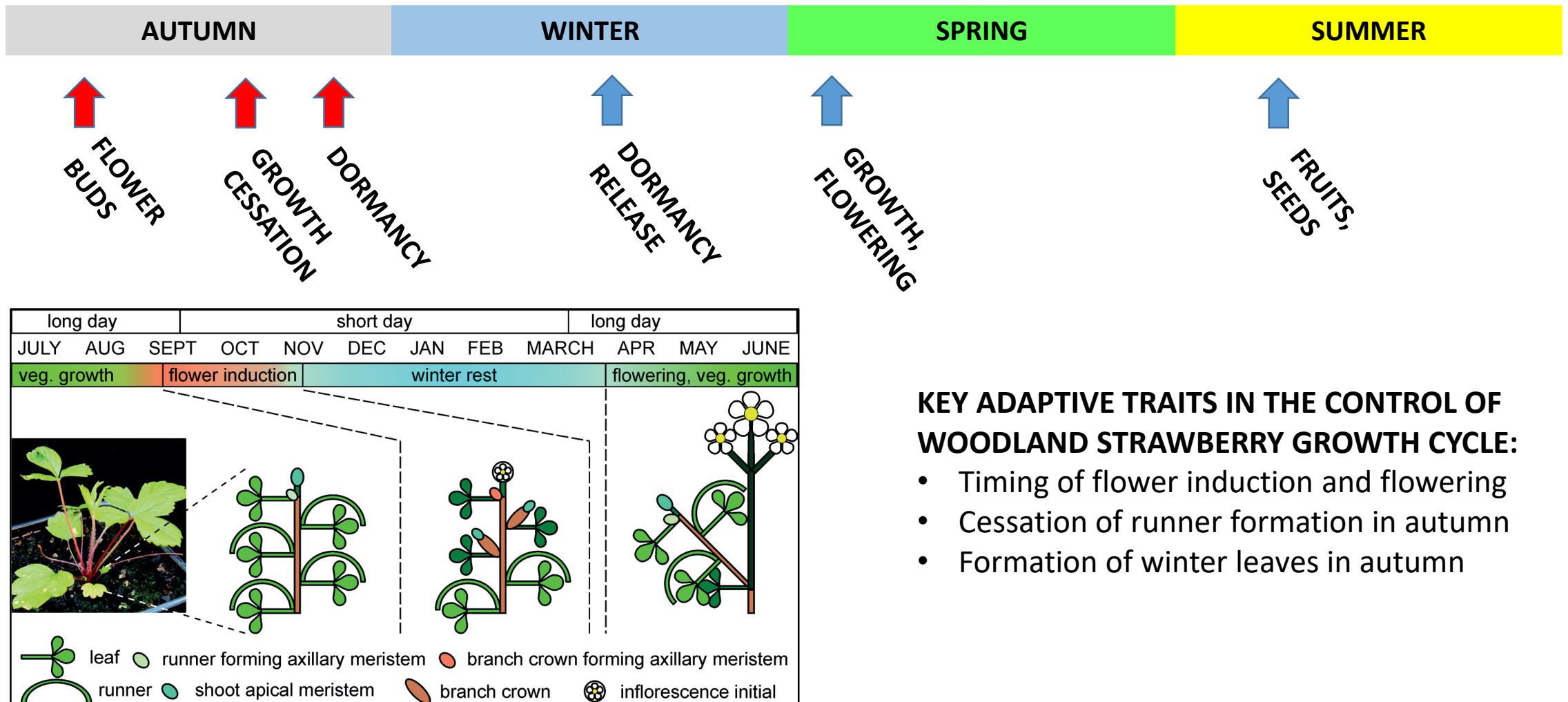
Perennial growth cycle and climate adaptation

- Light and temperature control seasonal plant development



Perennial growth cycle and climate adaptation

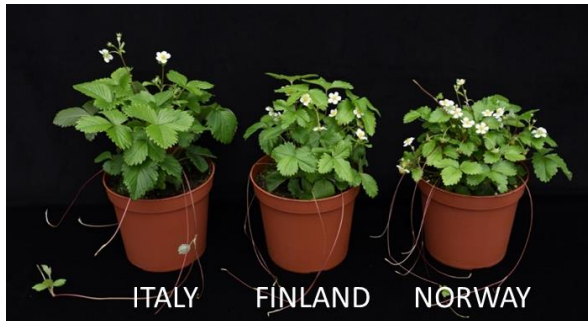
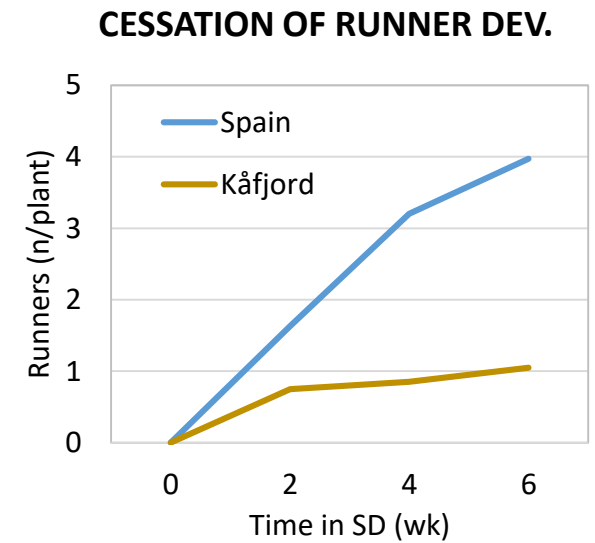
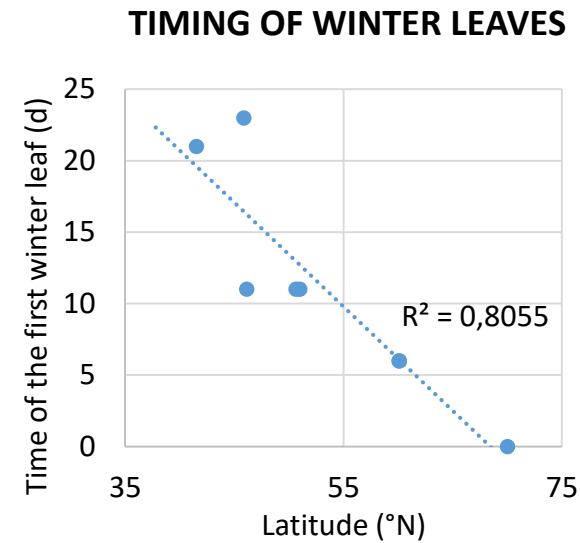
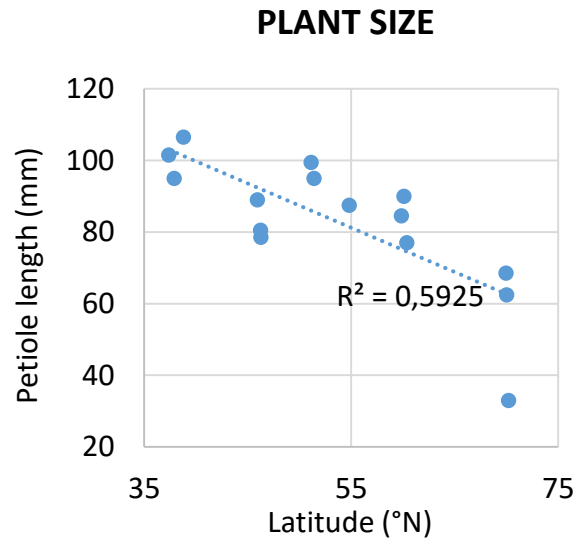
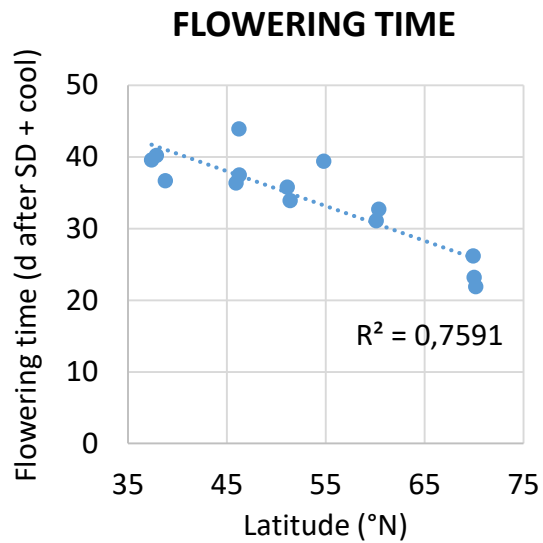
- Light and temperature control seasonal plant development



Adaptation in European woodland strawberry

Common garden experiments

- Outdoors and controlled climate



Summer leaves
senesce in autumn



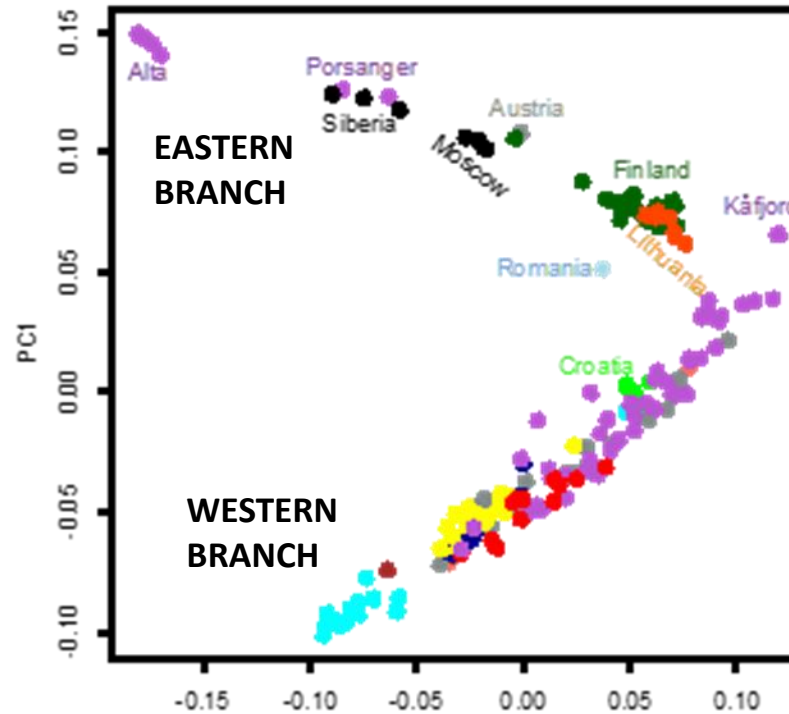
Winter leaves survive
the winter

Population genomics in woodland strawberry

PLANTCOLLECTION SITES

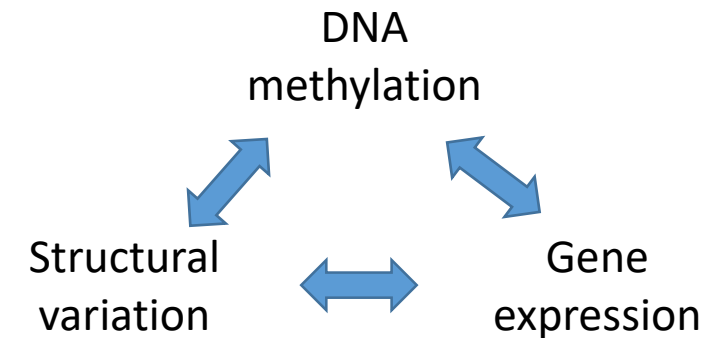


POPULATION STRUCTURE



POPULATION GENOMIC ANALYSES

- **230 accession sequenced (Illumina)**
- 10 de novo assemblies
 - SNP variation
 - Genome structural variation
 - Adaptive genomic landscape:
 - Selection signals in local populations
 - Genetic differentiation (F_{st})
- **45 methylomes (BsSeq) + transcriptomes**

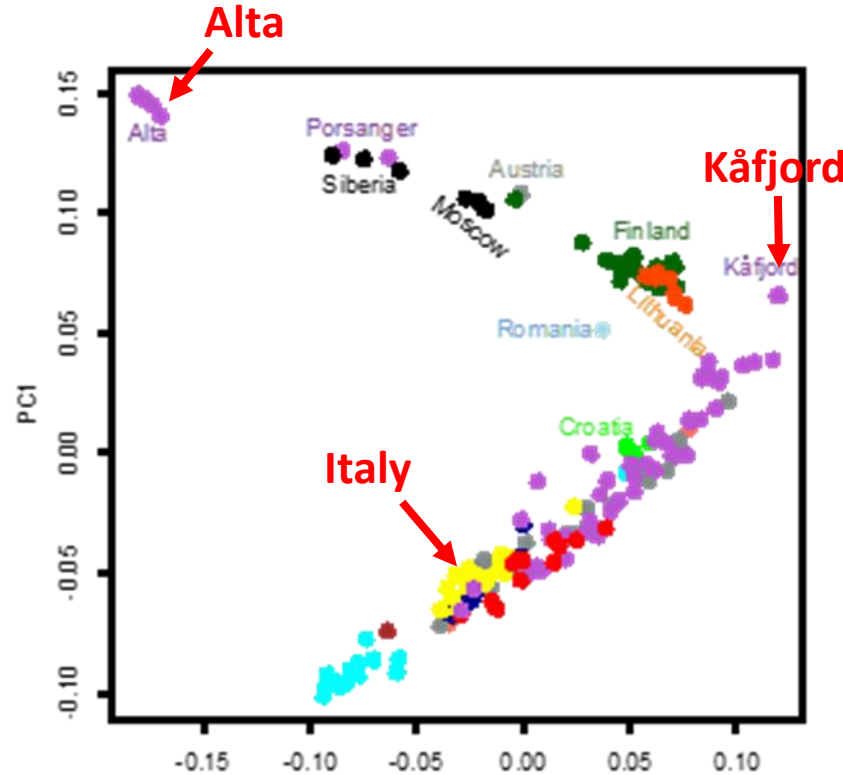


R'Life strawberry project focuses on extreme populations

COLLECTION SITES

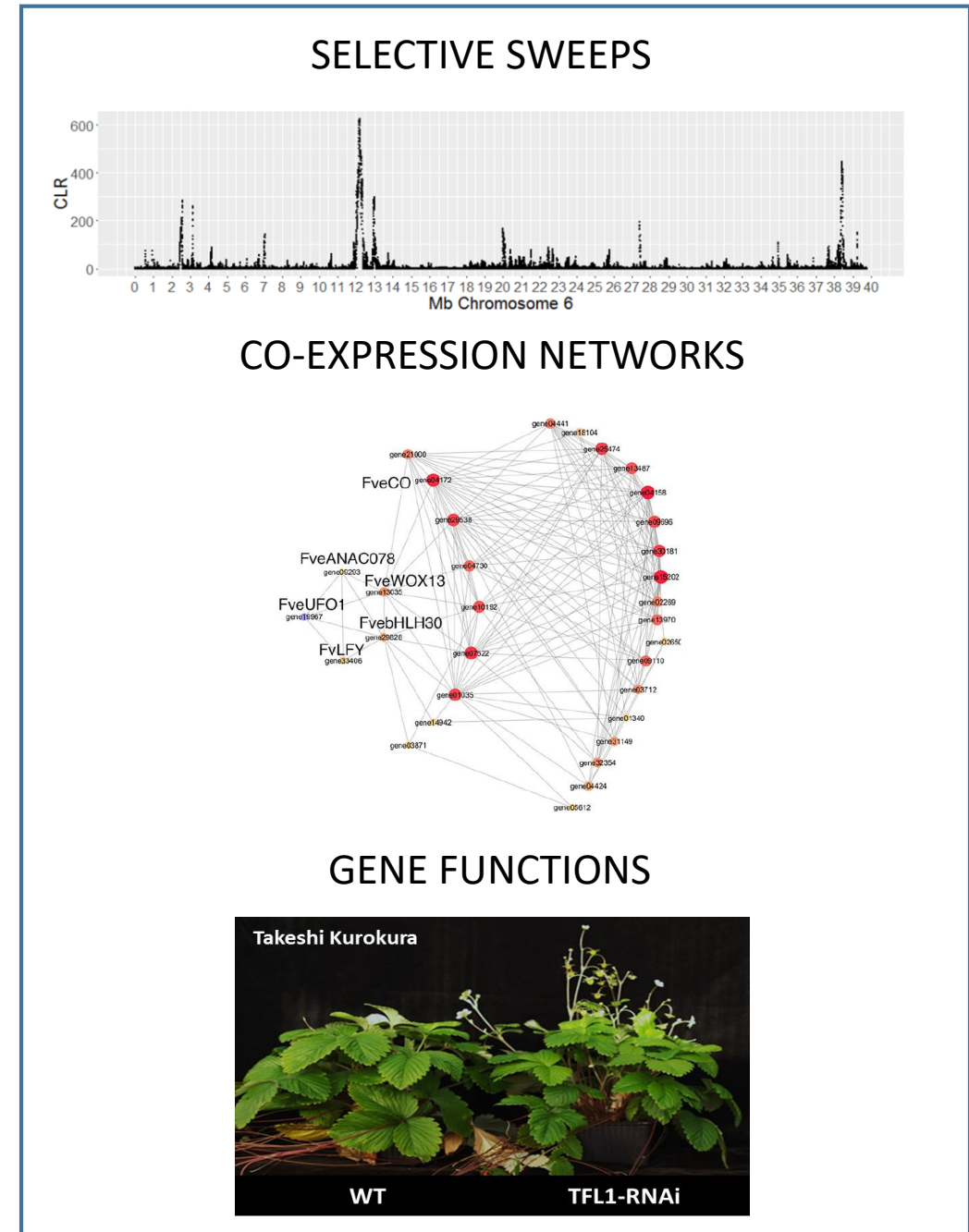
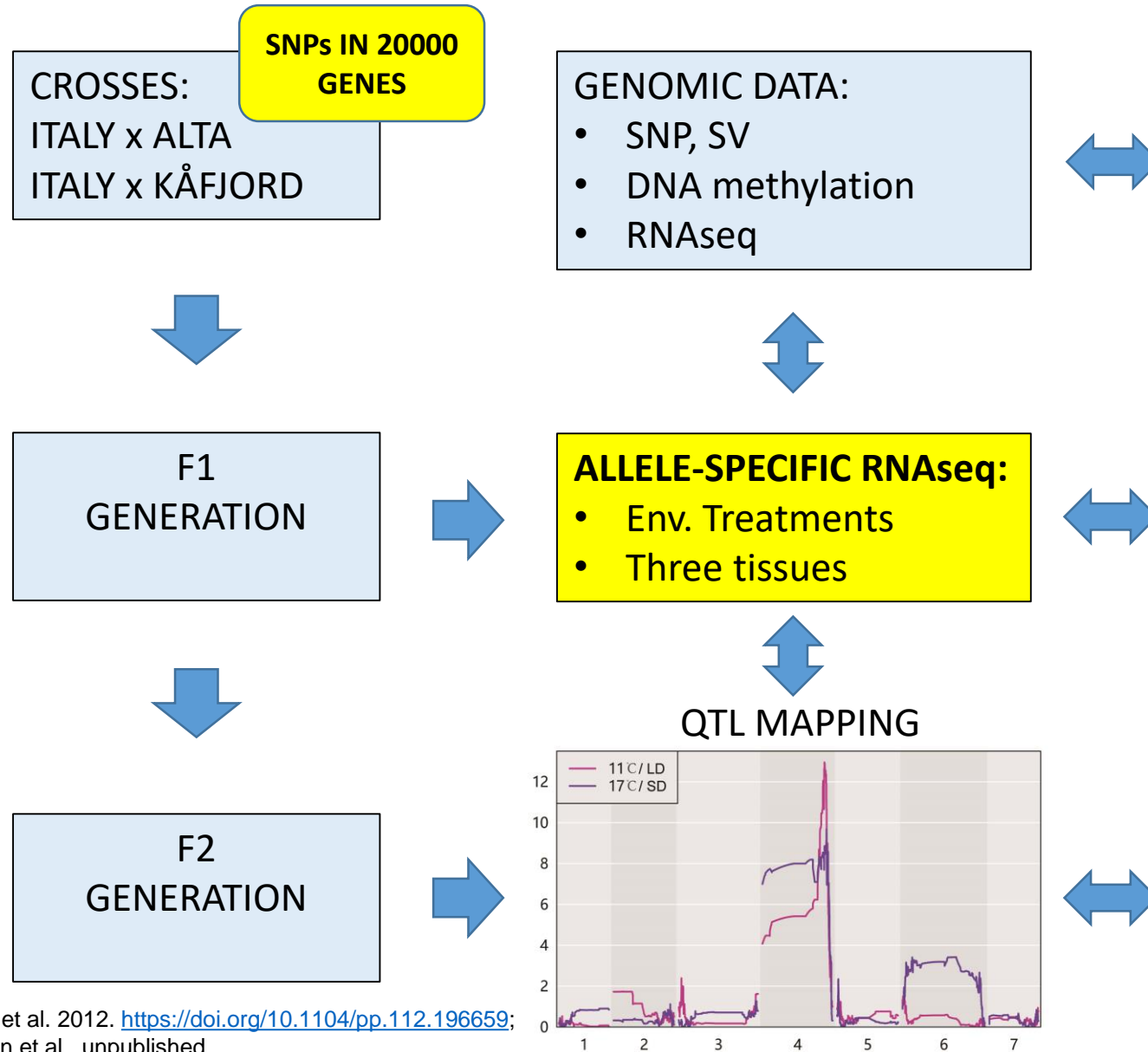


POPULATION STRUCTURE



- **Promoter and gene body Fst analyses:**
 - GO categories associated with adaptation highly differentiated between populations
 - High Fst common in promoters
- R'Life goals:
 - Role of *cis*-regulatory variation in climate adaptation
 - Association with DNA methylation and structural variation
 - Co-expression networks controlling climate adaptation

Approaches



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