

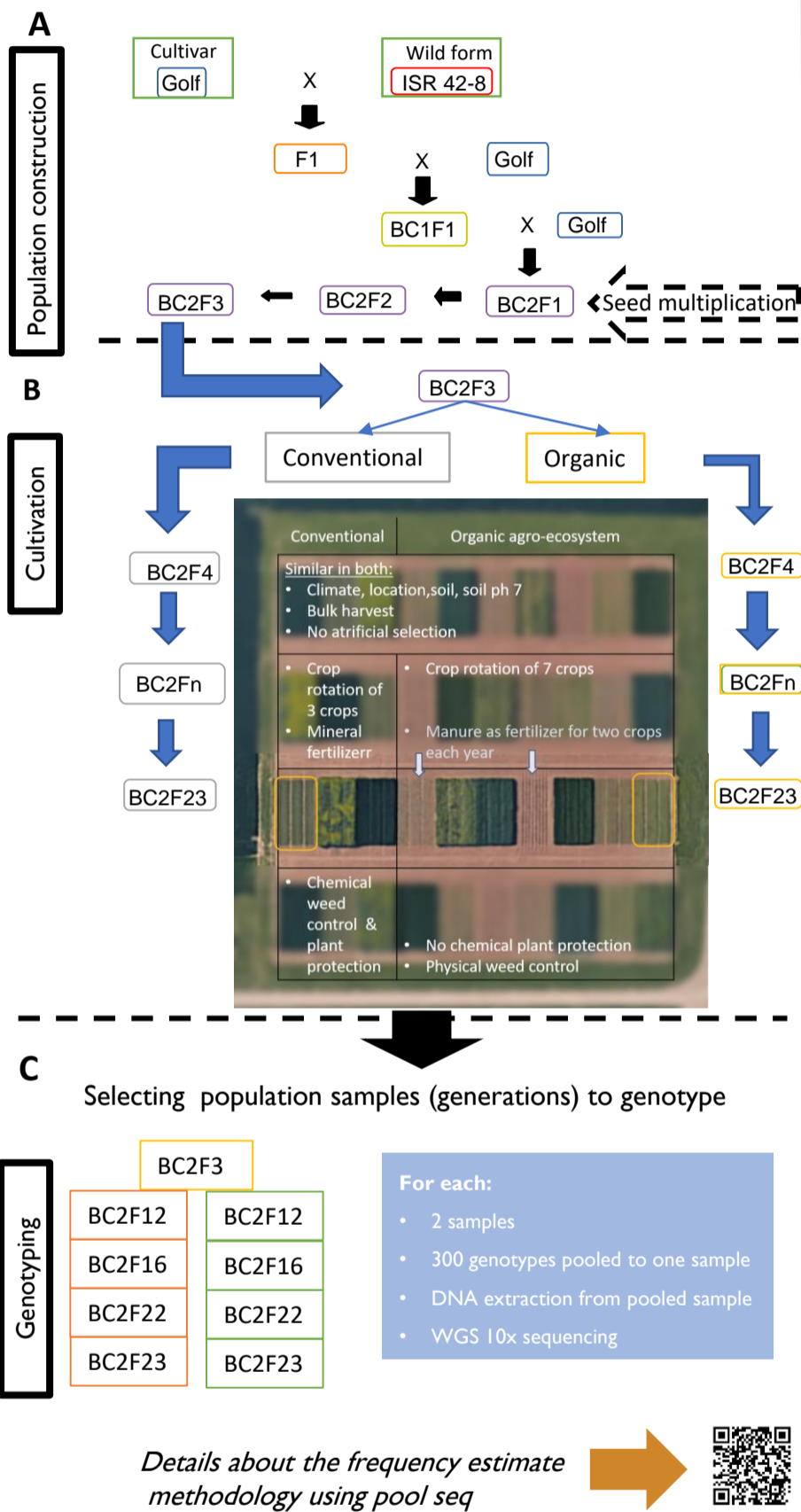
Experimental evolution in barley – 2 decades of natural adaptation to farming systems

Sustainable food production for a growing world population will pose a central challenge in the coming decades. Organic farming is among the most feasible approaches to achieving this goal if the yield gap to conventional farming can be decreased. However, **uncertainties exist whether organic and conventional agro-ecosystems require different breeding strategies.**

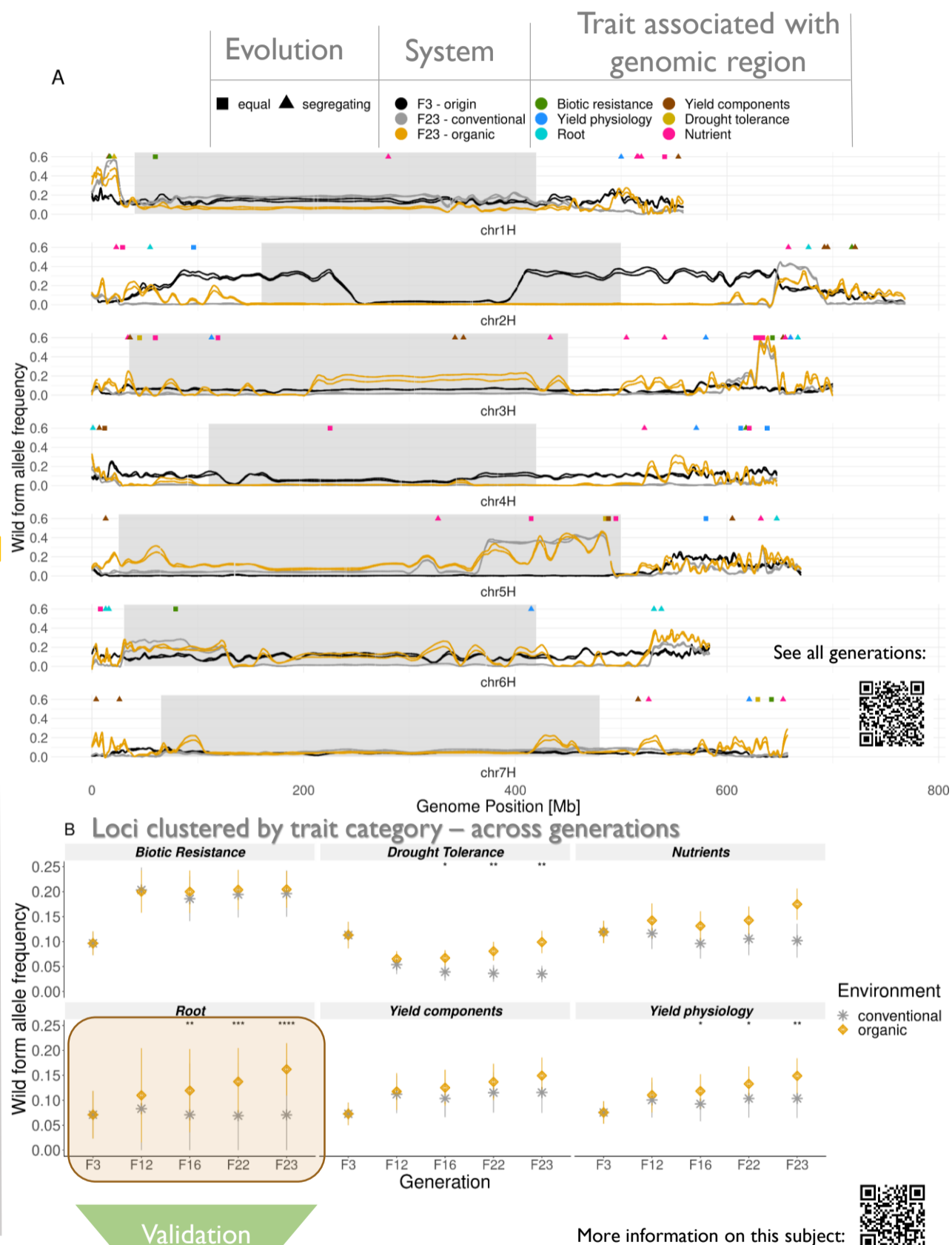
A heterogeneous spring barley population was established between a wild barley and an elite cultivar to examine this question. The population was **divided into two sets** and sown into an **organic and a conventional agro-ecosystem, without any artificial selection** for two decades. A fraction of seeds harvested each year was sown in the following year.

The **parents and five generations from both environments up to the 23rd generation** were whole-genome pool-sequenced to **identify adaptation patterns** towards ecosystem and climate **conditions in the allele frequency shifts.** Additionally, based on previously published QTLs in barley, a meta-data analysis was conducted to **link genomic regions' increased fitness to agronomically related traits.**

Methods:



Results: BC2F23 allele frequency patterns changes compared to original F3



Observation:

- The genomic data indicates more wild type like roots in the organic environment

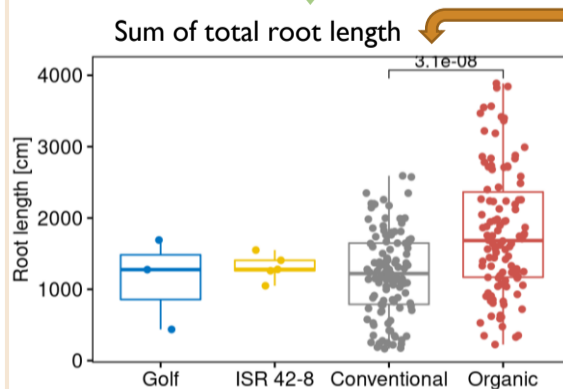
Hypothesis:

- Organic populations tend to produce longer roots to access nutrients in deep soil layers

Methods:

- Measure 100 BC2F24 genotypes from both farming systems
 1. in hydroponics (seedling)
 2. in field (flowering time)
- Harvesting roots, washing and using WinRHIZO for assessment

Results:



1. Mean root length is higher in the organically adapted population
2. The diversity in the organic was higher than in the conventional population after 21 generations of adaptation to a specific farming practice

Find out more about this validation study



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