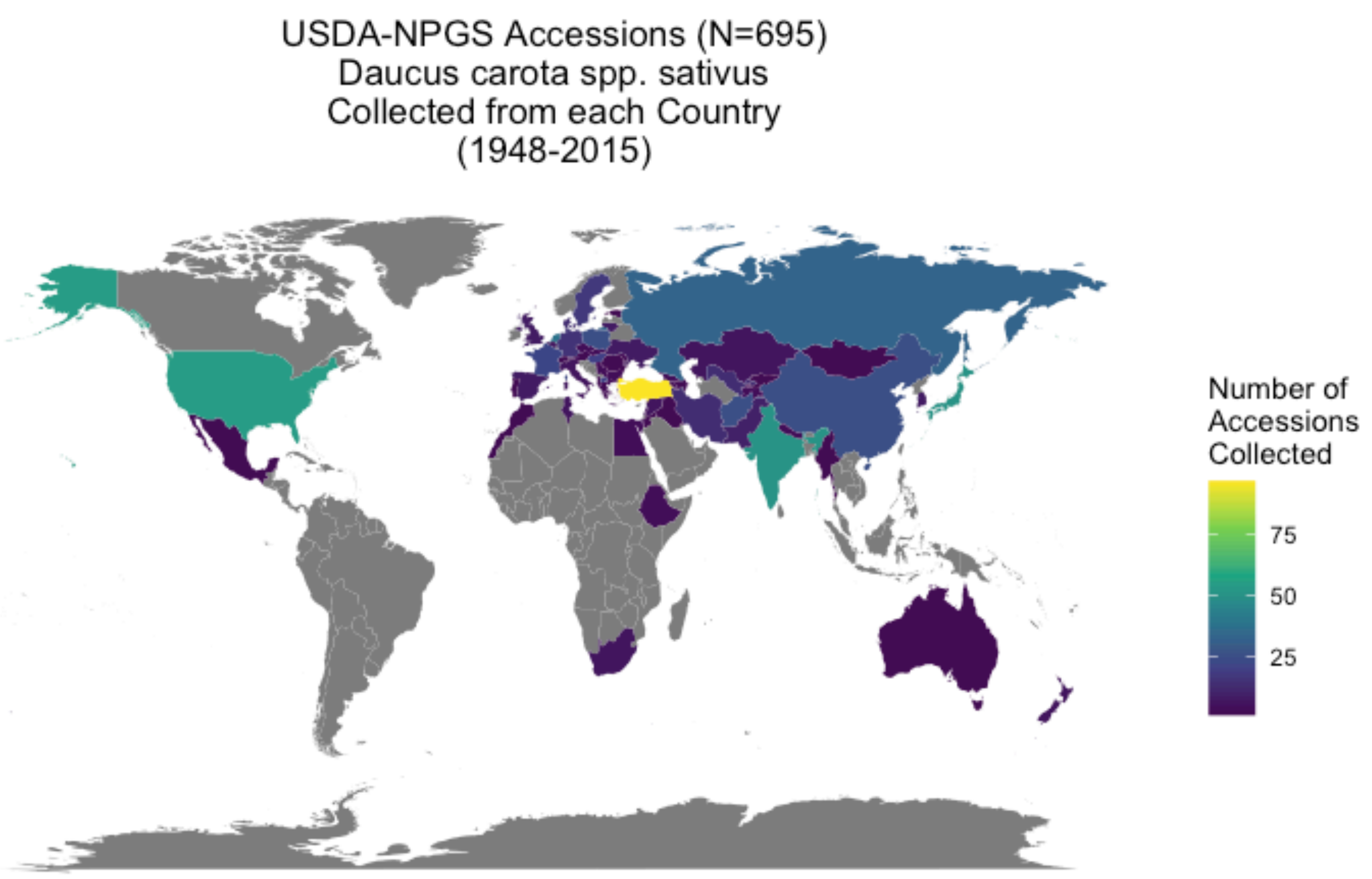
Stand establishment and bolting



Origin of USDA-GRIN accessions (*Daucus carota* spp. *sativus*). Geographic distribution of *Daucus carota a*ccessions collected from 58 countries between 1948 and 2015. These accessions have been cataloged in the GRIN-Global System and are maintained by the USDA North Central Regional Plant Introduction Station in Ames, IA.

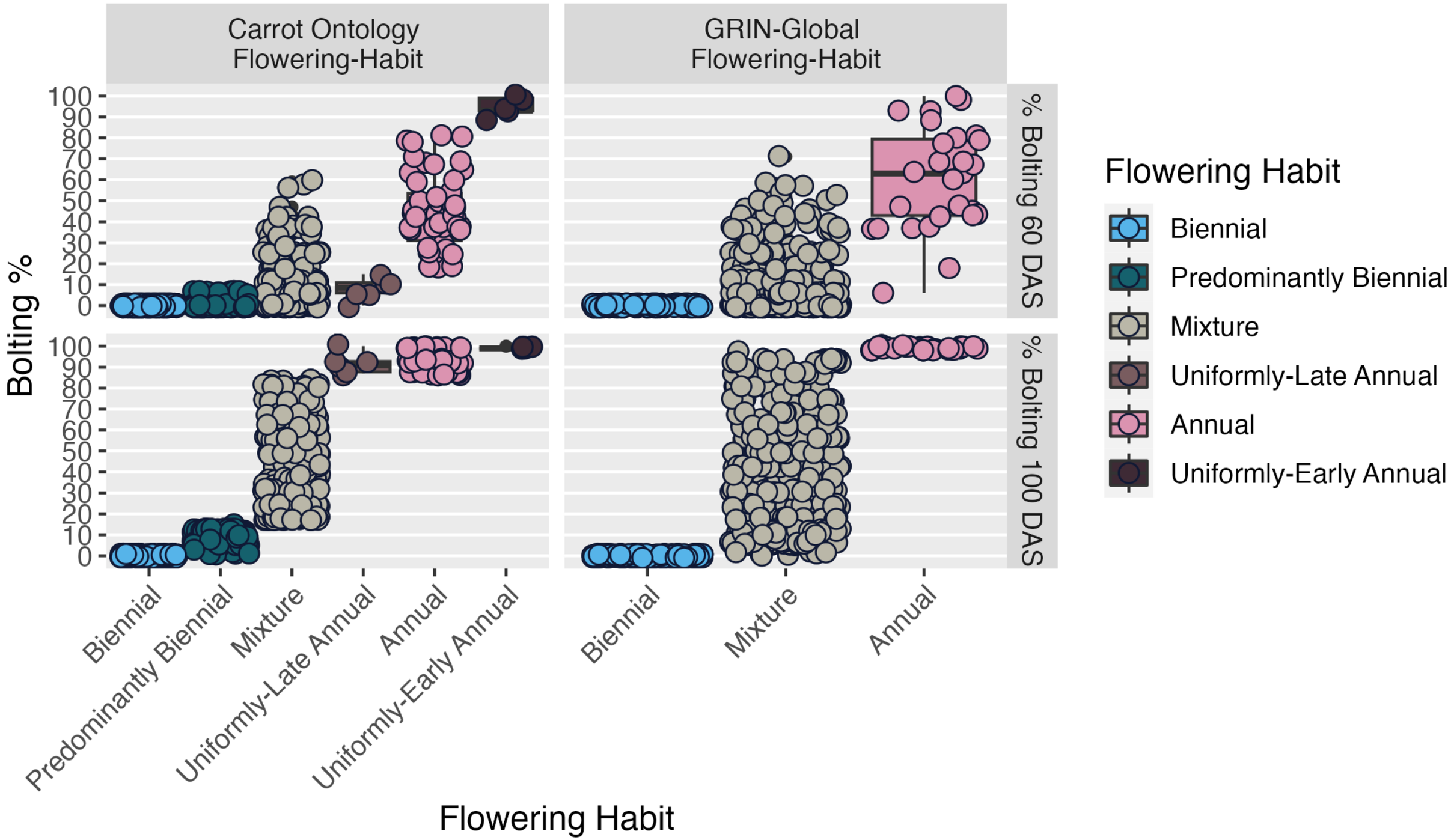
Dr. Jenyne Loarca

Establishment and canopy coverage

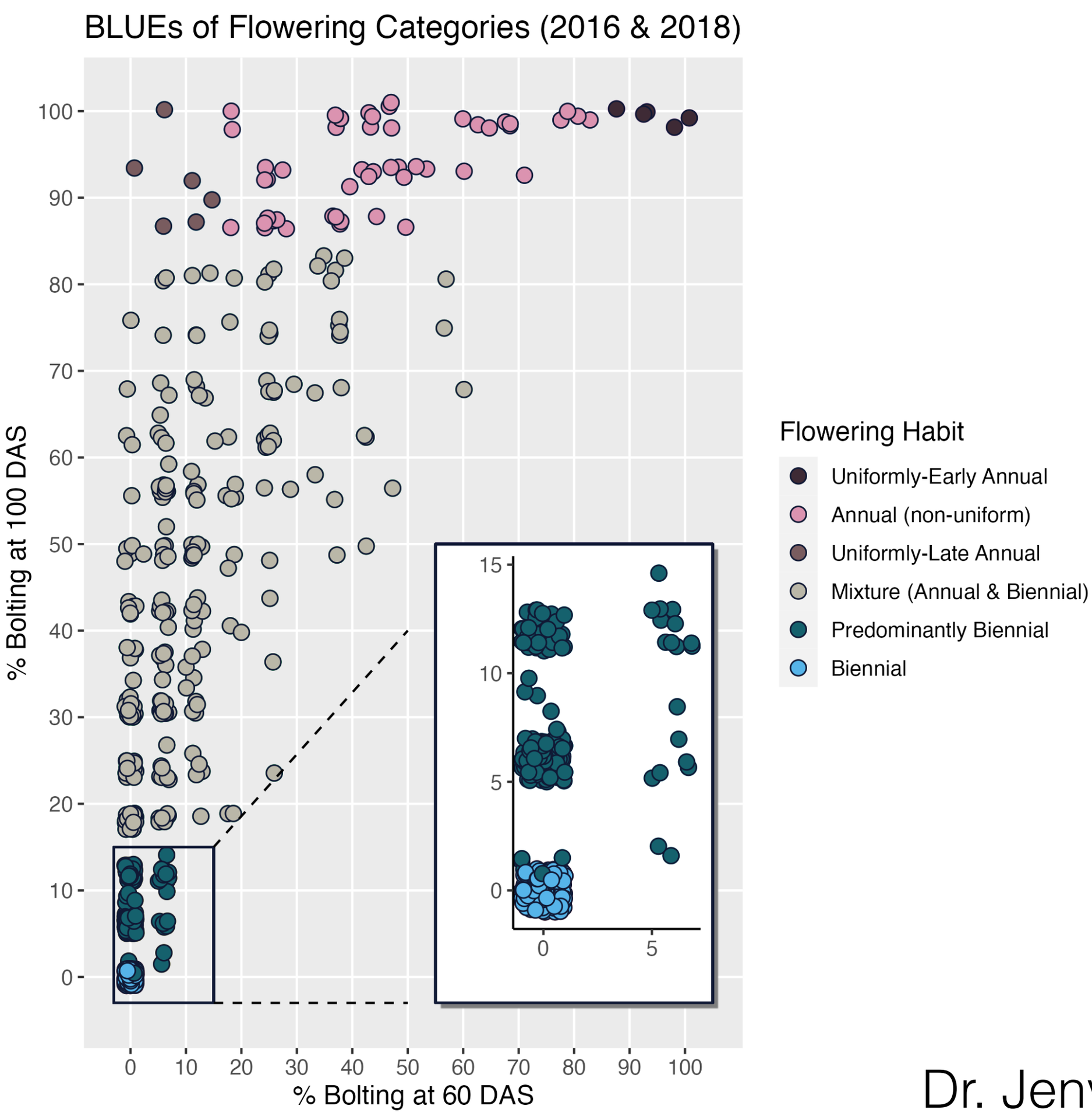
Canopy coverage is defined as the proportion of the ground covered by carrot foliar biomass. Photograph taken approx. 150 cm above the meter-length plot. Photos below are from five independent plots with canopy coverage in descending order from 100% carrot canopy coverage (left) to 0% carrot canopy coverage (right).

Dr. Jenyne Loarca

Flowering habit



Dr. Jenyne Loarca



Dr. Jenyne Loarca

Genomic Prediction

Genomic Prediction

Carrot SCRI 2016-2021

- Evaluation of genetic control and prediction of pigmentation, early vigor, top growth, flavor
- Phenotyping and genotyping with GBS of entire USDA collection

Carrot SCRI 2022-2026

- With breeding pools established in prior grant, test GS to more rapidly introgress multiple traits of interest from genetic resources to elite lines

Traits of Interest

- Canopy Height: better canopy coverage increases weed competition

- Flavor: decreased harsh flavors increases consumer preference

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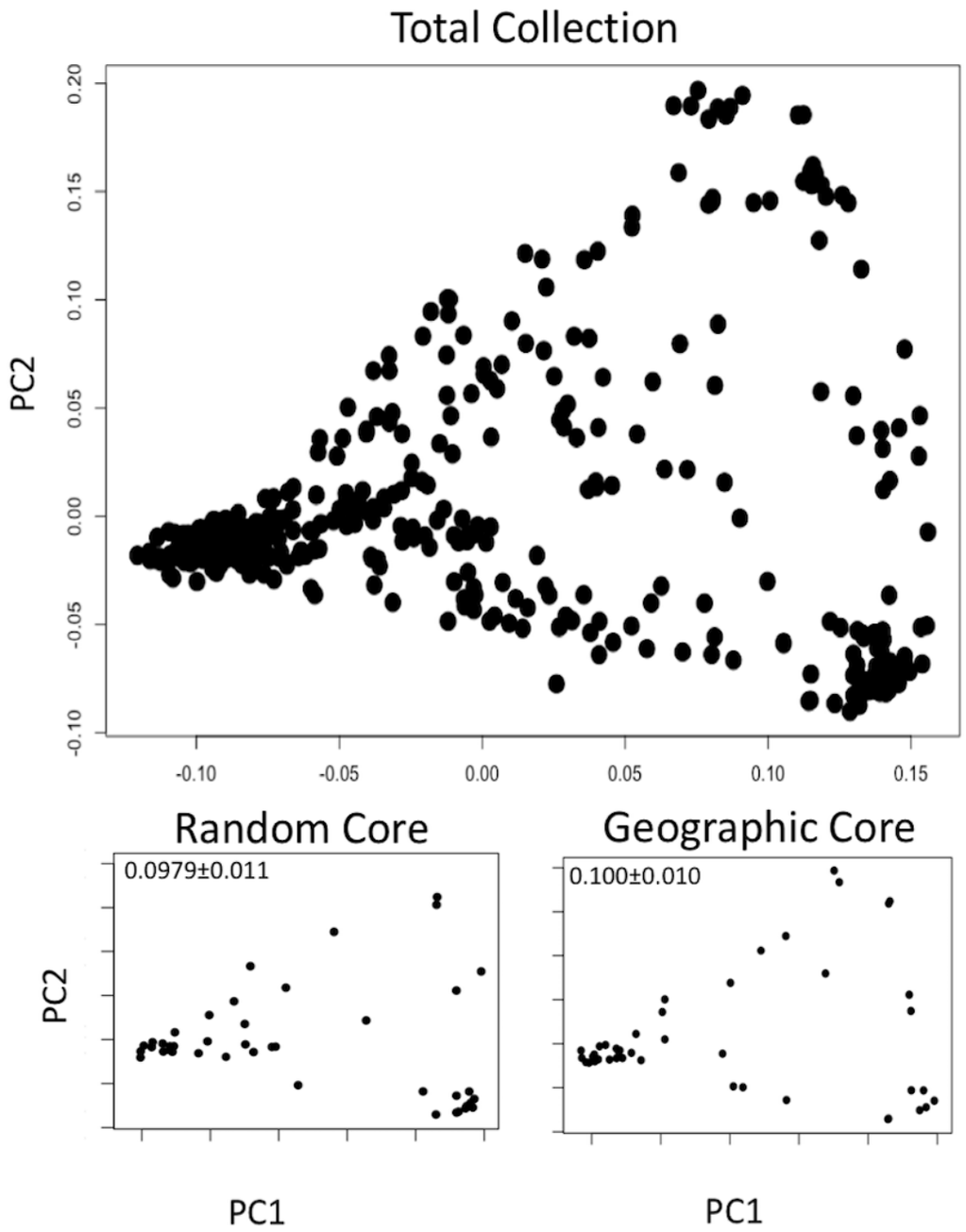
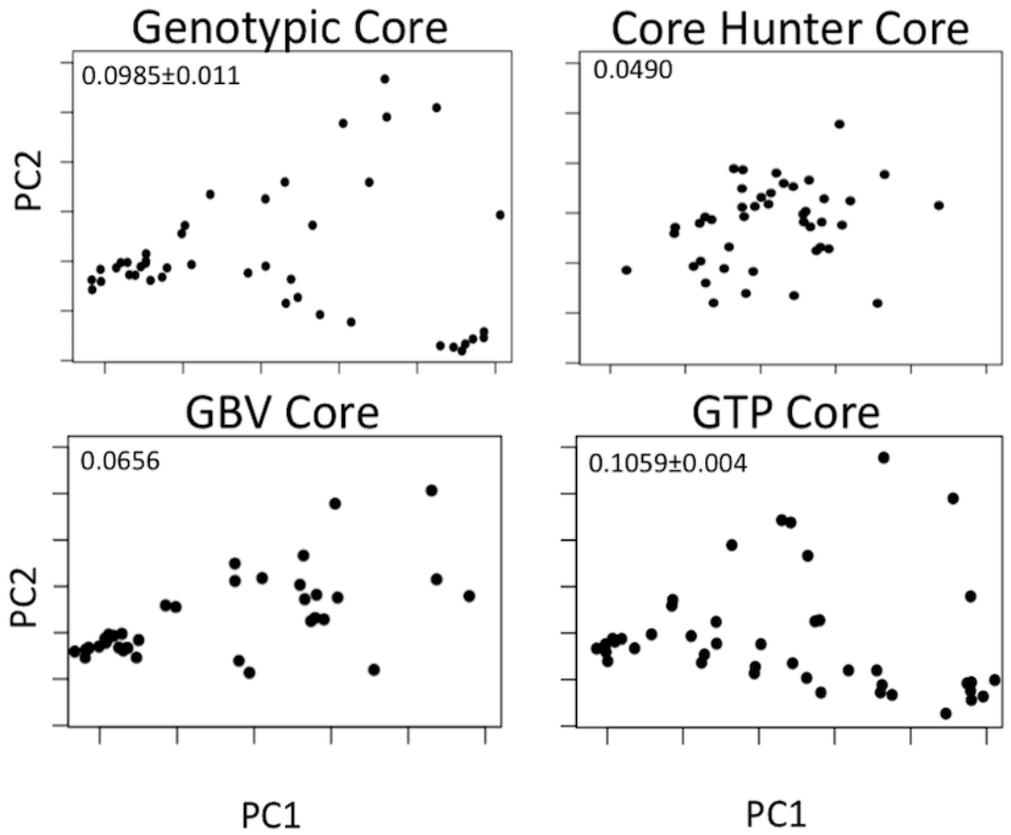
Useful core collections





- GBV - created using genomic estimated breeding values with prior data for training
- GTP - created as an optimized genomic training population for the whole collection

Corak et al. 2019

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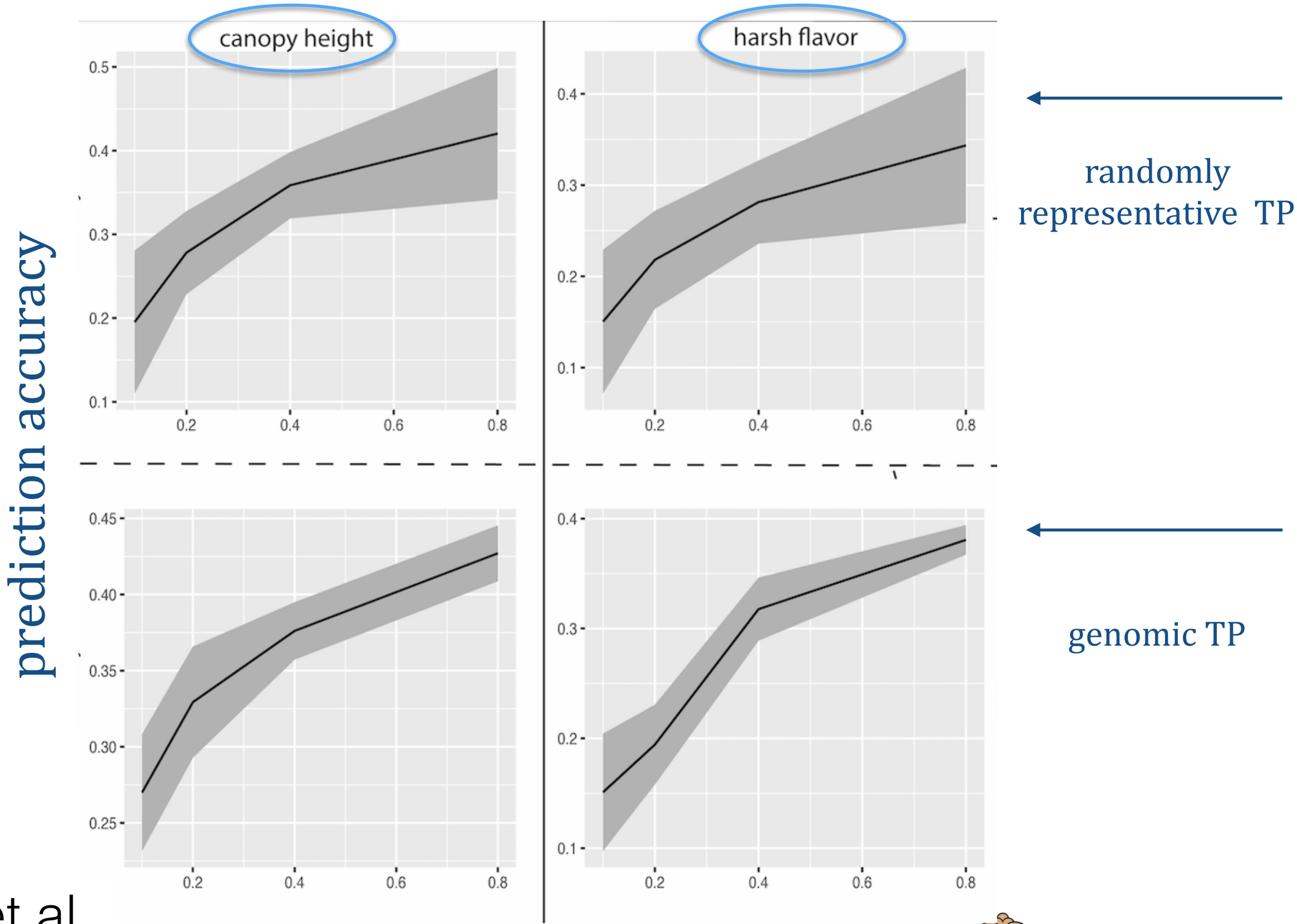
Predictive ability of core subsets



Corak et al. 2019

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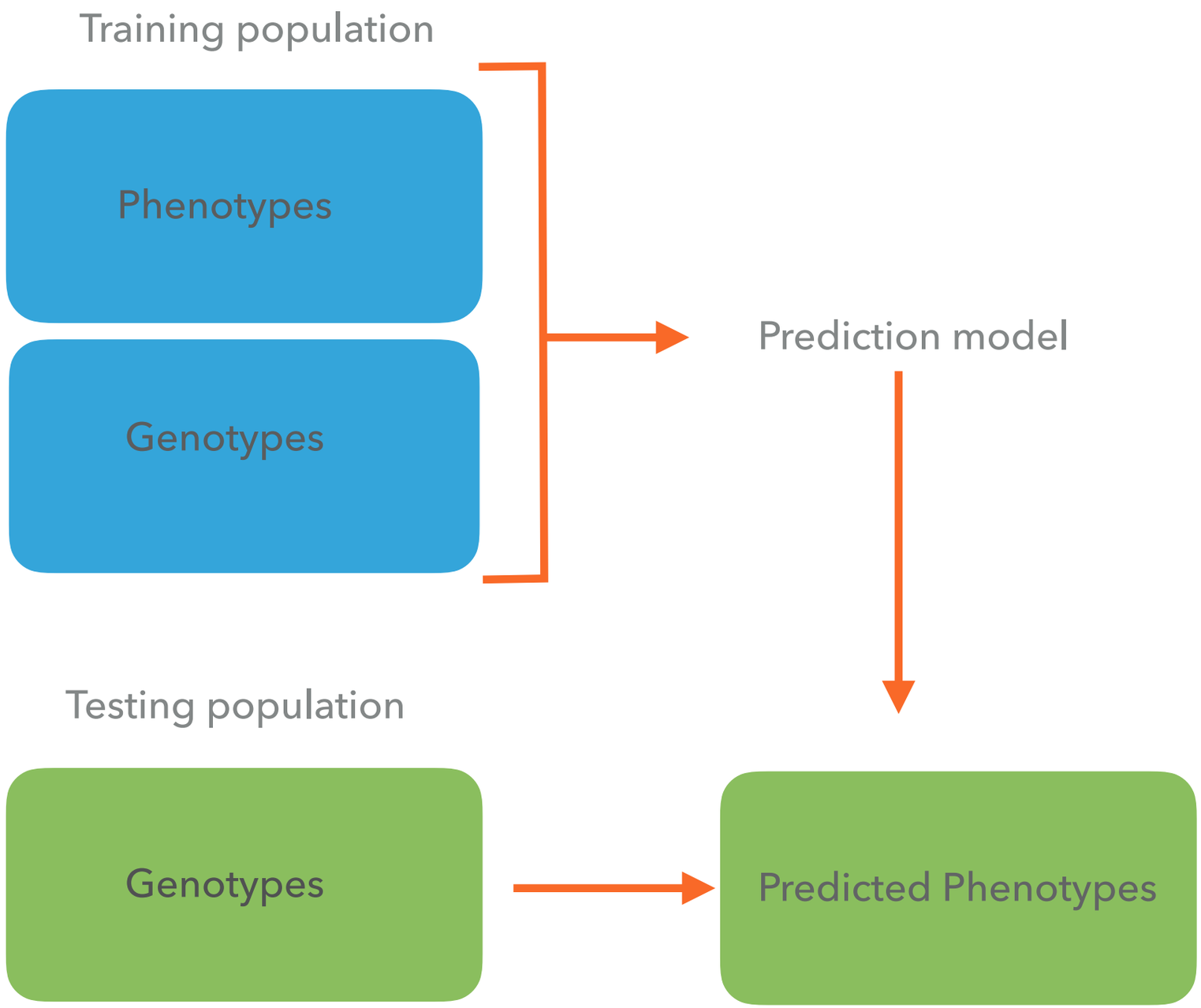
Genomic prediction



Dr. Keo Corak

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Genomic parent selection

- F2 populations similar for genomic and phenotypic selection methods
- Genomic selection requires substantially less investment in accession evaluation
- Higher prediction accuracy likely achievable with a larger training population size

Dr. Keo Corak

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Genomic parent selection

- Next steps:
  - response to selection beyond the F2 generation, development of advanced populations
  - genetic mapping of canopy cover and harsh flavor
  - multiple trait genomic prediction

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