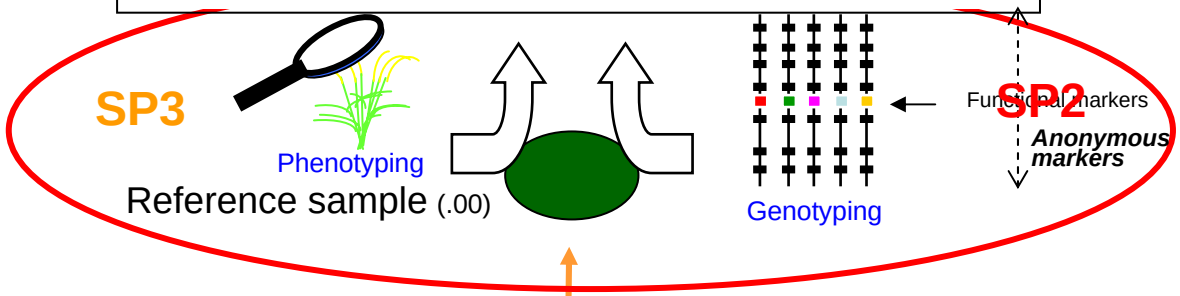
Concentrating genetic diversity in reference germplasm samples

Preparation to brainstorming session

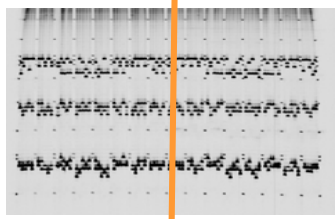
"Options for GCP populations development"

reconciling genetic analysis and breeding progress

Step 3.
Association studies → **genes/alleles tagged for marker-assisted breeding**



Step 2: from molecular data
sampling the core sample
to produce a reference sample
for integrated characterisation
and evaluation efforts

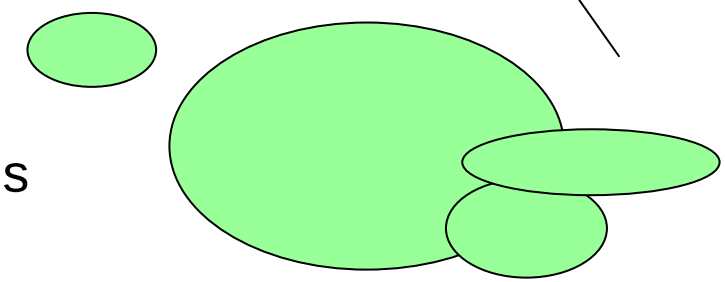


Marker development
Genotyping,
Sampling

Composite sample
(10%, up to 3000)

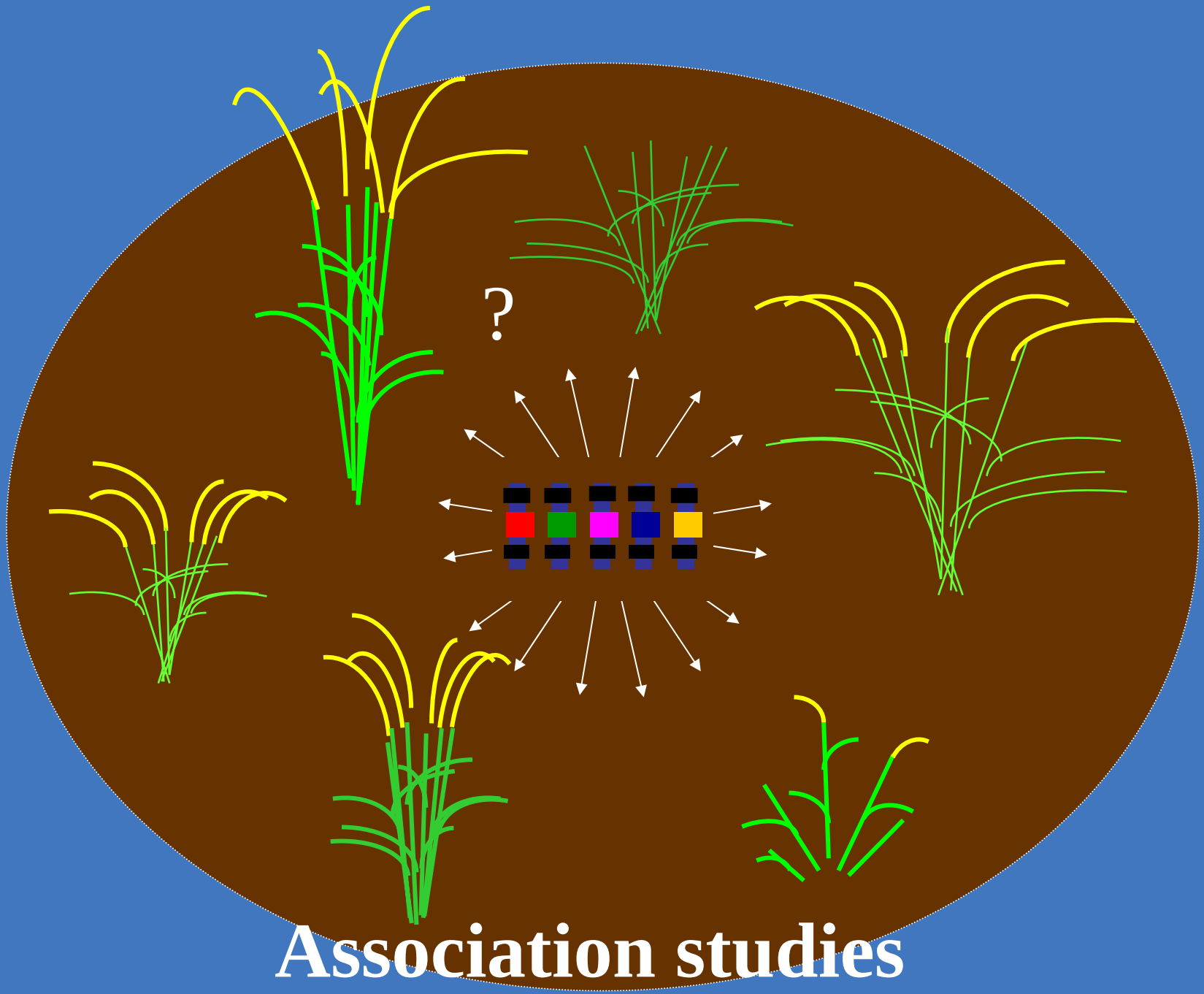
Step 1: from passport information,
sampling global resources
to produce a core sample

Data collection,
Analysis

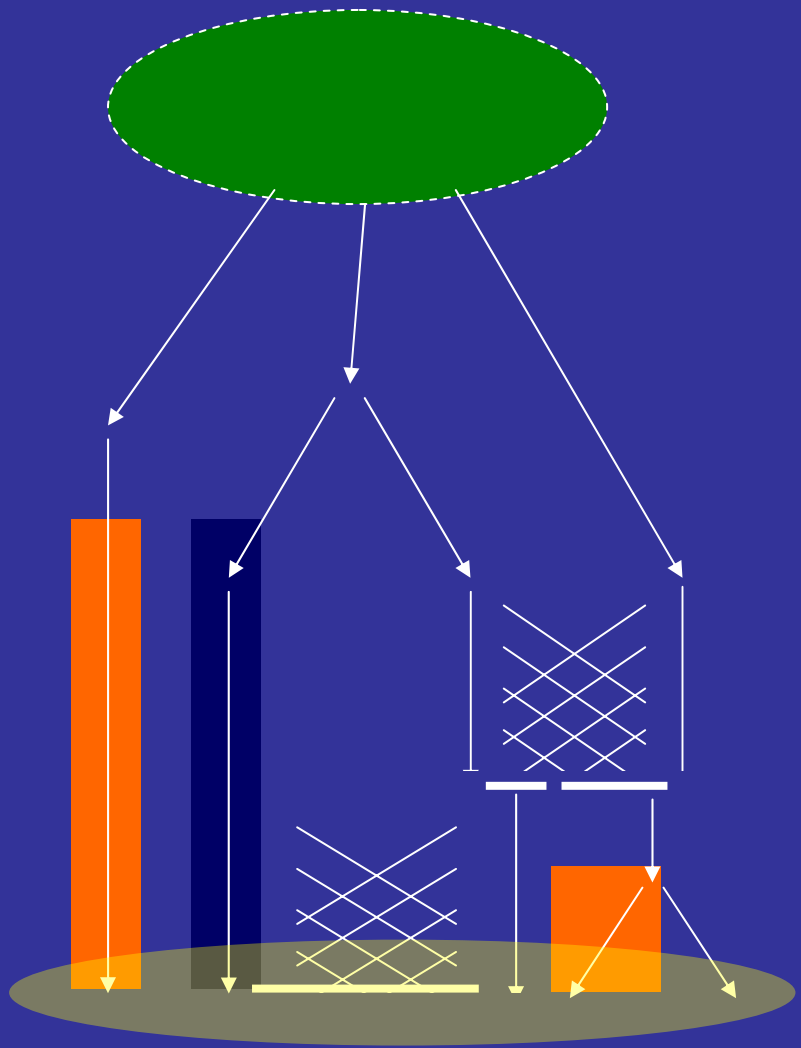


Various collections

Three steps to elaborate reference collections
in order to mine genes, alleles and markers



Association studies



Ancestral population

Foundations

Mutation

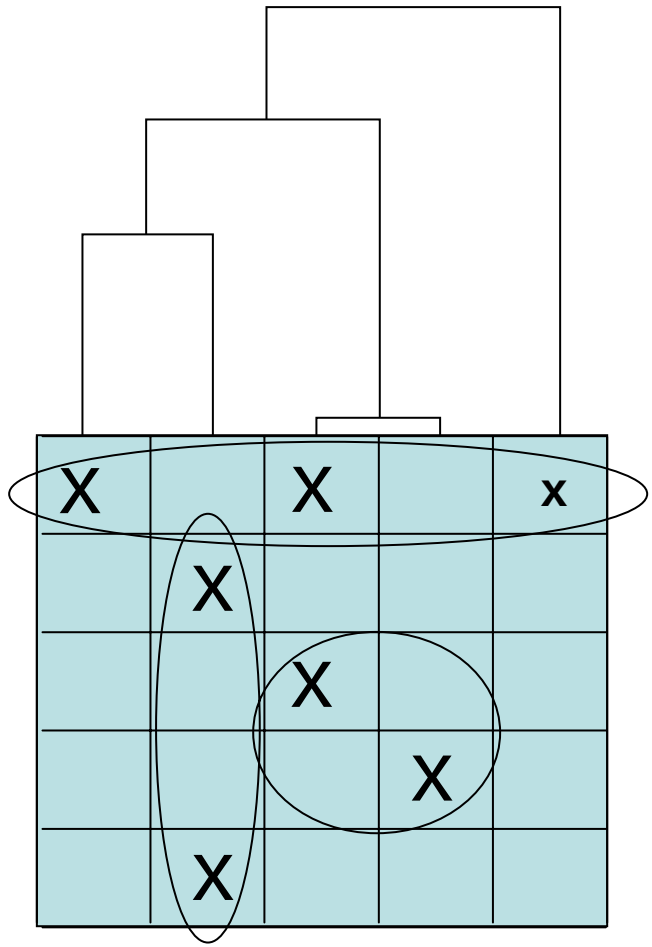
Drift Selection

Recombination

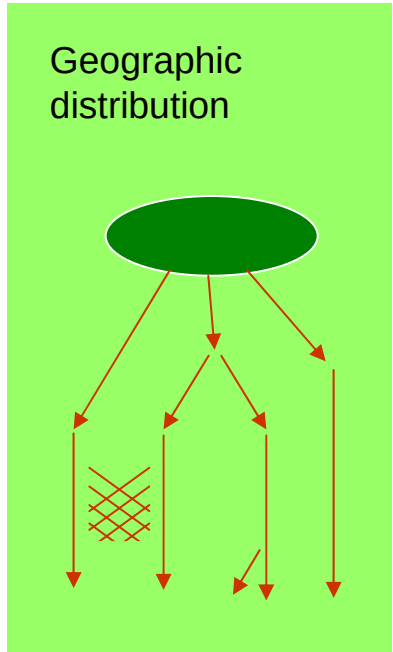
Crop domestication

Clusters

markers

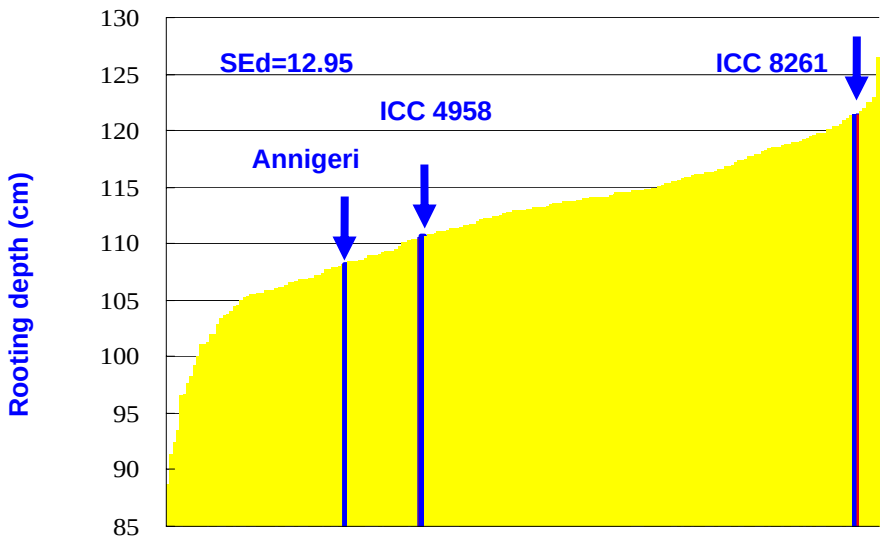


Ecotypes

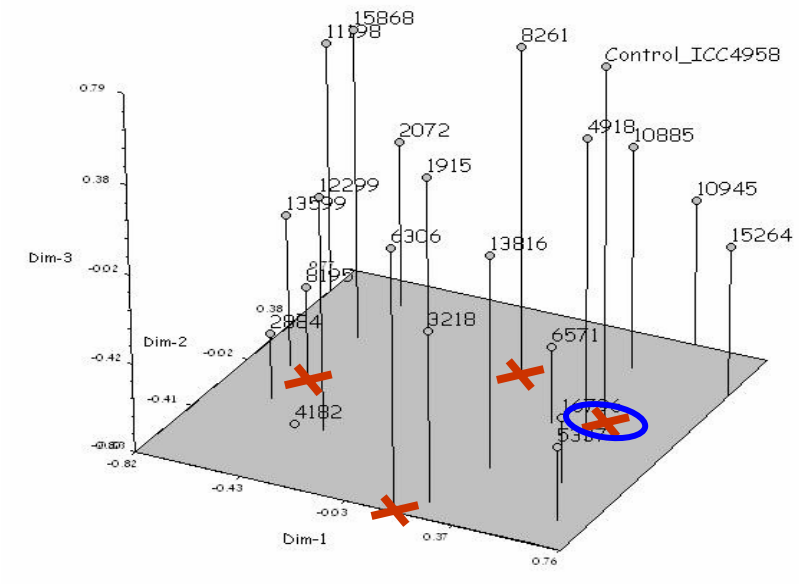


Identification of new sources for traits of economic importance using core/minicore

- 18 - drought related traits



Chickpea minicore germplasm accessions and five control cultivars grown in cylinder system and sampled at 35-d after sowing



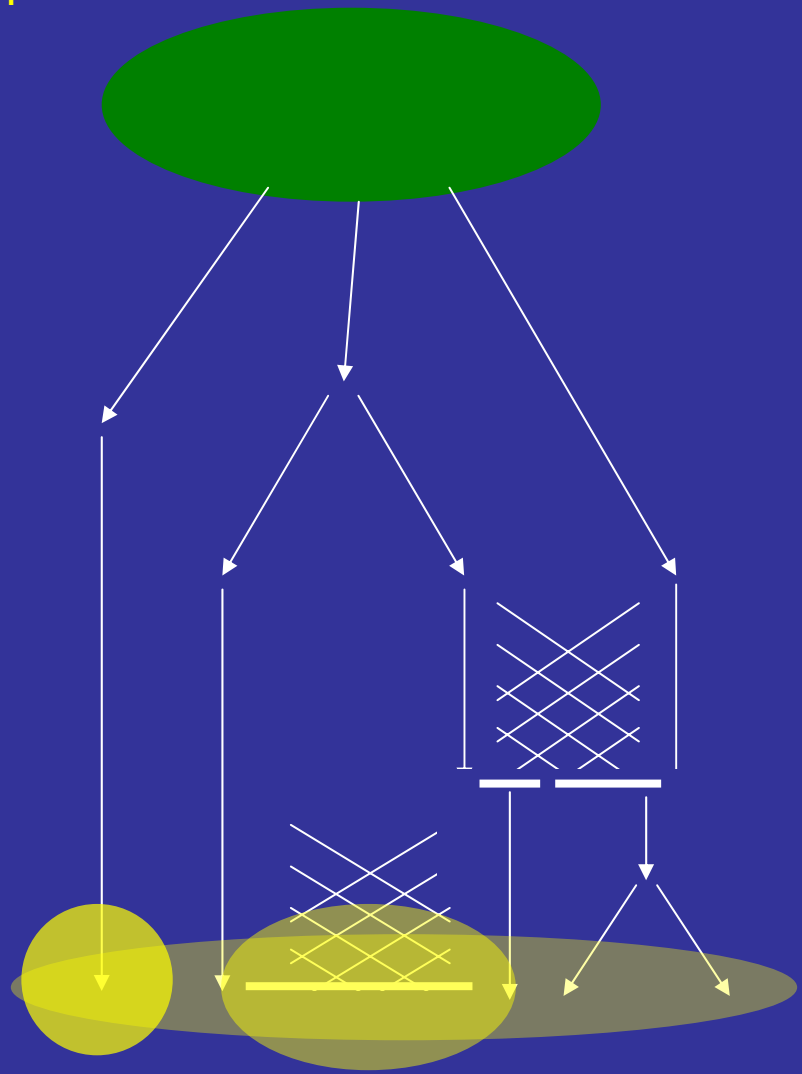
3D Scatter plots of chickpea accessions with high and low root length density using 50 SSR markers

Kashiwagi et al., 2005; Euphytica 146:213-222.

courtesy of H Upadhyaya

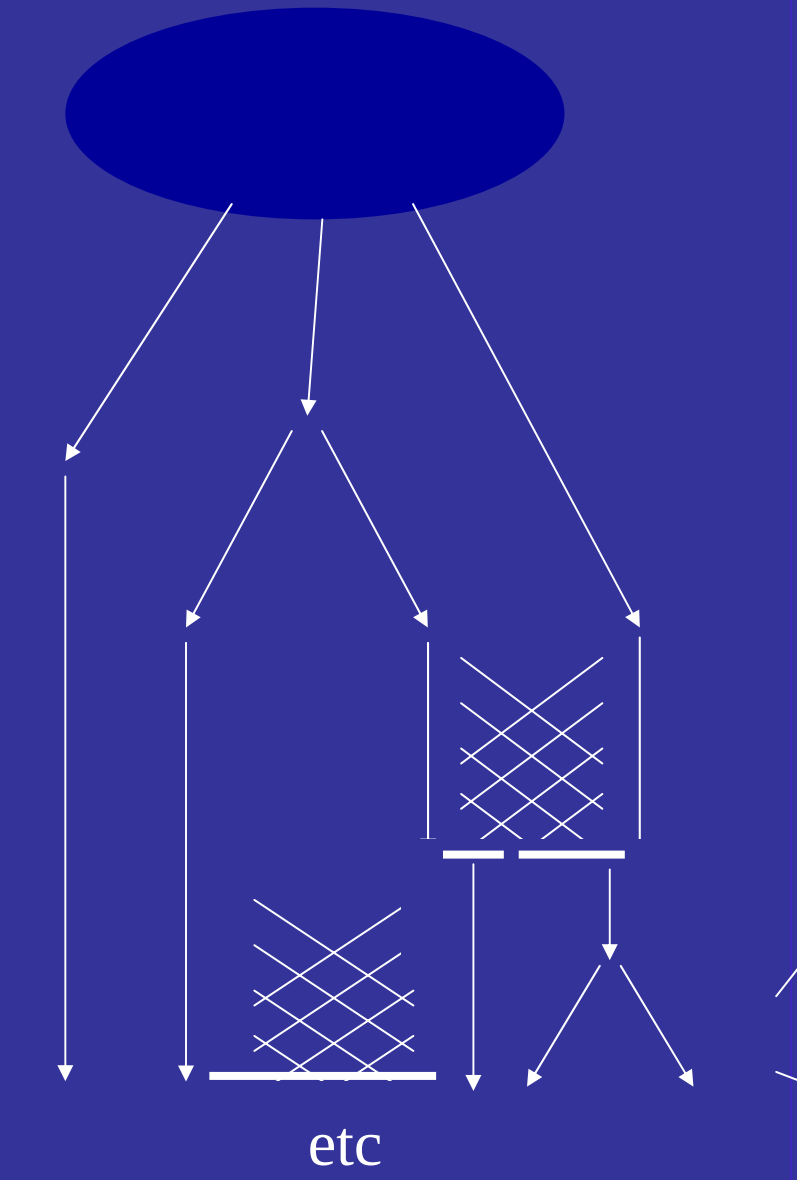
Sampling using molecular markers

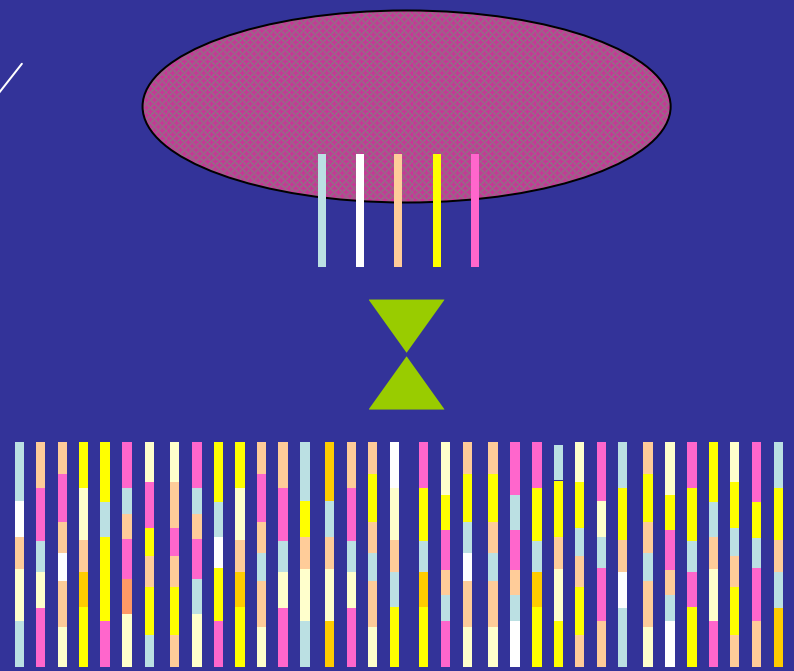
With an intention



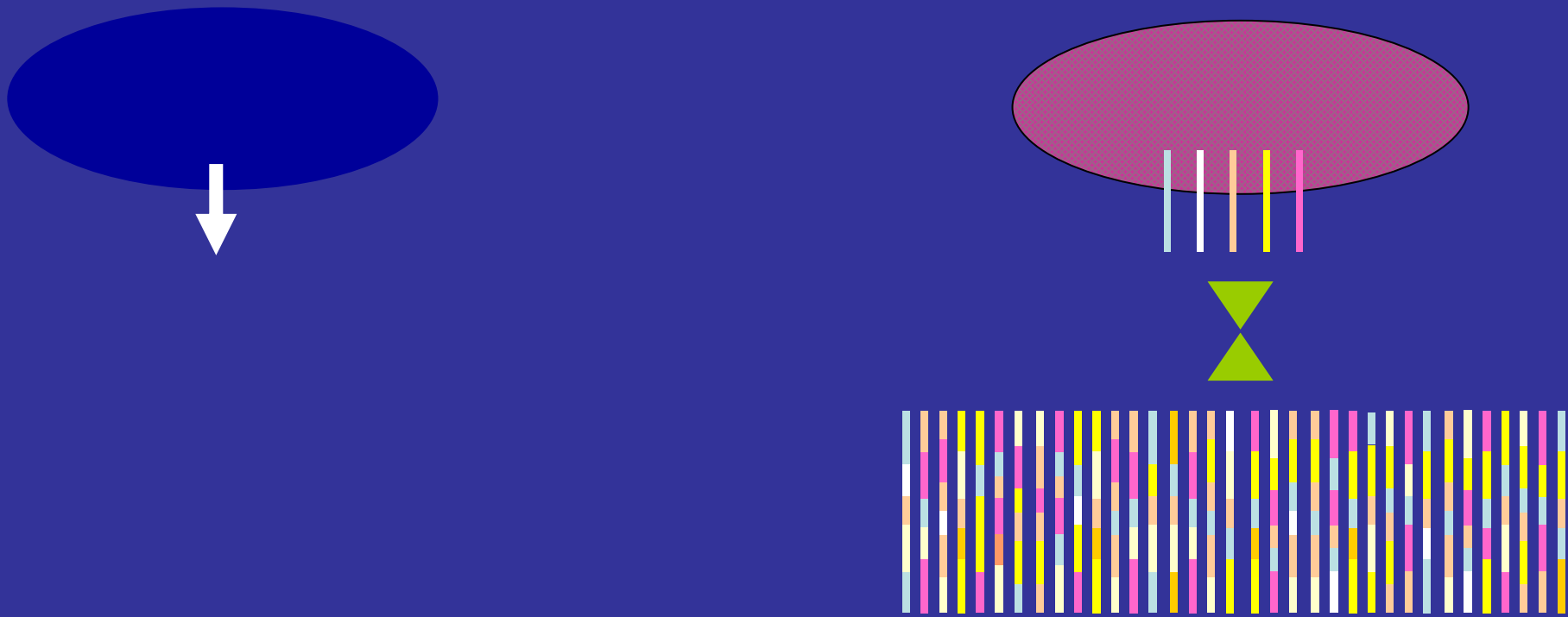
Sampling

- representing
- homogenizing
- focussing





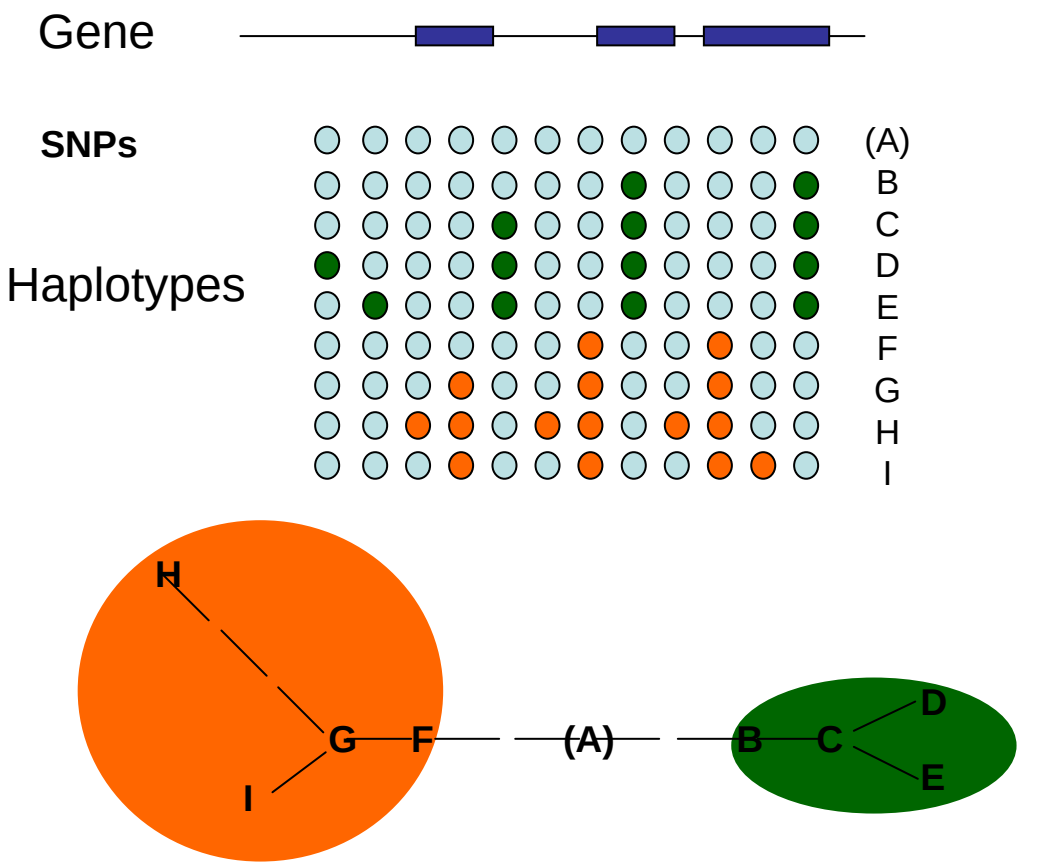
Domestication -------- Breeding

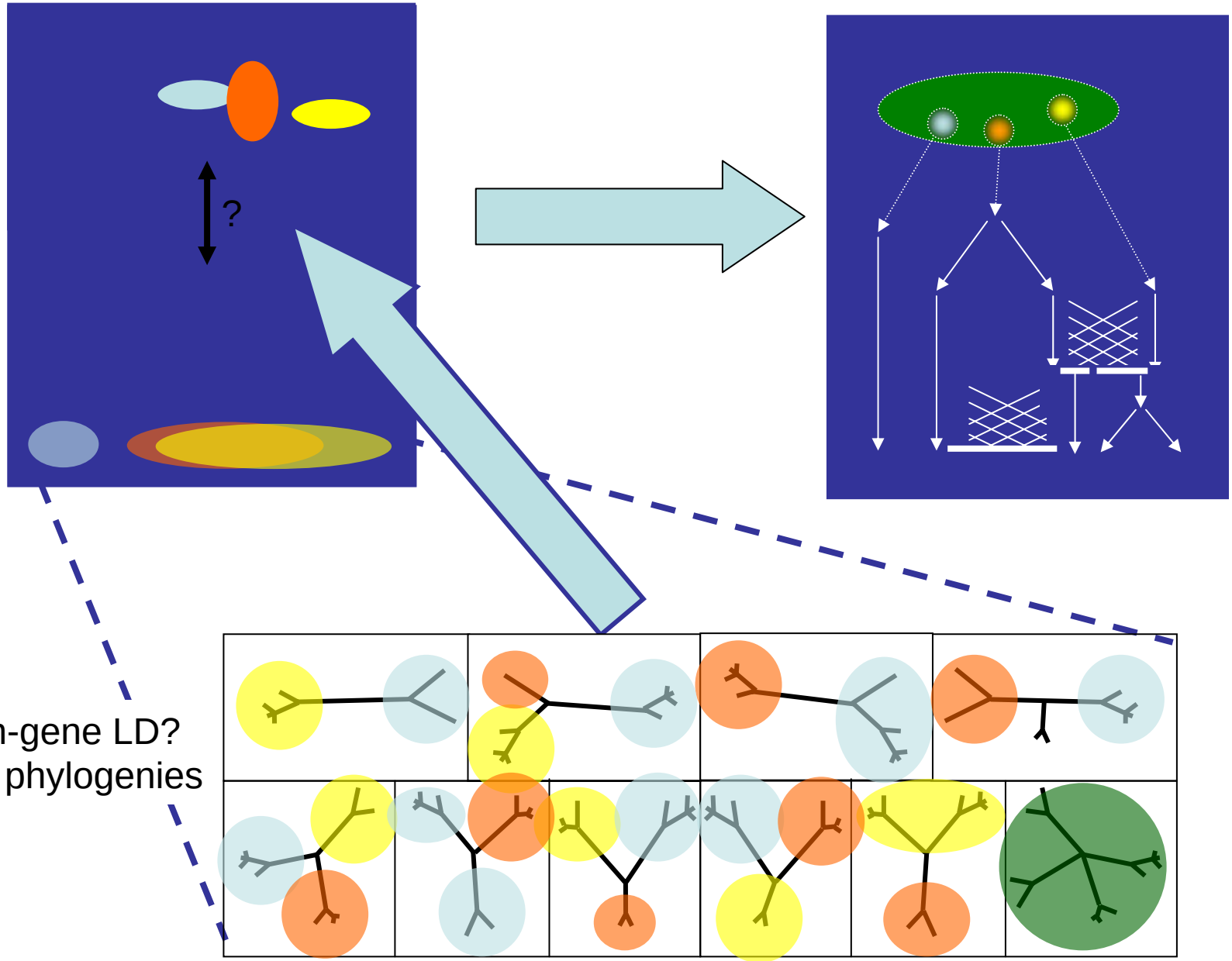


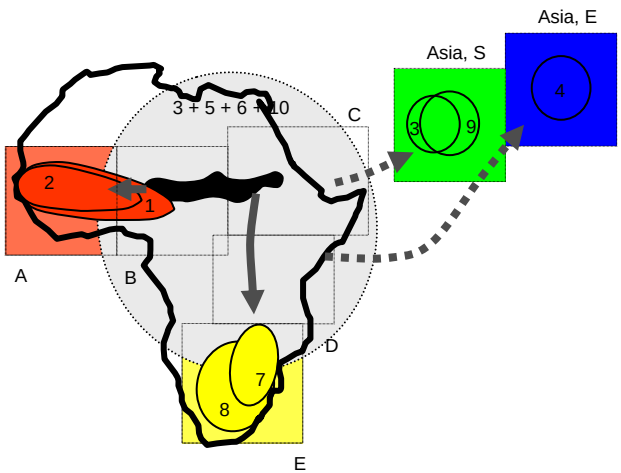
Domestication and linkage disequilibrium

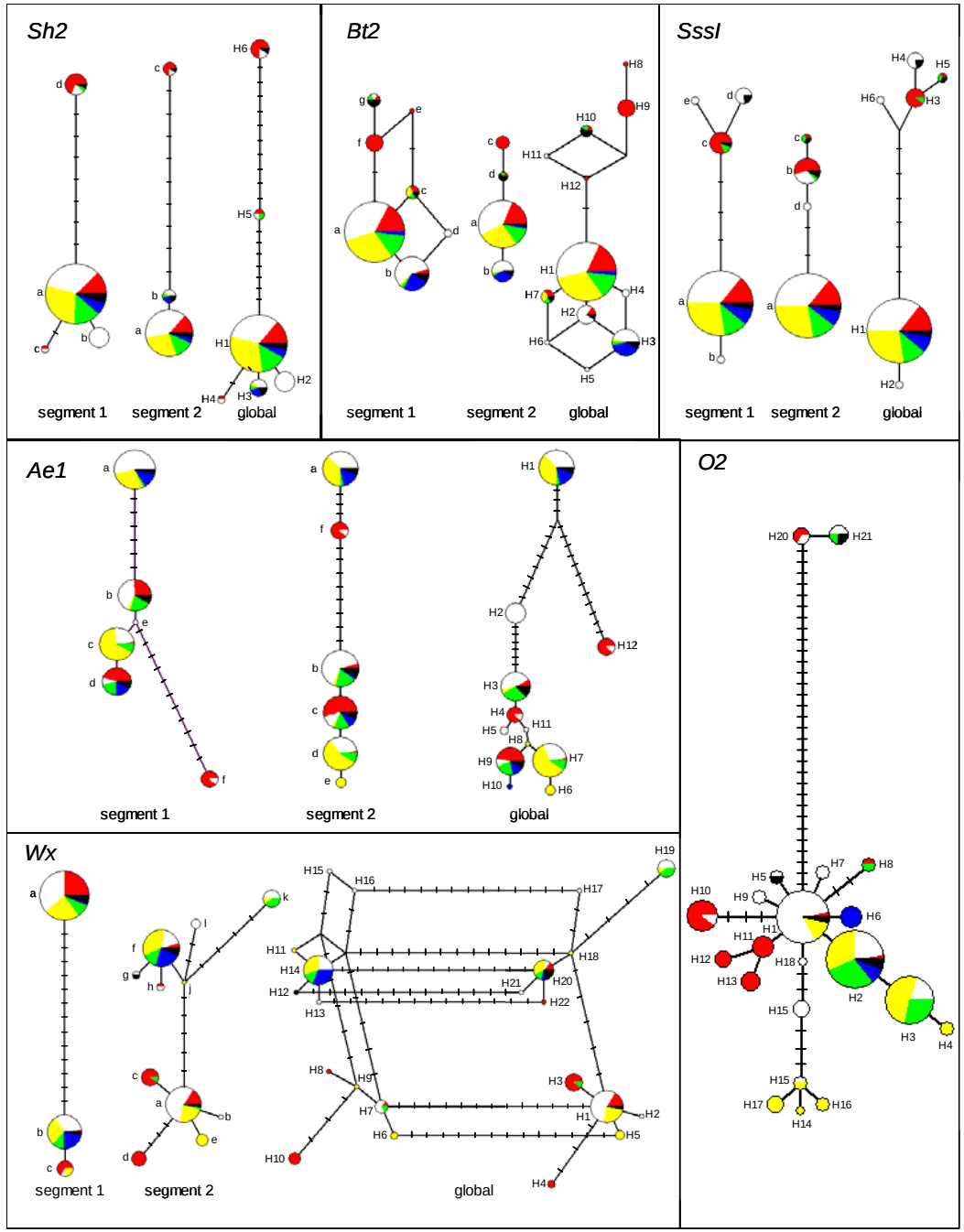
Crop evolution

allelic diversity at candidate genes

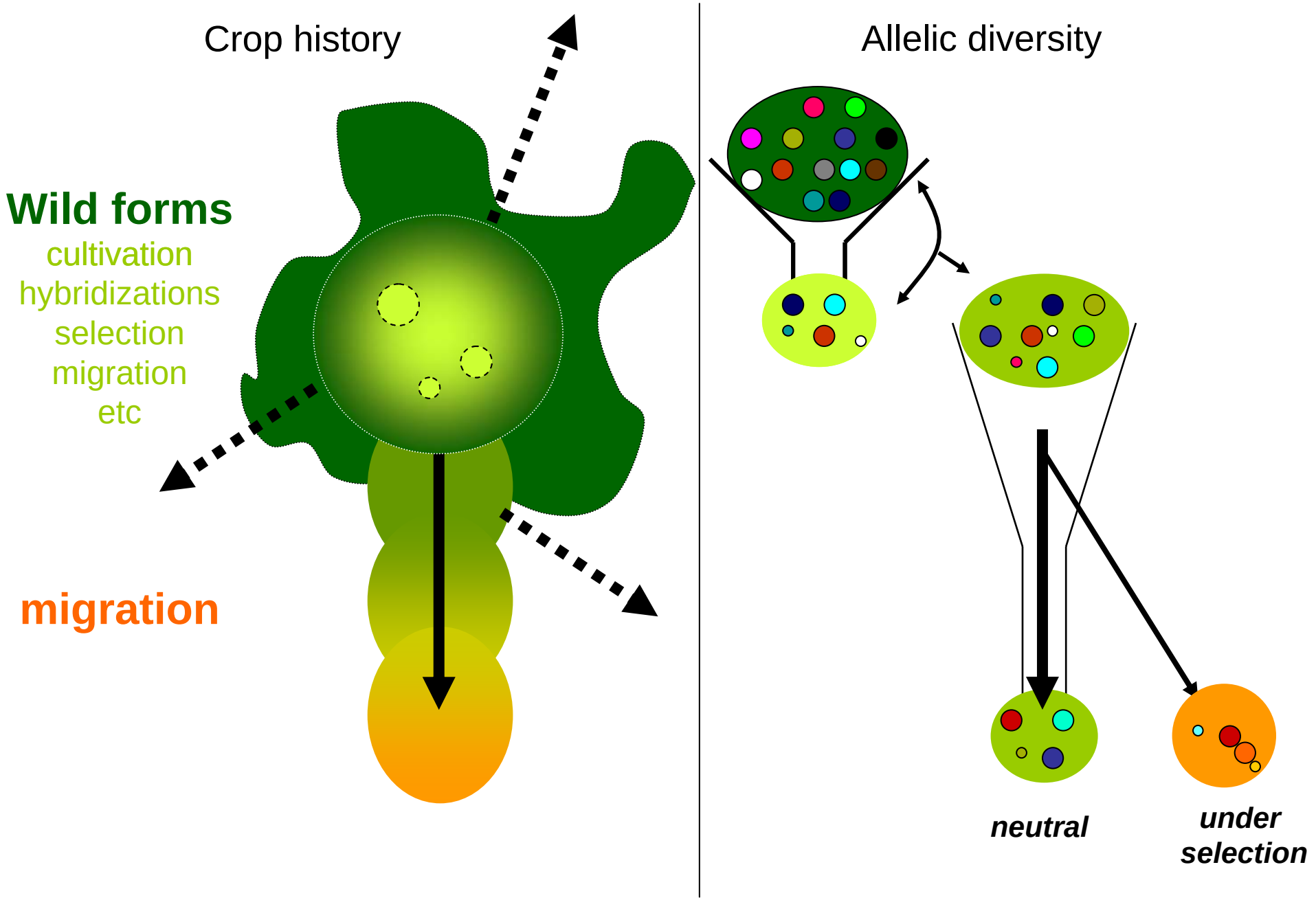

Gene
SNPs
Haplotypes
(A)
B
C
D
E
F
G
H
I
H
G
F
I
(A)
B
C
D
E
groups of haplotypes (alleles)
most recent
ancestral
most recent


?
Within-gene LD?
Allele phylogenies



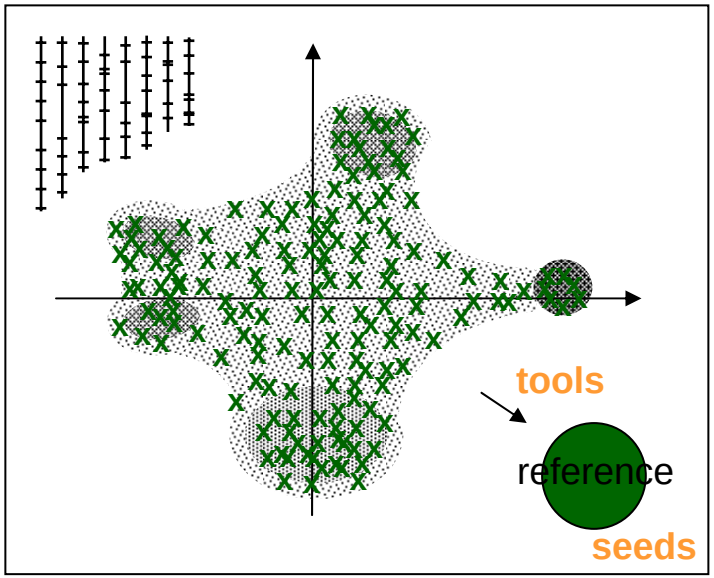


L. F. de Alencar Figueiredo, C. Calatayud, C. Dupuits,
C. Billot, J-F. Rami, D. Brunel,
X Perrier, B. Courtois, M. Deu, J-C. Glaszmann
unpublished

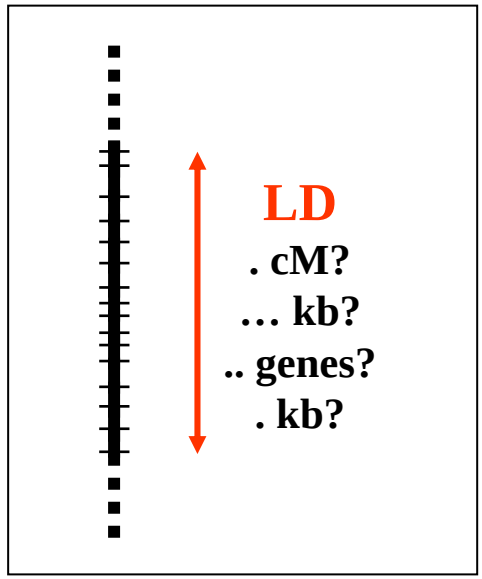

Crop history
Allelic diversity
Wild forms
cultivation
hybridizations
selection
migration
etc
migration
neutral
under selection

Importance of passport data

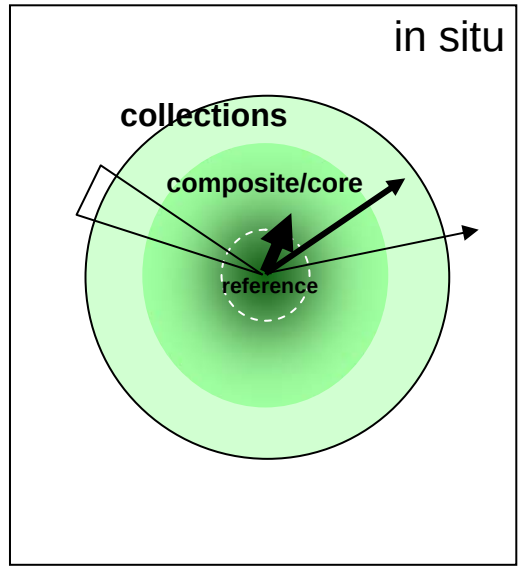
geographic origin
original environment



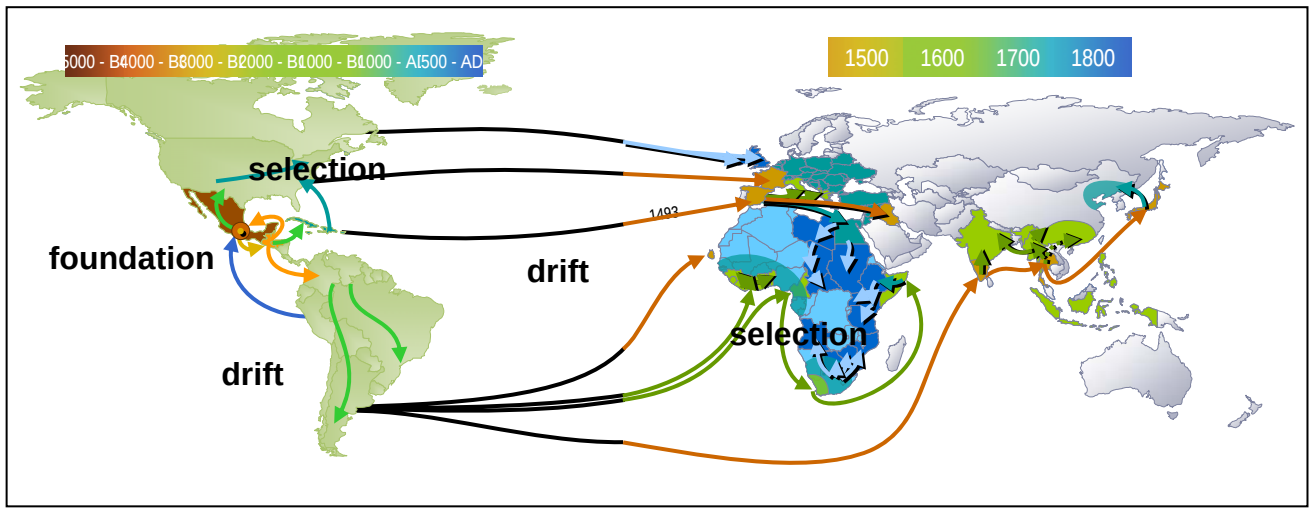
sampling, distributing



calibrating



mining



monitoring history, drift *vs* selection

Germplasm science

to support

breeding

Thank you