**ALA8.1 Genome Construction**

**Prerequisites**

Basic understanding of:

1. Concept of genetic gain
2. Concept of multi-objective optimization
3. Concept of operations research in plant breeding

**Purpose**

Apply genome construction to an example presented in eModule 8

**Background**

Simulation in plant genetics and plant breeding is useful to determine limitations of methods to be used and to help design experiments. Here, we will prepare mapping populations, which can be used to practice QTL mapping in eModule 5. This will be useful to determine the impact of type of population, trait architecture, marker density, population size, heritability, among others, on the power / ability of QTL detection.

**Tasks**

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Figure 8 (eModule 8)

1. Use the example given in Figure 8 of eModule 8 to apply genome construction principles “by hand.” Determine the minimum number of generations required to get from the 8 founder genotypes to the target genotype. Describe in detail the procedure that you suggest for each generation. How many individuals and marker data points do you need to generate in any given generation to be 99% confident that you will obtain the optimal genotype in the following generation.
2. How is the above affected if all loci of interest are located on the same chromosome ?
3. Which number of generations, marker data points, and individuals would you need if you would work with 16 founder genotypes, each contributing 1 locus (all loci unlinked) ?

**Tentative answers** (can differ, based on context / assumptions made)