Purpose:

Compare potential breeding methods based on the genetic gain equation.

Simulate phenotypic data using models of quantitative genetics for multiple cycles of selection and recombination.

Keywords:

Genetic Gain, heritability, additive genetic variance, Selection

References:

Captivate: Selection Heritability and Genetic Gain

Bernardo-Chapter 13, Section 11.9

ALA

An alternative EGT procedure has been proposed. In this alternative project 2x the number of lines are evaluated as F2:3 in a single replicate during the first summer after the nursery (see figure 2). The idea is to eliminate ½ of the lines, followed by development of F5:8 for evaluation in the same number of environments as the traditional F5 GT.

**Alternative
Early Generation Test**

Summer:	$E \times I$
Fall:	$F1$
Winter:	$F2$
Summer:	$F2:3$
Fall:	
Winter:	$F4$
Summer:	$F5$
Fall:	$F5:6$
Winter:	$F5:7$
Summer:	$Eval\ F5:8$

F5 Generation Test

Fall:	$E \times I$
Winter:	$F1$
Summer:	$F2$
Fall:	$F3$
Winter:	$F4$
Summer:	$F5$
Fall:	$F5:6$
Winter:	$F5:7$
Summer:	$Eval\ F5:8$

Determine whether the proposed Alternative EGT will result in greater genetic gain than the F5 GT. Due to the complex nature of h^2 with the proposed 2-stage evaluation and selection strategy, the analytical approach using the genetic gain equation cannot be used to approach the question. An alternative is to use simulation modeling to evaluate which of the strategies will be best.

In a file named "Selection Heritability and Genetic Gain ds8.xlsx" find tables in which both methods can be compared under the assumption of the same genetic architecture: equal additive effects at each of 10 functional marker loci. Two families of F2 and F5 derived lines have been simulated from crosses of 2 inbreds with a hub parent.

Conduct 3 cycles of evaluation and selection for each method and determine the realized gain from each. After each cycle of evaluation create two families with the best set of (3 or 4) lines. For the alternative EGT use one replicate of data for both families consisting of 100 F2:3 lines and 4 environments for the 50 F5:8 lines per family. For the traditional F5:8 evaluation use 4 environments, with 1 rep per environment for the 50 lines per family. Also, determine the relative costs for each method. Assume the cost of a field plot is $20 for the home site and $35 for an offsite environment.