AGRO-932 Spring 2020

HW2

Due Date: April 2nd, 2020 at 9 AM

Using the Flint-Garcia *et al*., 2009 data as we did in lab9 to test a hypothesis about fitness
(approximately equal to yield in agriculture setting) and genetic variances with the inbred
and one of the hybrid populations:

1. Establish a version-controlled directory system to host the homework2.

https://github.com/esanchezb/esb-agro932.git

Folder: HW2 https://github.com/esanchezb/esb-agro932/tree/master/HW2

2. Identify three traits of interest showing different levels of heterosis according to the
Flint-Garcia paper and clearly specify your hypothesis to test.

The traits of interest are:

➢ Plant yield (g/plant)
➢ Cob Weight (g)
➢ Leaf width (mm)

Plant yield is the most important trait in maize as well as cob weight, that was the rationale
for selecting two reproductive traits. Furthermore, non-reproductive traits also express
significant heterosis, that was the reason for choosing leaf width.

Hypothesis 1: There is a correlation between the level of heterosis for three traits and
heritability as a property of genotypes.

3. Following the basic steps to estimate genetic variances (VA for the inbred population
and VG for the hybrid population) and clearly interpret the ANOVA table and variance
components in terms of the covariances between relatives.

Trait	Inbred	H2_Inbred	Hybrid	H2_Hybrid
Plant yield	Va_YI = (549.08 - 358.99)/2	0.2093341	Vg_Yh = (2332 - 1210)/2	0.3167702
Cob Weight	Va_CI = (48.15 - 14.05)/4	0.3776301	Vg_Ch = (78.19 - 19.55)/4	0.4285297
Leaf width	Va_LI = (508.3 - 42.4)/4	0.7331235	Vg_Lh = (181.42 - 42.19)/4	0.4520601

4. Visualize, i.e., using a barplot, and interpret your results and report them in a
reproducible manner.
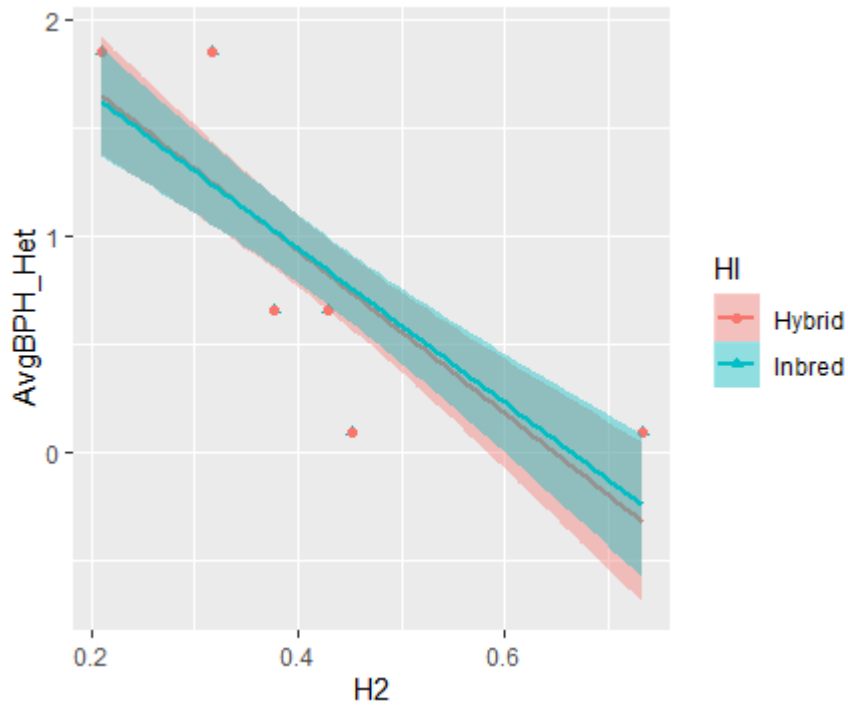
Figure 1. Correlation between heritability (H2) and average better parent heterosis (AvgBPH_Het).

There is a correlation between heritability and heterosis for each trait evaluated, as reported by Flint *et al*. (2009). Leaf width in inbred had the greater heritability (0.73) and plant yield had the lowest (0.21).