**ALA 1.3 Importance of heterosis versus hybrid performance for superior hybrids**

**Prerequisites**

Introduction in Crop Genetic, in particular on heterosis and hybrid performance

**Purpose**

To demonstrate the ability to calculate mean and high parent heterosis, and to understand their role in hybrid breeding.

**Background**

In literature, there often is a misperception of the significance of heterosis for breeding hybrid (and other) cultivars. While heterosis contributes to superior performance of hybrids, the best hybrids are not necessarily those with a maximum of heterosis. This simplified example illustrates the relationship of hybrid performance and heterosis.

**Tasks**

1. Calculate mean parent heterosis based on yields in Table 1, and enter values in Table 2.
2. Calculate high parent heterosis based on yields in Table 1, and enter values in Table 3.
3. Plot high and mean parent heterosis versus hybrid performance. Calculate respective correlations.
4. Interpret the low or even negative correlations between heterosis and hybrid performance.
5. What are the implications for hybrid breeding ?

**Table 1.** Inbreds 1, 2, 3 are from one heterotic group I, inbreds A, B, C from the opposite heterotic group II. Generally, the yield of hybrids between group I and II inbreds exceeds the per se performance of inbred lines (in brackets).

|  |  |  |  |
| --- | --- | --- | --- |
|  | Inbred 1 (1 t/ha) | Inbred 2 (2 t/ha) | Inbred 3 (3 t/ha) |
| Inbred A (1 t/ha) | 4 t/ha | 4.2 t/ha | 4.5 t/ha |
| Inbred B (1.2 t/ha) | 3.5 t/ha | 4 t/ha | 4.5 t/ha |
| Inbred C (1.4 t/ha) | 4 t/ha | 3.5 t/ha | 4.2 t/ha |

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

1. Mean parent heterosis

**Table 2.** Mean parent heterosis

|  |  |  |  |
| --- | --- | --- | --- |
|  | Inbred 1 | Inbred 2 | Inbred 3 |
| Inbred A |  |  |  |
| Inbred B |  |  |  |
| Inbred C |  |  |  |

1. High parent heterosis

**Table 3.** High parent heterosis

|  |  |  |  |
| --- | --- | --- | --- |
|  | Inbred 1 | Inbred 2 | Inbred 3 |
| Inbred A |  |  |  |
| Inbred B |  |  |  |
| Inbred C |  |  |  |

1. Plots of high and mean parent heterosis versus hybrid performance
2. Interpretation
3. Consequences for hybrid breeding