Finding the optimum size of synthetics

The theory of polycross breeding:
Based on «Sewall Wright» formula: \( Y = C - \frac{(C - S)}{n} \)
\( C = \) performance of crosses, \( C - S = \) inbreeding depression, \( n = \) clone no.

\( \mu(n) = \) mean of all possible synthetics of size \( n \)
\( Y_{GCA} = \) expected yield of synthetic with best \( n \) clones

→ Optimum at 7-11 clones

Practical example of Agroscope breeding program: 2x/4x L. perenne synthetics

\[ \Delta Y = 8.04 - 0.31 \times N + 0.0047 \times N^2 \ (p=0.166) \]

\[ \Delta Y = -0.88 - 28.06 \times 1/N \ (p=0.0006) \]

Boller B., Grieder C. Schubiger F.X. | Performance of diploid and tetraploid perennial ryegrass synthetics with variable numbers of parents

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Conclusions

- Diploids ≠ tetraploids
- Diploids: Caution with N < 7
- Tetraploids: Incentive to explore larger opportunities for selection of synthetics with low number of clones
- Successful synthetics also possible with large clone numbers