

1 **Optimal cross selection for long-term genetic gain in a two-**
2 **part genomic selection strategy**

3 **Supplementary Material S3:**
4 **Additional Results with the Cross-Self-Select method**

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10 **Table S3.1: Breeding program characteristics with the two-part Cross-Self-Select**
11 **breeding strategy (number of crosses, number of doubled-haploid lines per cross,**
12 **total number of doubled-haploid lines, and total cost) 2**

13 **Table S3.2: Per cycle characteristics of the population improvement component**
14 **by number of recurrent selection cycles per year with the two-part Cross-Self-**
15 **Select breeding strategy (number of crosses per cycle, number of selection**
16 **candidates per cycle, and minimum or maximum number of parents used per**
17 **cycle) 2**

18 **Fig. S3.1: Genetic mean of doubled-haploid lines (top) and population**
19 **improvement component (bottom) over 20 years of selection by breeding**
20 **strategy under constrained costs (mean and 95% confidence interval). 3**

21 **Fig. S3.2: Genetic standard deviation of doubled-haploid lines (top) and**
22 **population improvement component (bottom) over 20 years of selection by**
23 **breeding strategy under constrained costs (mean and 95% confidence interval). 4**

24 **Fig. S3.3: Genetic standard deviation of doubled-haploid lines (top) and population**
25 **improvement component (bottom) over 20 years of selection by breeding**
26 **strategy under constrained costs (mean and 95% confidence interval). 5**

27 We implemented the Cross-Self-Select method by selfing the 640 population
 28 improvement candidates. This could generate 50,000 to 80,000 candidate genotypes (=
 29 selfing 640 plants with 4 tillers and assuming 20 to 30 seeds per selfed tiller). To
 30 equalize costs with other programs (Table S1), we reduced the number of produced
 31 doubled-haploid lines per cross (Table S3.1) and generated “only” 10,240 candidates
 32 per year (Table S3.2). Out of these candidates we selected 32 or 128 parents with one
 33 cycle, which respectively corresponds to 0.31% and 1.25% selected individuals
 34 (selection intensity of 3.04 and 2.59). We assumed that the selfing step doubled cycle
 35 time. In results below we compare two cycles of the Cross-Self-Select method per year
 36 with the four cycles of the Cross-Select method.

37 Table S3.1: Breeding program characteristics with the two-part Cross-Self-Select
 38 breeding strategy (number of crosses, number of doubled-haploid lines per cross, total
 39 number of doubled-haploid lines, and total cost)

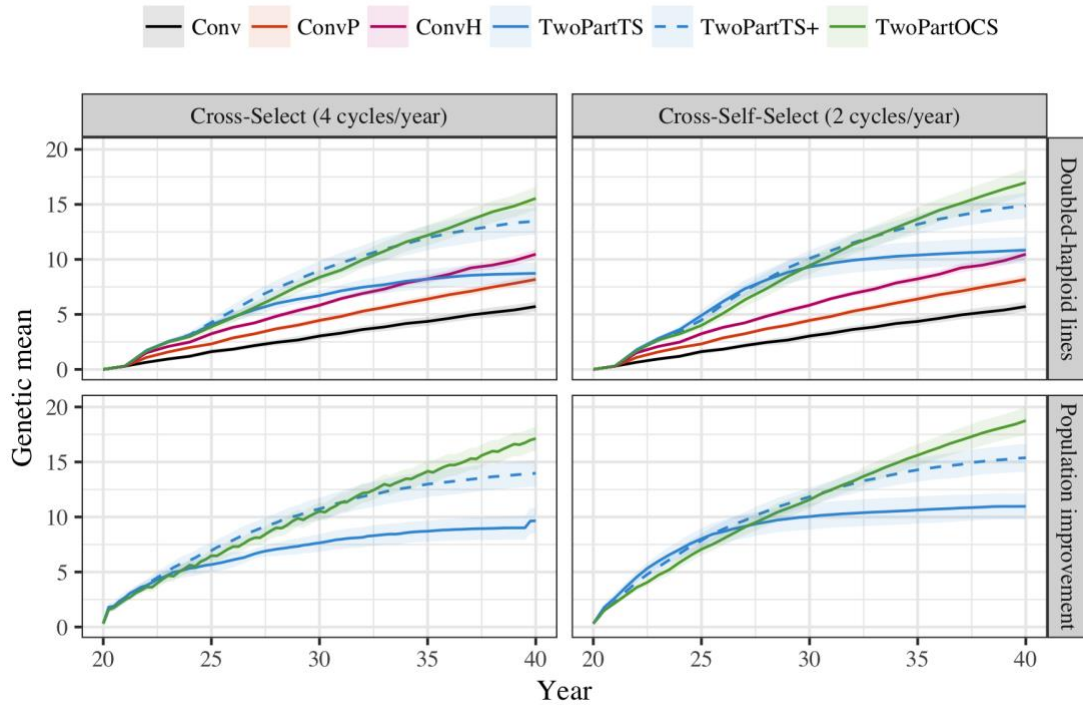
Strategy	#Crosses	#Lines / cross	#Lines	Cost (\$)
TwoPart (Cross-Self-Select)	/	/	2,600	347,800
product development	100	16	1,600	88,000
population improvement	64	15.6	1,000	259,800

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41 Table S3.2: Per cycle characteristics of the population improvement component by
 42 number of recurrent selection cycles per year with the two-part Cross-Self-Select
 43 breeding strategy (number of crosses per cycle, number of selection candidates per
 44 cycle, and minimum or maximum number of parents used per cycle)

#Cycles	#Crosses	#Candidates	#Parents	
			Min	Max
1	64	10,240	32	128
2	32	5,120	16	64
3	22	3,414	12	44

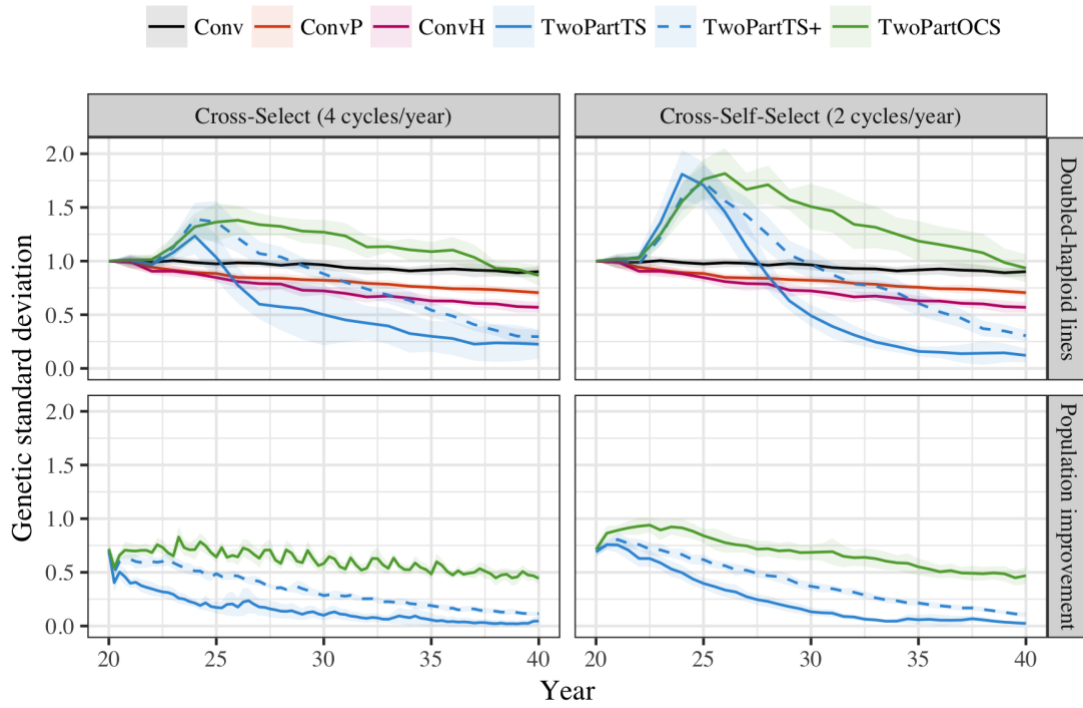
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47 Fig. S3.1: Genetic mean of doubled-haploid lines (top) and population improvement
 48 component (bottom) over 20 years of selection by breeding strategy under constrained
 49 costs (mean and 95% confidence interval).

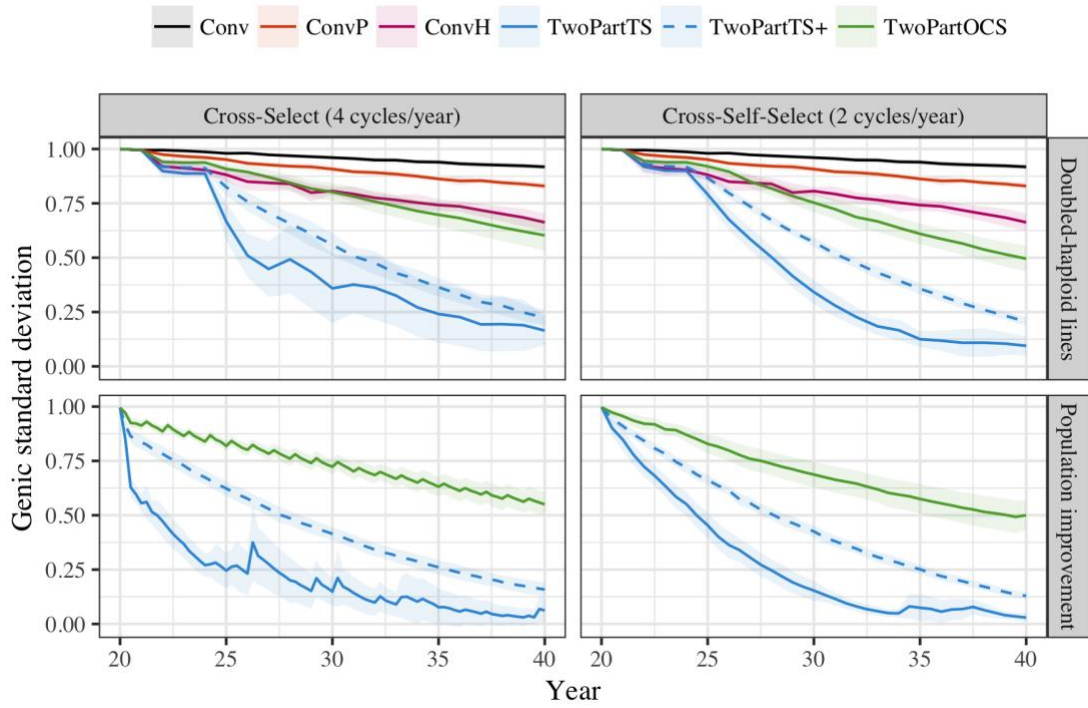
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52 Fig. S3.2: Genetic standard deviation of doubled-haploid lines (top) and population
 53 improvement component (bottom) over 20 years of selection by breeding strategy under
 54 constrained costs (mean and 95% confidence interval).

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57 Fig. S3.3: Genic standard deviation of doubled-haploid lines (top) and population
 58 improvement component (bottom) over 20 years of selection by breeding strategy under
 59 constrained costs (mean and 95% confidence interval).