

GENETIC GAIN WITH NATURAL SELECTION AFTER 12 SELFING GENERATIONS IN SEGREGANT POPULATIONS OF THE COMMON BEAN

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It is expected from a segregant population of autogamous plants, carried out by the bulk method to suffer action from the natural selection along the endogamy process. The direction and magnitude of this effect is not known in the specific case of the common bean. To obtain this information, six segregant populations from the crossing of two early cultivars, ESAL-686 and 'Manteigão Fosco 11 with three normal cycle cultivars, 'Carioca MG, Milionário and EMGOPA 201-ouro, were advanced by the bulk method from F₂ to F₁₃ generation.

The advancement of the generations was done in Lavras, located in the south of the state of Minas Gerais, at latitude 21°15' south and 45 west at 920 m of altitude. In each advancement of the generations, an experiment was carried out in randomized blocks with 5 replications. In these experiments, 11 treatments were evaluated, being 5 parental lines and the 6 segregant populations. The plots consisted of 4 five-meter-long lines. At harvest time, grains from different replications from each population, after being weighed, were mixed and stored in cold chamber until the next planting.

When comparing the average of hybrids and parental lines in different generations (Table 1), it was observed that the parents' average, in the initial generations, was superior to the hybrid populations' average. From F₇ generation on, a tendency to reduce this difference was verified. The hybrid populations along the generations presented an environmental variation and, probably, genetic variation due to the reduction of heterozygosis and to the natural selection's action. The parents presented only environmental variation, since the genotype is the same. Therefore, removing the environmental effect from the average of each population gives an estimate of the genetic deviation along the generations. With this data, the linear regression coefficient (b) among the generations and the genetic deviation (Table 2) were estimated. These estimates were always positive, although the determination coefficients (r^2) were not high. In the average of the 6 populations, the value of b was of 38.9 kg/ha/generation, which corresponds to an yearly average increase of 2.43%.

Table 1. Average productivity in kg/ha, obtained by the different segregant populations in F₂ to F₁₃ generations evaluated in Lavras, Brazil.

Generations	Average (kg/há)	
	Parents	Hybrids
F ₂	1786.4	1524.9
F ₃	1115.0	1099.8
F ₄	1625.6	1274.7
F ₅	1257.0	763.3
F ₆	1874.4	1695.3
F ₇	2274.4	2132.7
F ₈	1360.0	1436.0
F ₈	1988.8	2080.7
F ₁₀	2351.2	2642.7
F ₁₁	1178.8	1113.3
F ₁₂	2267.2	2234.7
F ₁₃	1063.2	1210.3
General average	1678.5	1600.7

Table 2. Estimates of mean (m) and the regression coefficients (b) among the generations and the genetic deviation of the six segregant populations evaluated among F₂ to F₁₃ generations.

Crossing	m	b	r ²	b/m (%)
Manteigão Fosco x Ouro	1502.04	44.31	0.53	2.90
Manteigão Fosco x Carioca MG	1575.04	3.33	0.057	0.21
Manteigão Fosco x Milionário	1528.83	53.51	0.52	3.44
ESAL 686 x Milionário	1662.13	49.83	0.52	3.00
ESAL 686 x Ouro	1601.21	50.99	0.57	3.14
ESAL 686 x Carioca MG	1588.86	30.67	0.34	1.88