Genetic progress resulting from forty-three years of breeding of the carioca common bean in Brazil

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ABSTRACT. We aimed to evaluate 40 common bean cultivars recommended by various Brazilian research institutions between 1970 and 2013 and estimate the genetic progress obtained for grain yield and other agronomic traits. Additionally, we proposed a bi-segmented nonlinear regression model to infer the year in which breeding began to show significant gains in Brazil. The experiment was carried out in Viçosa/MG and Coimbra/MG, in the dry and winter seasons of 2013. For this, a randomized complete block design with three replications was employed. The following traits were evaluated: number of pods per plant (NPP); number of seeds per pod (NSP); 1000-seed weight

(W1000); grain yield (Yield); plant architecture (Arch); and grain aspect (GA). Genotypic means were estimated over years using linear mixed models, and genetic gains were estimated using bi-segmented nonlinear regression models. In summary, the methodology proposed in the present study indicated that bean breeding programs in Brazil began to influence Yield beginning in 1990, resulting in a gain of 6.74% per year (68.15 kg/ha per year). The years from which estimated genetic progress for NPP (5.62% per year), NSP (4.59% per year), W1000 (2.08% per year), and GA (1.36% per year) began to increase were 1994, 1990, 1989, and 1986, respectively.

Key words: *Phaseolus vulgaris* L.; Cultivars; Genetic gain; Agronomic traits; Bi-segmented regression