

GENETIC BASE OF BRAZILIAN CULTIVARS
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Brazil, the world's largest dry bean producer, has a long tradition of bean research. The country's first bean breeding program was initiated by the Instituto Agronomico de Campinas, Sao Paulo, in 1932. Brazil's first cultivar of hybrid origin was 'Mantuba' (derived from a cross of 'Manteigao' x 'Tubarao'), which the Escola Superior de Agricultura e Veterinaria, Vicosa, Minas Gerais, released in 1934. Since then at least 10 breeding programs have released a total of 66 cultivars of hybrid origin in 9 market classes. Most of these cultivars belong to the three most important market classes grown in Brazil: 25 are "preto" (black), 15 "carioca" (small, cream with brown stripes), and 16 "mulatinho" (small, light tan). Sixty-four have features of the race Mesoamerican and 2 may be classified as representing the race Nueva Granada (Table 1).

Table 1. Market class and year of release of bean cultivars released in Brazil. 1934-1993.

Year of release	Preto	Mulatinho	Carioca	Other
1934				Mantuba ¹
1971-1979	Moruna	Pirata 1 Pirata 2 Ricobaio 1014 IPA 74-19 IPA 1 IPA 2		Aroana
1980-1984	Moruna 80 Rico 1783 Milionario 1732 Vitoria Capixaba Precoce Chapeco-EMPASC 201 Rio Negro-IAPAR 8	IPA 3 IPA 5 Aete 3 Catú EPABA 1	Ayso Carioca 80	Aroana 80 Ouro-EMGOPA 201 Rio Piquiri-IAPAR 5 Rio Vermelho-IAPAR 7
1985-1989	Xodo Fortuna Grande Rio-BR 2 Ipanema-BR 3 FT 120 FT Taruma IAPAR 20 FT Rio Preto Macanudo-BR/IPAGRO 1 Pampa-BR/IPAGRO 2 Serrano-EMCAPA 404	Ricomig 1896 IPA 6 IPA 7	IAPAR 14 IAPAR 16 Rio Doce Carioca IAC FT Paulistinho FT Zebrinha	Rubi-EMGOPA 202
1990-1993	Barriga Verde-BR 6 IAPAR 44 Minuano-BR/IPAGRO 3 Diamante Negro Onix BR-IPA 10	IPA 8 São Jose	FT Bonito IAPAR 31 IAPAR 57 IPA 9 Goytecazes Carioca MG Aporé	Roxo 90 ¹ Safira Vermelho

¹ Race Nueva Granada

Genetic relationships among cultivars were estimated using coefficients of parentage (r) based on pedigree analysis. Of the 74 different ancestors that contributed to the genetic composition of these cultivars, 55 belonged to the race Mesoamerica. Twenty ancestors contributed 70 percent of the genes. Eighteen of these progenitors belonged to the race Mesoamerica. Table 2 lists the 10 most commonly used ancestors.

Table 2. Most frequently used ancestors of Brazilian cultivars: their genetic contribution and presence in the pedigree of cultivars.

Genotype	Mean genetic contribution (%)	Presence in pedigree of n cvs ¹	Race ²
Cornell 49-242	.095	22	M
Carioca	.082	13	M
Porrillo S.	.054	16	M
Chumbinho 79	.050	12	M
Roxo	.044	7	NG
S89N (Rio Tibagi)	.044	6	M
Actopan	.042	11	M
Costa Rica	.039	7	M
L-3-0-5-0	.031	6	M
Jamapa	.030	11	M
Total contribution of 10 ancestors	.511		

¹ Number of times used as progenitor of released cvs

² M = Mesoamerica, NG = Nueva Granada

Brazilian bean cultivars have a relatively narrow genetic base. Moreover, hybridization within genotypes of the same race is common. Although the genetic base is narrow at the intraracial level (Table 3), recently released material contain new genetic combinations intended to overcome the shortcomings of previous cultivars. Consequently, the genetic variability of Brazilian cultivars has been broadened and made more useful, since new blocks of genes have been introduced in cultivars of the same class.

Table 3. Relative genetic contribution and presence of different bean races used in the development of bean cultivars in Brazil.

Race	Mean genetic contribution	Presence in pedigree ¹
Mesoamerica	.856	65
Durango	.040	16
Jalisco	.003	3
Nueva Granada	.093	12
<i>Phaseolus acutifolius</i>	.014	13

¹ Number of times used as progenitor of released cvs