

## Genetic diversity in the carioca common bean commercial group based on molecular markers

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The Carioca commercial grain type is traditionally preferred for consumption in Brazil, justifying the efforts for developing superior cultivars detaining the most common desirable commercial traits. The aim of this work was to evaluate the genetic diversity within a set of 60 'Carioca' common bean accessions from the Agronomic Institute (IAC, Campinas, S.P., Brazil). The genetic diversity was assessed using SSRs and AFLPs. Roger's modified genetic distance was used for SSR data and Jaccard's similarity coefficient was used for AFLP estimates. The relationship between populations (K) was evaluated with Structure software. SSRs and AFLP data were analyzed by treating each genotype class as being, effectively, of diploid nature, according to the Structure analysis. PCO was performed with the MRD distance matrix and the first three principal coordinates were used to describe the dispersion of the 60 accessions according to their allele data. For SSRs, the F statistics of Wright were estimated using the GDA program, and for AFLPs, AMOVA was used to test the structure of genetic diversity of the genotypes. Seventy SSRs were polymorphic and twenty AFLP primer combinations produced 635 polymorphic bands. The polymorphism information content (PIC) was calculated for SSRs and was superior (0.03 to 0.70) to AFLP PIC values (0.03 to 0.37). Clustering analysis showed that the 'Carioca' cultivars are far more diverse than what was thought, but they detain low genetic structure. SSR dendrogram divided the genotypes into 09 groups with correspondence to the ten group pattern found by Structure analysis. SSR clustering showed associations to some morphological characteristics. AFLP clustering divided the accessions into 05 groups, but Structure analysis failed to solve accurately group division for dominant data. No significant correlation was found between SSR and AFLP genetic distance matrices. Principal coordinate analysis for SSR data showed that the original 'Carioca Comum' was detached from the rest of the evaluated genotypes, revealing that the 'Carioca' genotypes diverged from the original one and that there is still sufficient variability within 'Carioca' gene pool to be exploited further in breeding programs. According to GDA analysis, the total molecular variance was partitioned into 17% of variation among SSR dendrogram groups and genetic variation was greater within groups than among groups ( $F_{ST} = 0.83$ ). This indicated a high level of genetic differentiation in our Carioca sample. From AFLP data, AMOVA showed that the between group variance accounted for 2%, while the within group variance accounted for 98% (GST). Meanwhile, the observed heterozygosity was very low for all genotypes (0.16), reflecting the inbreeding index characteristic of an autogamous species. In conclusion, the knowledge of genetic diversity in Carioca common bean germplasm will provide bean breeders with a starting point in designing crosses using contrasted and complementary parents to broaden the genetic basis within the different commercial classes of bean grown in Brazil.

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