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Brachiaria (*Gramineae*) is a very important forage grass genus for tropical pastures. Hybridization between species of *Brachiaria* has only been successful with accessions of identical ploidy levels. The National Center for Beef Cattle Research (CNPQC) of the Brazilian Corporation for Agricultural Research (EMBRAPA), has a large collection of species and begun a breeding program in 1988. This paper reports about the variation in DNA content in 37 accessions of 11 different species from this genus. The objective is to determine ploidy levels in accessions relevant to the breeding program, to be used in interspecific hybridization, hoping to generate hybrids with agronomic potential. A diploid *B. decumbens* plant was used as a control. This plant has known chromosome numbers, determined by conventional cytological analysis. Leaf tissue from adult plants was carefully chopped with a razor blade for nuclei extraction, in buffer solution as in Galbraith, D.W. et al. (Science 220:1049, 1983). The results show wide variation within and between species. *B. jubata* and *B. arrecta* have smaller DNA contents when compared to *B. decumbens*, whereas *B. dura* and *B. subulifolia* have larger quantities. The most variable species seems to be *B. brizantha*, where the diploid accessions show up to 23% more DNA than the control; the tetraploid accessions vary from similar quantity up to 10 % more than the control, and a group of accessions shows intermediate indexes. These intermediate indexes hinder determination if they are, in fact, tetraploid plants with originally higher nucleic acid contents, or hexaploid plants with low DNA contents. In these cases, conventional cytology must be used. *B. ruziziensis* and *B. humidicola* display values 10% lower to 15% higher than the control among the accessions analysed. *B. decumbens* is the species displaying the greatest homogeneity of indexes. Some results from this study are very complex and may even suggest that different poliploidization processes have occurred in the evolution of this genus. These results point out the importance of the information on ploidy levels for futher breeding efforts in the *Brachiaria* program.