A Core Subset

of Brazilian Maize Germplasm

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The Brazilian maize germplasm collection comprises 2,263 accessions that have adequate passport data and are currently conserved at the Centro Nacional de Recursos Genéticos (CENARGEN-EMBRAPA), and the Centro Nacional de Pesquisa de Milho e Sorgo (CNPMS-EMBRAPA). The objective of this research was to develop a core collection of the collection to facilitate its use by breeding programs. The subset and related research was developed by an interdisciplinary group of curators, breeders, and statisticians.

Developing a core collection is basically a sampling excercise. The two main problems to solve are the size of the sample and the sampling strategy to be used. In our case, 300 accessions were considered an adequate sample size. This represents 13% of the base collection, which is more than the 10% limit recommended by Brown (1989). In addition, 300 is a number of accessions that can be handled with relative low cost by the curator.

A two-level sampling strategy was used. At the first level, the accessions were classified into three strata according to origin of the germplasm: 1) landraces (1,753 accessions); 2) improved materials (222 accessions); and 3) introductions (288 acccessions). Each stratum was proportionately represented in the core collection.

At the second level, specific sub-classifications were used within each stratum. Landraces were classified in 27 groups, based on ecogeographical origin and grain type (Table 1), as suggested by Abadie et al. (1997). The ecogeographical regions used in this case were the same as those used by Cordeiro et al. (1995) for the classification of Brazilian cassava accessions. A logarithmic strategy was used to assign the proportional representation of each group in the core collection. Within each group, the accessions were selected by the curators taking into account their experience and knowledge of the crop when possible, or otherwise at random.

The improved materials were classified as pops (pop maize), non-pops from CNPMS, and non-pops from other breeding programs. This classification followed from the principal components analysis done on the data of Feldman and Silva (1984), following the methodology used by Abadie et al. (1997) in the study of the landraces. The introductions were classified based on their origin as tropical or temperate, and within each of these groups based on the four main grain types (pop, flint, floury, dent), as suggested by the

experience of the curators and breeders. The representation of each group of the latter two strata was proportional to their size. The core collection samples belonging to each group were selected by the breeders trying to maintain maximum genetic variation and to include those accessions representative of the main genetic pools used in the breeding programs.

The development of this maize core collection has resulted in a new classification of the Brazilian maize collection, based on experimental results (Abadie et al. 1997) and on the knowledge and experience of curators and breeders. In addition, the classification was developed using available passport and characterization data, without the need for additional expensive research. The appeal of the new classification system is both its simplicity and its intuitively sound biological and practical basis. We expect that this will encourage breeders to use Brazilian maize germplasm in their programs.

Acknowledgement

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Table 1. Distribution of Brazilian landraces based on grain type and ecogeographical region of origin, in the base collection (BC) and core collection (CC).

Origin	Pop BC	Pop CC	Flint BC	Flint CC	Floury and other BC	Floury and other CC	Dent BC	Dent CC
South	29	10	23	9	5	5	279	17
Cerrados	26	10	77	13	50	12	321	19
Cerrados North	12	8	9	7	6	5	110	14
Amazonia	35	12	94	15	19	8	121	14
Caatinga	17	8	38	11	1	1	169	16
Agreste Litoral	1	1	14	8	0	0	62	12
Non-class	4	0	5	0	7	0	10	0

Landraces in the CC = 235.