



Development of Double Haploids in Tropical Maize in CIMMYT

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Double Haploids in Maize breeding

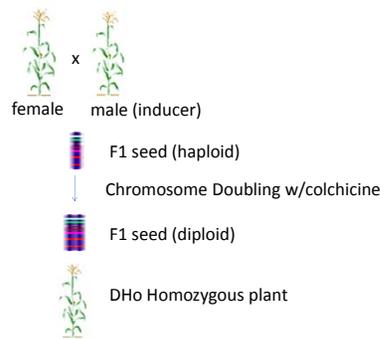
Commercial hybrids in maize involve the development of inbred lines that when crossed produce F1 progeny which, due to hybrid vigor, outperforms its parents. Producing an inbred line requires at least six generations of self-fertilization to reach homozygosity, making the process long and expensive.

Double haploids are a shortcut to the production of inbreds because a haploid genome (one out of the two set of chromosome that make up a diploid organism such as maize or humans) is doubled artificially. In this way we can assure that the genome is completely homozygous at all loci in only one generation.

Tropical Inducer

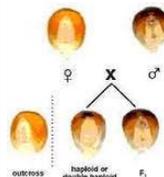
Currently at **Agua Fria**, CIMMYT's tropical Experimental Station, breeders have developed several double haploid lines of maize adapted to tropical environment using a temperate inducer line (RWS and UH400 from Germany). However, these lines have very low adaptation to tropical climate, low pollen production, low rate of haploidy induction, asynchrony in flowering time between the inducer and maternal lines and susceptibility to tropical diseases such as rust and turicum. CIMMYT is developing through backcross method an **adapted tropical inducer** that will overcome these difficulties. The inducer lines developed have red stalk and produce seed with red embryo and endosperm.

Development of Double Haploids



- Cross specific genotype (female) with inducer (male).
- 8% is considered a good haploid induction rate.
- Identify haploid seed with visual marker.
- Double chromosomes using colchicine.
- DHo homozygous plants are grown in the field and the best are selected for hybrid development.

How do we find the haploid seed in the cob?



The use of a phenotypic (visual) marker is crucial for a fast and effective screening of haploid seed in the corn cob. The marker should be detected early, easily and cheaply. Its expression needs to be independent from the environment and dominant. Haploid seed will show white embryo (maternal) and red endosperm (paternal). Seed which are identical to either one of the parents are discarded.

Importance of Double Haploids in CIMMYT breeding programs



The development of maize hybrids adapted to tropical environments can be both tedious and challenging. Using the Double Haploids technique makes this process faster, cheaper and more efficient. For CIMMYT, an institution that aims at developing advanced lines to meet the needs of millions of people world-wide, making this process resource and time efficient is crucial. For this reason, developing tropical inducer lines adapted to the region and with good induction rate is very important and will make possible the evaluation and production of more lines each year.

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