

RESULTS OF THE MAIZE BIOFORTIFICATION RESEARCH ACTIONS IN THE HarvestPlus AND BioFort PROJECTS

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The Embrapa Maize and Sorghum research team has been involved in the biofortification effort to generate maize cultivars with enhanced nutritional value, focused on bioavailable vitamin A precursors (proVA), iron and zinc in the kernels within the HarvestPlus and BioFort projects. Two cycles of mass selection were conducted for agronomic and ProVA traits in maize since the establishment of the pro-VA synthetic variety resulting in an improved pro-VA synthetic cultivar. Analysis of the last cycle of selection for pro-VA showed average proVA carotenoids and total carotenoids for 100 ears of 8.2 and 31.5 $\mu\text{g}\cdot\text{g}^{-1}$ (dwb), respectively, while, the average values were 10.6, and 35.8 $\mu\text{g}\cdot\text{g}^{-1}$ (dwb) for 15 selected ears. This represents an increment of approximately four times the total of these substances in the normal yellow maize produced in Brazil. In 2010, four sets of primers that amplified polymorphisms within the genes *lycE* and *crtR1*, previously reported as associated with increased levels of pro-Vit A, were tested using 10 maize inbred lines from the Embrapa Breeding Program contrasting for carotenoid content. The superior allele for *LycE* gene was presented in four of the 10 maize lines evaluated, whereas the superior allele of the gene *crtR1* was not presented within the current Brazilian germplasm. For the other two primers combinations of superior alleles were detected in the Embrapa germplasm in different frequencies. These results indicate that it will be possible to use Marker Assisted Selection (MAS) to track the superior alleles for pro-Vitamin A content. However, further germplasm screening will be necessary and a specific breeding program needs to be designed to use the molecular tools to develop biofortified maize cultivars with proVA content of $15\mu\text{g}\cdot\text{g}^{-1}$ or higher.