A SMALL-KERNEL PHENOTYPE FOR THE *SORBITOL DEHYDROGENASE-1* MUTANT

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Sucrose first arriving at the kernel can be cleaved by either invertase or the reversible sucrose synthase reaction. In either case, fructose is a product. Fructose is typically phosphorylated by hexokinase, and then used for respiration or polysaccharide biosynthesis. Alternatively, fructose may follow a less well-known fate in some tissues, where it can be converted to sorbitol by sorbitol dehydrogenase (SDH). This enzyme is highly active in maize endosperm, but since kernels do not store sorbitol, an intermediary role is likely. To help test hypotheses for the significance of SDH in maize, we screened the UniformMu maize population and identified an *sdh1* mutant. Since the UniformMu population is highly inbred, the wild type material provides a uniform set of controls for functional analysis of the mutants. The *sdh1* mutation reduced maximal SDH activity in developing kernel to less than 6% of that in wild type. Quantification of the small-kernel phenotype as dried-seed weight showed reductions ranging from 11-30%, with a mean of 21% for first-round field analyses (significant to $p<.001$). The role of sorbitol in developing maize kernels is potentially pivotal, but remains undefined. Sorbitol may function as an intermediate metabolite and/or shuttle aiding transfer of carbon resources and reducing power (NAD[P]H) within the endosperm and to the embryo.