BRC Science Highlight
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Editing of an alpha-kafirin gene family increases digestibility and protein quality in sorghum

Background/objective

The successful editing of a genetic allele through use of a genome-editing reagent in sorghum was demonstrated on the alpha-kafirin gene family.

Approach

- We used a clustered regularly interspaced short palindromic repeats (CRISPR)/CRISPR-associated protein 9 (Cas9) gene-editing approach to target the k1C genes and create variants with reduced kafirin levels.
- A single guide RNA (sgRNA) was designed to introduce mutations in a conserved region encoding the endoplasmic reticulum signal peptide of α-kafirins.

Results

- Sequencing of kafirin PCR products revealed extensive edits in 25 of 26 events in one or multiple k1C family members.

Significance

- The relatively high efficiency of successful edits with CRISPR technology in sorghum was demonstrated.
- A single guide RNA can lead to novel allelic variation across a gene family in sorghum, increasing efficiency of genetic design for improving bioproduct production.

Figure 2. Comparison of three kernels selected from 26 T_1 events (E1-E26) and the wild-type control Tx430 viewed on a light box. The wild-type Tx430 kernels show fully vitreous kernels while the edited lines show variably reduced vitreousness. Groups of three representative kernels for each event were imaged together and then combined into a single composite image for comparison.

Li, A., et al. 2018. "Editing of an alpha-kafirin gene family increases digestibility and protein quality in sorghum." ***Plant Physiology****, 00200.2018, DOI: 10.1104/pp.18.00200*

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