

Title

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Example:

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(Abstract)

(Example)

Genome editing of upstream open reading frames enables translational control in plants

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Translational regulation by upstream open reading frames (uORFs) is becoming established as a general mechanism for controlling the amount of protein that is synthesized from downstream primary ORFs (pORFs). We found that genome editing of endogenous uORFs in plants enabled the modulation of translation of mRNAs from four pORFs that are involved in either development or antioxidant biosynthesis. A single-guide RNA that targeted the region harboring a uORF initiation codon can produce multiple mutations. Following uORF editing, we observed varying amounts of mRNA translation in four pORFs. Notably, editing the uORF of *LsGGP2*, which encodes a key enzyme in vitamin C biosynthesis in lettuce, not only increased oxidation stress tolerance, but also increased ascorbate content by ~150%. These data indicate that editing plant uORFs provides a generalizable, efficient method for manipulating translation of mRNA that could be applied to dissect biological mechanisms and improve crops.