‘Tuning’ plant flowering signals with CRISPR could yield heartier crops suited to harsh environments

Increasing human populations demand more productive agriculture, which in turn relies on crop plants adjusted for high-yield systems. [G]enetic tuning of the signaling systems that regulate flowering and plant architecture can be applied to crops. Crops that flower sooner might be adaptable to regions with shorter growing seasons, and compact plant shapes might facilitate agricultural management. The universality of these plant hormone systems facilitates application to a range of crops, from the orphan crop teff to the well-known wheat.

…

Although many species-specific genetic and trait modifications helped to elevate the major crops above others to feed the world, the majority of both major and minor crops share a history of a few common modifications to plant physiology and growth that sparked agricultural revolutions.

…

Two hormonal systems are at the core of the most successful and reoccurring agricultural revolutions: the flower-promoting protein florigen and its antagonist antiflorigen and the growth-stimulating small molecule gibberellin (GA) and its target for degradation, the growth repressor DELLA. The central components of these hormonal systems govern growth among plant organs. Mutations in the founding antiflorigen gene *SELF-PRUNING* in tomato and its homologs in other crops such as soybean and cotton confer precocious termination of shoots, transforming tall, vine-like plants into compact bushes better suited for large-scale mechanical harvesting.

…

Tools for genome editing can now rapidly generate a wide range of novel alleles and associated quantitative variation that can be selected to fit specific genotypic background or environmental needs …. Traits regulating GA and florigen are often shared across plant species, whereas traits such as those that control shattering of seeds and pods are regulated in a species-specific manner. We argue that the core hormone systems, including GA and florigen, offer higher chances than other targets to rapidly generate new beneficial variation to improve old crops and enhance the productivity, adaptation, and adoption of many underutilized crops.

Read full, original article: Revolutions in agriculture chart a course for targeted breeding of old and new crops **(Behind paywall)**