

USU Technology Highlight:

CROP HYBRID FROM APOMICTIC REPRODUCTION

This technology enables crop hybrids to clone themselves through their own seed. It has the potential to disrupt the trillion dollar commercial seed industry by cutting seed production costs by 80% and enabling the production of superior hybrids of important inbred world crops. Hybridity will increase yields of such crops by 15-50%, opening the door to enhanced global food security.

PROBLEM

Since the days of the Egyptian Pharaohs, people have known that inbreeding decreases vitality. However, today's crop breeding practices—including those used to develop hybrids—rely on long-term episodes of repeated inbreeding and single seed descent (which often takes 8-10 years) to achieve crop uniformity. For sexual crops, plant-to-plant uniformity is achieved in no other way. Today, yields are limited to what can be achieved by a single highly inbred genotype for inbred crops or by two (sometimes four) highly inbred genotypes for hybrid crops. Hybridization studies prove that inbred crops yield far below their genetic yield potentials and unfortunately, it currently remains impossible for most crops to produce commercial quantities of hybrid seed

SOLUTION

Through gene expression profiling experiments and pharmacological studies, metabolic and molecular regulators that reactivate sex/asex switching have been identified and procedures have been developed to switch sexually reproducing plants to reproduce asexually and asexually reproducing plants to reproduce sexually (Gao, 2018; patent pending).

The use of this technology has already been proven successful inducing apomeiosis on three sexual plant species through carefully timed pharmacological treatments applied laboriously in laboratory settings. The inventors suspect that the high penetrance needed for commercial seed production (especially when making crops obligately sexual except when induced to be asexual for seed production) would require genetic engineering, as high penetrance may be difficult to achieve with chemical applications. Transformation studies are underway.

BENEFITS

This technology will remove uniformity-by-inbreeding requirements, enabling breeders to achieve full hybrid superiority for major world crops (without inbreeding constraints), and it will allow seed companies to produce commercial quantities of seeds of their new, uniquely superior hybrid creations at a lower cost. Sexual crops could be engineered to reproduce asexually for uniform clonal seed production except when chemically induced to reproduce sexually for genetic recombination and selection purposes. The expected increase in the yields of crops worldwide is great enough to enhance global food security.

APPLICATIONS

This technology can be adapted one crop at a time and is most ideal for use in adapting the major world crops (corn, wheat, rice, cotton, etc.) to achieve crop uniformity and increase yield and vitality. Once fully implemented, this technology has the potential of revolutionizing food, feed, fiber, and timber production globally.

CONTACT

Questions about this technology including licensing availability can be directed to:

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DEVELOPMENT STAGE

TRL 3

PATENT STATUS

Patent Applied For

WEBSITE

rgs.usu.edu/techtransfer/crop-hybrid/

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