Novel Methods and Compositions for Epigenetic Gene Silencing in Plants

Tech ID: 23991 / UC Case 2014-444-0

SUMMARY

Dr. Steve Jacobsen and colleagues in UCLA's Department of Molecular, Cell, and Developmental Biology and the Howard Hughes Medical Institute have developed novel methods and compositions for targeted genetic repression in plants. The technology has broad agricultural applications.

BACKGROUND

Epigenetic control in plants involves various molecular components, including regulators of DNA methylation, histone-modifying enzymes, and other chromatin and chromatin-binding proteins. Interestingly, many plants share such epigenetic control features and the changes mediated by them have been shown to be heritable and stable over generations. Thus, epigenetic control of genes in plants has become an important area of research for commercial food producers, who aim to improve the environmental and economic impact of their crops.

INNOVATION

Dr. Jacobsen's group has engineered a series of proteins that can be expressed as transgenes to selectively target regions of the plant genome for epigenetic silencing. These proteins function by recruiting complexes containing either RNA Polymerase IV or RNA Polymerase V to specific genetic loci, resulting in targeted DNA methylation and gene silencing. Importantly this genetic silencing is maintained in subsequent generations of plant, independent of the presence of the original transgene. This technology exploits the natural mechanisms of gene silencing, originally identified by Jacobsen's group in Arabidopsis thaliana, and which is conserved in many commercially relevant plant species. This technology provides a robust and versatile platform for controlling plant phenotypes without the need for direct genetic engineering of the plant genome, exogenous agents, chemicals, or selective breeding.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,351,867	07/16/2019	2014-444

RELATED MATERIALS

- SRA- and SET-domain-containing proteins link RNA polymerase V occupancy to DNA methylation. Nature (2014).
- Polymerase IV occupancy at RNA-directed DNA methylation sites requires SHH1. Nature (2013).

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Methods For Weed Control And Hybrid Seed Production

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INVENTORS

- Jacobsen, Steven E.

OTHER INFORMATION

KEYWORDS

plants, genetic repression, epigenetics, crop science, DNA methylation

CATEGORIZED AS

- **Agriculture & Animal Science**
  - Plant Traits
- **Biotechnology**
  - Food
  - Genomics

RELATED CASES

2014-444-0

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