Next Generation Mutagenesis

A multigenerational design technique efficiently stacks genetic mutations, drastically reducing the time and cost required for developing new traits in breeding material and generating a vast, reusable library of sequenced mutant seeds.

Among the most effective ways to assign functions to genes is the identification of genetic variants in a gene that perturb organism phenotype. Such genetic variants can be of natural origin or generated deliberately by mutagenesis. The utility, cost effectiveness, and use of induced mutants depends on the mutation density of the treated product. This can be affected by the reagent used and by the procedure used to produce the mutants. Various reagents exist to intentionally induce mutations in plants; alkylating agents, such as ethyl methanesulfonate (EMS), are the most frequently used. Unfortunately, many mutagenesis methods, pollen mutagenesis of maize in particular, are highly inefficient due to a relatively low number of transmitted mutations. Due to low mutation numbers, many promising uses of mutagenesis are not cost effective, and thus, not highly used. Therefore, there is an unmet need for a cost-effective method for generating mutant alleles with high frequency.

Researchers at Purdue University have developed a technique for stacking mutations to increase the mutation density per individual. This increases the efficiency of generating independent mutant alleles, thus opening up multiple applications that were impossible until now. The novel process utilizes a multigenerational design to maximize independent changes in the genome and allows screening of subtle differences in mutant phenotypes. This maximizes the frequency of polymorphisms of interest for enhancing elite breeding material. Desired traits can be mapped within an inbred line, and the variation responsible can be cloned. By increasing the number of mutations per plant, the researchers have decreased the number of plants needed and time required to perform testing. This is especially advantageous in controlled environment screens or with non-model species, which can be quite expensive per plant. This method generates a vast library of immortalized mutant seed and data, which can be reutilized for multiple independent purposes and benefits, rather than being inhibited, by scale.

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Advantages:

-Increases efficiency and mutation density per plant

-Facilitates generation of independent mutant alleles

-Allows for the screening of subtle differences and mutations

-Builds a vast library of genetic, sequenced traits

Potential Applications:

-Genetic alterations

-Mutagenesis

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Intellectual Property:

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