ESA Patentverwertungsagentur Sachsen-Anhalt GmbH

Technology Offer

New approach for the generation of haploid plants

Abstract

The efficiency of plant breeding is crucial for the implementation of new traits. One goal is to generate new varieties faster. The invention provides a new method based on KLN2 for the generation of double haploid plants.

Background

Agriculture has to provide a sustainable basis for the nutrition of people addressing the needs of a growing population and taking into account that the usable land is limited and production will have to expand to regions with adverse conditions. Plant breeding has become faster over the years but is still a time and labor-consuming process. The goal is to accelerate plant breeding and to incorporate the knowledge of desirable traits in a short time.

Problem to be solved

The generation of double haploid plants is a major tool in modern plant breeding.

Methods applied so far are:

a) chromosome elimination after wide crossing. This method depends on suitable crossability and can only be applied to a subset of genotypes.
b) anther and microspore culture. Limitations of this method are tissue culture ability of the species of interest. The application is rather laborious and expensive.

Alternatively an approach based on CENH3 is being developed. It has also a number of limitations: cenh3 null mutants are viable only in heterozygous state and for the crop species with two isoforms of CENH3 (e.g. barley) a generation of double mutants is required. Since an altered CENH3 variant has to be transformed additionally it is a GMO approach.

The invention provides a new approach for the generation of haploid plants, which is based on KLN2. The KLN2 protein possesses conserved a centromere targeting motive CENPC-k and is involved in the regulation of centromeric localization of CENH3. The approach exploits a knl2 mutant. Female knl2 mutants can be crossed with wild type males, which results in the formation of haploid seeds. This has been shown for *Arabidopsis thaliana*.

A technology of the

IPK GATERSLEBEN

Technology / Field of Application

- Agriculture
- Breeding

Market / Business

- Agribusiness
- Plant breeder

State of development

Test stage

Patent Status

Application pending

Reference No.: *- ESA-IPK027 -*

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Advantages over the state of the art

This approach has many advantages over existing technologies because:

- it can be applied to a broad number of phenotypes
- it is less laborious and expensive
- plant species with only one isoform exist - therefore only a single mutant has to be generated
- the generation of a viable homozygous mutant is possible
- the knl2 mutant can be crossed directly with the wild type – therefore
- the final product and the inducer line are non-GMO.
- haploid inducer lines can be generated by directed mutagenesis of the CENPC-k motive or selected from existing TILLING populations.

Possibilities for Cooperation

The ESA PVA seeks on behalf of the Leibniz Institute of Plant Genetics and Crop Plant Research licensees especially in Germany and Europe. The scientific guidance for an industrial partner can be ensured in suitable manner.

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