

Genetic Consequence of Polyploidy in Plant Breeding

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Abstract

the genetic consequences of polyploidization in plants. This study aims to provide a comprehensive overview of the genetic changes associated with polyploid formation, focusing on the mechanisms of genome rearrangements, chromosomal rearrangements, and gene expression changes. The results show that polyploidization can lead to significant changes in genome organization, including the formation of new genes, changes in gene expression patterns, and alterations in chromosomal structures. These changes can have both positive and negative effects on plant performance, such as increased yield, improved stress tolerance, and enhanced nutritional value. The study also highlights the importance of understanding the genetic basis of polyploid formation for developing new crop varieties with desired traits.

Classification of polyploids

Polyploids are plants with more than two sets of chromosomes. They can be classified into three main categories based on their origin:

Euploidy

Euploid polyploids are formed by the natural or induced doubling of the chromosome number in a single species. This results in a whole倍體 (whole set) of chromosomes. Examples include hexaploid wheat (6x), octoploid rye (8x), and tetraploid potato (4x).

Aneuploidy

Aneuploid polyploids are formed by the addition or subtraction of one or more pairs of chromosomes from a euploid genome. This results in an extra or missing chromosome. Examples include triploid banana (3x), pentaploid sugarcane (5x), and hexaploid bread wheat (6x).

Autopolyploids are formed by the self-fertilization of a single species, leading to the doubling of its own chromosomes. This results in a whole倍體 (whole set) of chromosomes. Examples include hexaploid wheat (6x) and octoploid rye (8x).

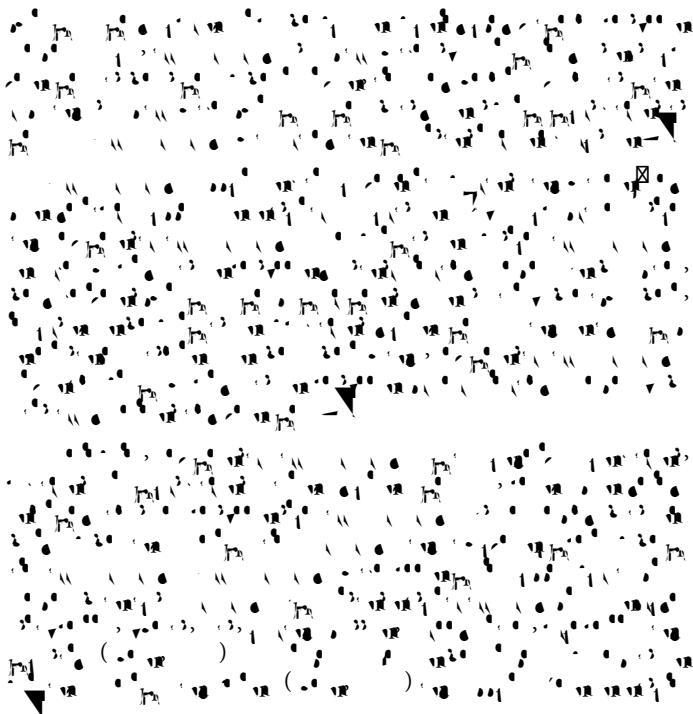
Autopolyploidy

Allopolyploids are formed by the hybridization between different species followed by self-fertilization. This results in a whole倍體 (whole set) of chromosomes from both parents. Examples include hexaploid bread wheat (6x) and octoploid rye (8x).

Allopolyploids

Table 1: List of major crop and their ploidy.

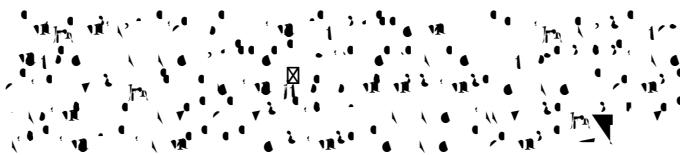
Common Name	Ploidy	Name	Propagation
Teff	2n=14	GermEE	Öö]] [ä
Sorghum	2n=18	GermEE	Öö]] [ä
Wheat	2n=42	Hexapod	Out Crossing
Rice	2n=24	GermGI	Öö]] [ä
Potatoes	2n=48	Tetraploid	Outcrossing, Vegetative
Soybean	2n=40	GermI	Öö]] [ä
Barley	2n=18	GermFI	Öö]] [ä
Tomato	2n=18	GermGI	Öö]] [ä
Banana	2n=3x	HemHH	Vegetative
Watermelon	2n=24	GermGG	Öö]] [ä
Sugarcane	2n=80	Octoploid	Outcrossing, Vegetative
Sugar Beet	2n=18	GermFI	Öö]] [ä
Cassava	2n=36	GermH	Outcrossing, Vegetative



Common applications of polyploidy in plant breeding

Mutation breeding:





the first time, the results of the study were presented at the 1996 meeting of the International Society for Traumatic Stress Studies. The results of the study were presented at the 1997 meeting of the American Psychological Association.

Conclusion

- mimic a mosaic trophectoderm biopsy. *J Clin Pathol* 64: 101–105. doi: 10.1136/jclinpath-2020-210300
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