## Fri, 29 November, 16:30-

**Graduate School of Bioagricultural Sciences**
**Lecture room 2［農学部第２講義室］**

GTR Nagoya University

# The Quest for Clonal Seeds

## Towards Engineering Apomixis in Maize


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Apomixis refers to the asexual reproduction through seed, which generates plants that are genetically identical to the mother plant. The engineering of apomixis has tremendous agricultural potential to maintain complex genotypes, e.g. those of $F_1$ hybrids. Gametophytic apomixis deviates from sexual development in three major steps: (1) meiosis is circumvented or aborted (apomeiosis), (2) embryogenesis initiates without fertilization (parthenogenesis); and (3) developmental adaptations enable the formation of functional endosperm. The aim of our research is to identify mutations that mimic the major components of apomixis in order to combine them to engineer apomixis in crops. In a genetic screen in maize, we identified the *non-reduction in female4* (*nrf4*) mutant displaying apomeiosis. Homozygous *nrf4* plants produce up to 95% unreduced embryo sacs. Using sequencing-based transposon display the *Nrf4* gene was cloned and found to be a grass-specific pioneer protein. Using SNP arrays to study the effect of the *nrf4* mutation on meiosis showed it to be comples, leading to both first and second division restitution. Nonetheless, depending on the genetic background of the mother plant, up to 30% of the unreduced female gametes were diploid and derived from a mitotic division, leaving the maternal chromosome complement unrecombined. Using *nrf4* in combination with a tetraploid 'haploid inducer" line, we could recover up to 15% clonal progeny. To our knowledge this is first proof that production of clonal individuals through seed is possible in maize.

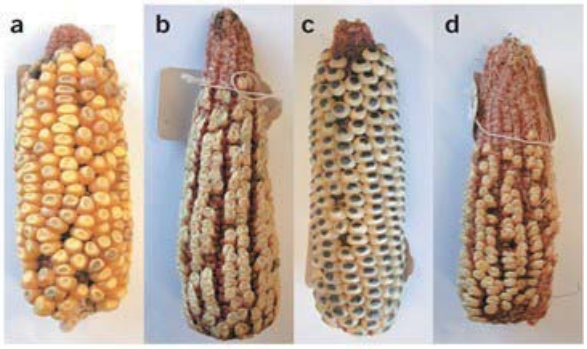


**Figure 2** Seed abortion as a result of interploidy crosses.

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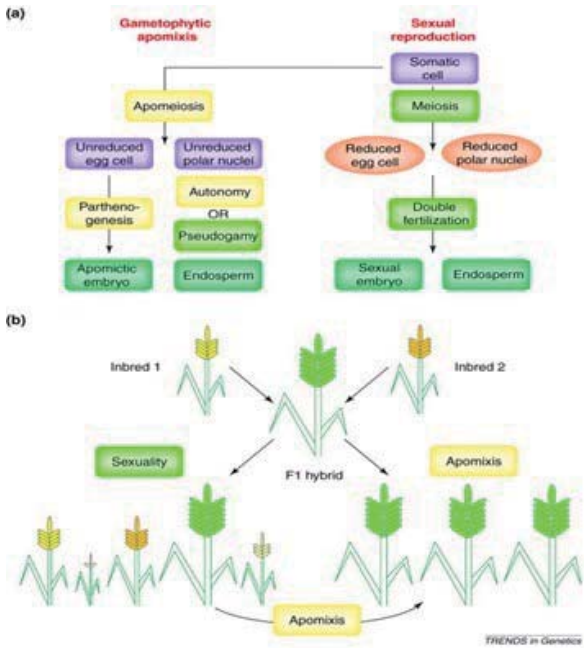


Trends in Genetics 2001


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