

研究论文

# 高粱A<sub>2</sub>型细胞质雄性不育系小孢子发生的细胞学观察和减数分裂染色体行为分析

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收稿日期 2005-9-1 修回日期 网络版发布日期 2006-7-14 接受日期 2006-1-16

**摘要** 高粱A<sub>2</sub>型细胞质雄性不育性(CMS)的细胞质来源于IS12662C, A<sub>2</sub>细胞质杂交种目前已用于生产。本文以A<sub>2</sub>/B<sub>2</sub>V<sub>4</sub>为材料, 对A<sub>2</sub> CMS小孢子败育过程作了细胞学观察, 并对小孢子败育过程中减数分裂的染色体行为作了分析。研究发现, 在A<sub>2</sub>雄性不育系A<sub>2</sub>V<sub>4</sub>的花药发育过程中, 绒毡层细胞不形成或提前解体; 绒毡层细胞畸形化; 绒毡层细胞虽发育正常, 但小孢子母细胞减数分裂行为异常; 这些都导致小孢子退化。A<sub>2</sub>细胞质雄性不育花粉母细胞减数分裂行为从后期 I 开始出现异常, 同源或姊妹染色体向两极分离时滞后或不分裂; 染色体多倍化; 一个细胞内出现多核和多核仁现象, 最终导致小孢子败育。

**关键词** 高粱 [A<sub>2</sub>细胞质雄性不育](#) [绒毡层](#) [减数分裂](#)

分类号 [S514](#)

## Cytological Observation of Microsporogenesis and Its Chromosomal Behavior in Meiosis of A<sub>2</sub> Cytoplasmic-male Sterile Line in Sorghum

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**Abstract** The study of sorghum (*Sorghum bicolor* L. Moench) A<sub>2</sub> cytoplasm male sterility is significant for utilizing sorghum heterosis and preventing potential disasters caused by employing sole cytoplasm source. The cytoplasm of sorghum A<sub>2</sub> cytoplasm-male sterility (CMS) came from IS12662C, and the hybrids with A<sub>2</sub> cytoplasm have been released for commercial use. Study on meiosis is very useful for understanding CMS male sterility and improving male sterile lines. In this study, A<sub>2</sub>/B<sub>2</sub>V<sub>4</sub> were used to study the processes of microspore abortion during anther development and investigate the chromosomal behaviors of meiosis in A<sub>2</sub> CMS by cytological observation. For observing anther development, sorghum florets at various development stages were taken, fixed in FAA and observed with an Olympus microscope after staining, paraffin-embedded and sliding. For observing chromosome behavior in PMC, florets were taken, fixed with Carnoy's fixation, squashed on a slide and observed with an Olympus microscope. Many abnormal phenomena were observed during A<sub>2</sub> CMS anther development which were as follows: (1) no tapetal cells were formed or tapetum collapsed at very early stage during the microsporogenesis, and tapetal cells deformed; (2) although tapetal cells developed normally, meiotic behavior of chromosomes in pollen mother cells (PMC) were abnormal, leading to the degeneration of microspores; (3) the abnormal chromosomal behavior occurred in PMC meiosis of A<sub>2</sub> CMS started from anaphase I; (4) homologous chromosome movement to opposite poles at metaphase I was delayed or sister chromatids did not divide at metaphase II; (5) chromosomes multiploidized, and several nuclei or nucleoli were found in one cell. The abortion of tapetal cells was not the only reason but for the failure of microspore, but all of above abnormalities lead to the failure of normal microspore development.

**Key words** [Sorghum](#) [A<sub>2</sub> Cytoplasmic-male sterility](#) [Tapetum](#) [Meiosis](#)

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