

研究论文

小麦雄性不育系和保持系花药ATP酶细胞色素氧化酶细胞化学定位

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收稿日期 1999-6-23 修回日期 2000-6-3 网络版发布日期 接受日期

摘要 本文运用电子显微镜细胞化学标记技术,对K型雄性不育系和其保持系小麦花药各个组织中的细胞色素氧化酶和ATP酶活性进行了定位,相对定量研究。结果表明,药壁四层组织和药隔细胞中两种酶的活性分布在花粉粒败育前,不育系与其保持系之间几乎没有差别,均在细胞核、核仁、质膜与胞间连丝中有ATP酶的活性,线粒体内嵴上有细胞色素氧化酶活性分布,但药隔细胞中这两种酶的活性都较药壁细胞中的强。单核花粉粒时期,保持系和不育系花粉粒的细胞核和核仁中都有ATP酶的活性,而线粒体的内嵴上没有细胞色素氧化酶的活性分布。进入二核期,保持系和不育系花粉粒质膜上,线粒体的内嵴上分别出现ATP酶和细胞色素氧化酶的活性。但随着花粉粒的发育,内壁的形成,保持系花粉粒中两种酶的活性逐渐增强,以至花粉成熟前夕,内壁和微通道中具显著的ATP酶活性,花粉粒内充满丰富的内嵴,内嵴具显著细胞色素氧化酶活性的线粒体;而不育系花药,随着花粉的发育,花粉粒质膜上的ATP酶活性增加不明显,且内壁发育异常,在内壁中几乎没有ATP酶活性出现。同时,线粒体内嵴的细胞色素氧化酶增加到一定程度后,酶的活性开始降低以至最后消失。据此分析认为,花药药壁,药隔细胞中两种酶的活性变化与花粉的败育没有直接的联系,而花粉粒细胞内两种酶的变化与花粉的败育密切相关。

关键词 [ATP酶](#) [细胞色素氧化酶](#) [雄性不育](#) [超微细胞化学定位](#)

分类号 [S511](#)

Ultracytochemical Localization of ATPase and Cytochrome Oxidase in the Anther from K-77(2) A and 77(2)B

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Abstract Ultracytochemical localization of cytochrome oxidase and ATPase in anther from cytoplasm male sterile [K-77(2)A] and its maintainer [77(2)B] was studied with electron microscopic cytochemical technique. The results indicated that the activity distribution of ATPase and cytochrome oxidase in epidermis, endotheium, middle-layer, tapetum and vascular cells from K-77(2)A was similar to that from 77(2)B, and in both cases the reaction product was mainly distributed on nucleus, nucleolus, plasma membranes and plasmodesmata, and the two enzymes' activity in the vascular cells was stronger than in other cells. During uninucleate pollen stage, the activity of ATPase was observed in nucleus and nucleolus, but the activity of cytochrome oxidase was not observed in mitochondria from both K-77(2)A and 77(2)B. At early binucleate stage, plasma membranes and mitochondria in pollens of K-77(2)A and 77(2)B showed weak activity of ATPase and cytochrome oxidase. In the course of pollen growth and its intine formation, two enzymes' activity in the pollens from 77(2)B increased gradually. When the intine had been formed, it revealed remarkable ATPase activity, and the pollens were full of mitochondria with developed cristae where cytochrome oxidase activity was observed. ATPase activity on plasma membranes of the pollen from K-77(2)A increased slightly, and the intine development was abnormal and there was weak ATPase activity in the intine. It was found that there is no direct correlation between pollen abortion and the two enzymes' activity in the epidermis, endotheium, middle-layer, tapetum and vascular cells, but that there is close correlation between the two enzymes' activity in the pollen and pollen abortion.

Key words [ATPase](#) [Cytochrome oxidase](#) [Cytoplasmic male sterile](#) [Ultracytochemical localization](#)

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