

研究论文

## CaM和TFP对水稻早期胚胎离体发育的影响

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**摘要** 研究了不同浓度的外源钙调素(calmodulin, CaM)和钙调素拮抗剂TFP(trifluoperazine)对水稻授粉后3~5 d胚胎离体发育的影响。结果表明:(1) CaM对水稻3~5 d胚胎离体发育的调控具有时间和浓度效应。较高浓度的CaM(10-6~10-5 mol/L)对不同时期的水稻胚胎发育均具一定抑制作用, CaM浓度越大, 抑制作用越强; 培养基中外加10-7 mol/L CaM时, 不同时期的水稻胚胎均表现出最佳的生长速度和最高的正常胚胎诱导频率; 在相同的CaM条件下, 胚龄越大, 胚胎离体生长越快, 正常胚胎诱导频率及总诱导频率越高。(2) 较高浓度的TFP抑制水稻3~5 d胚胎的离体生长和发育, 其作用亦有时间和浓度的效应, 胚胎越小, 抑制作用越强; TFP浓度增加, 抑制作用增强, 不同发育时期的胚胎生长速度及正常胚胎诱导频率、总诱导频率均逐渐下降。

**关键词** [水稻](#) [CaM](#) [TFP](#) [胚胎](#) [离体发育](#)

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## Effects of Exogenous CaM and TFP on Development of Rice(*Oryza sativa* L.) Early Embryos in vitro

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**Abstract** Calmodulin (CaM), as the most important Ca<sup>2+</sup> sensor, controls diverse cellular and physiological processes in higher plant. Many studies suggest that CaM plays vital roles during plant sexual reproductive process. The effects of CaM on development of early embryos in vitro are poorly understood despite those effects of CaM on zygotic embryo development reported from some researches. In this study the line of indica rice Xiaogan-01 was used to investigate the effects of CaM and trifluoperazine (TFP) on development of rice early embryos of 3–5 DAP (days after pollination) in vitro by adding 10-8, 10-7, 10-6 or 10-5 mol/L exogenous CaM to medium, and 10-7, 10-6, 10-5 or 10-4 mol/L TFP to the medium with 10-7 mol/L CaM. CaM and TFP were found to exert different effects on the development of 3 to 5-day-old embryos in rice. The influence of CaM on the development of 3 to 5-day-old embryos in vitro was related to the concentration of CaM and the age of embryos. With the high concentration of CaM (10-6–10-5 mol/L), the growth and the development of 3 to 5-day-old embryos were inhibited in a certain degree, the higher the concentration of CaM used, the more evident the inhibition was (Fig.1). With 10-7 mol/L CaM, all embryos grew rapidly and the highest frequency of normal embryogenesis was reached. At the same concentration of CaM, the older the embryos were, the more quickly they grew and the higher their frequency in normal embryogenesis and in total induction (Table 1). The development of 3 to 5-day-old embryos in vitro was inhibited by TFP which was related to the concentration of TFP and the age of embryos. The younger the embryos were, the more obvious the inhibition appeared (Fig.2). The growth speed of all embryos in vitro, the frequency of normal embryogenesis and the total induction frequency were decreased with increasing TFP concentration (Table.2). The results indicate that CaM and TFP have very important and complex effects on the development of rice early embryos in vitro.

**Key words** [Oryza sativa L.](#) [CaM](#) [TFP](#) [Embryo in vitro](#) [Development](#)

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