

研究论文

Ca²⁺/CaM对玉米干旱信息传递的介导作用研究

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摘要 以钙离子(Ca²⁺)螯合剂EGTA、钙通道阻断剂异博啉(Vp)和CaM拮抗剂(TFP)处理玉米幼苗, 对干旱胁迫下根、茎、叶及其木质部汁液ABA含量和pH变化及气孔导度、蒸腾速率进行了测定。结果表明, 2 mmol/L EGTA和100 μmol/L Vp分别处理至植株出现萎蔫, 均使玉米根、茎和叶的ABA总量降低, 但木质部ABA含量增加、pH升高, 同时, 气孔导度和蒸腾速率降低; 80 μmol/L TFP处理至出现干旱胁迫时, 使根、茎、叶及其木质部汁液ABA含量和pH值升高, 气孔导度和蒸腾速率随之降低。初步说明Ca²⁺参与了水分胁迫下玉米幼苗ABA的信息转导过程, 而CaM没有介导。

关键词 [干旱胁迫](#) [玉米](#) [Ca²⁺/CaM](#) [ABA](#) [pH](#)

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Function of Ca²⁺/CaM on Transduction of Stress Signal

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Abstract Most studies on the role of ABA in the stomatal response of the whole plant to drought rely on a good estimate of ABA concentration in xylem sap. In this report, the roles of the second signal system Ca²⁺/CaM on the process of ABA synthesis and its signal transduction were investigated. Various volumes of sap were collected by pressurizing leaves cut from 6-8-leaf-old seedlings. The changes of bulk ABA of root, stem and leaf, xylem sap ABA, xylem sap pH, leaf stomatal conductivity, and transpiration rate were all measured with seedlings treated with the solutions including different concentrations of EGTA, verapamil and trifluoperazine followed by water stress for 24 h. ABA contents were measured with the method of ELISA and the stomatal conductivity and transpiration rate with PP photosynthesis system made in England; at the same time, the pH value was measured with microelectricity trode. The results showed that the total ABA contents in leaves were decreased, but ABA concentration and pH of the xylem sap increased (Fig.1, 2), and the stomatal conductivity and transpiration rate decreased when the maize seedlings were treated with 2 mmol/L EGTA solution followed by drought stress (Fig.3). The effects of 100 μmol/L verapamil solution on maize seedlings were similar to that of EGTA solution (Fig.4-6). When the maize seedlings were treated with 80 μmol/L TFP solution followed by drought stress, ABA contents in roots, pH of xylem sap in both leaves and roots and ABA concentration of xylem sap in leaves were all increased (Fig.7, 8), and the stomatal conductivity and transpiration rate decreased (Fig.9). Those results indicated that Ca²⁺ might participate in ABA accumulation induced by water stress, but CaM might not, the reason of it is also discussed.

Key words [Water stress](#) [Maize](#) [Ca²⁺/CaM](#) [ABA](#) [pH](#)

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