地表球囊霉诱发番茄抗早疫病的机理

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Mechanism of tomato plants enhanced disease resistance against early blight primed by arbuscular mycorrhizal fungus *Glomus versiforme*.

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摘要 丛枝菌根可以改善植物营养状况,提高宿主植物的抗病性.本文研究了番茄幼苗预先接种丛枝菌根真菌(AMF)地表球囊霉后对番茄植株保护酶活性和防御反应基因表达,以及对番茄早疫病抗性的影响.结果表明：被AMF侵染的番茄植株在接种早疫病病原菌茄链格孢菌后,其叶片内的超氧化物歧化酶(SOD)和过氧化物酶(POD)活性迅速提高.其中SOD酶活性在接种后18 h达到最高,比只接种地表球囊霉(G)、茄链格孢菌(A)以及未接种AMF和病原菌的对照(CK)分别高28.6%、79.2%和82.8%;POD酶活性在接种后65 h达到最高,分别比G、A处理和CK高762%、18.3%和1710%.经荧光定量PCR检测表明,AMF侵染后的番茄植株再接种病原菌,其叶片中*PR*1(病程相关蛋白基因)、*PR*2(β-1,3-葡聚糖酶基因)和*PR*3(几丁质酶基因)基因的最高转录水平达到CK的9.67、8.54和13.4倍.与CK相比,先接种地表球囊霉再接种茄链格孢菌的番茄植株(GA)的早疫病发病率和病情指数分别降低了36.3%和61.4%.预先接种AMF的番茄植株在遇到病原菌袭击时诱导的防御反应强而迅速,诱发(priming)可能是菌根真菌提高宿主植物抗病性的重要机制.

关键词： 丛枝菌根真菌 番茄 诱发 早疫病 抗病性

Abstract： Arbuscular mycorrhiza (AM) can not only improve host plants nutrient absorption, but also enhance their disease resistance. Taking the tomato (*Lycopersicon esculentum*) seedlings pre-inoculated with arbuscular mycorrhizal fungus (AMF) *Glomus versiforme* as test materials, this paper studied their protective enzyme activities and defense-related genes expression, and their resistance against a fungal pathogen *Alternaria solani* Sorauer which causes early blight. The seedlings pre-inoculated with AMF and later inoculated with *A. solani* showed significantly higher activities of superoxide dismutase (SOD) and peroxidase (POD) in leaves. The leaf SOD activity of the dually inoculated plants reached the maximum 18 h after pathogen inoculation, being 28.6%, 79.2%, and 82.8% higher than that of the plants with *G. versiforme* inoculation alone, pathogen inoculation alone, and non-inoculation, and the leaf POD activity reached the maximum 65 h after pathogen inoculation, being 762%, 18.3%, and 1710% higher, respectively. Real time RT-PCR analysis showed that dual inoculation with *G. versiforme* and *A. solani* strongly induced the expression of three defense-related genes. The transcript levels of pathogen-related protein (*PR*1),basic type β-1,3-glucanase(*PR*-2), and chitinase(*PR*-3) in leaves were 9.67-, 8.54-, and 13.4-fold higher, as compared with the non-inoculation control, respectively. Bioassay showed that the disease incidence and disease index of the seedlings pre-inoculated with *G. versiforme* were reduced by 36.3% and 61.4%, respectively, as compared with the non-mycorrhizal control plants. These findings indicated that mycorrhizal colonization could induce stronger and quicker defense responses of host tomato plants, and priming could be an important mechanism of the enhanced disease resistance of mycorrhizal tomato plants.

Key words： arbuscular mycorrhizal fungus tomato priming early blight disease resistance

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[1] 柏艳芳,郭绍霞,李敏. **入侵植物与丛枝菌根真菌的相互作用**[J]. 应用生态学报, 2011, 22(09): 2457-2463.