The functional analysis of Apple *MdAGR* involved in the regulation of adventitious root formation by affecting protein localization of *MdRR12*

苹果*MdAGR*通过影响*MdRR12*蛋白定位参与不定根发生调控的功能分析

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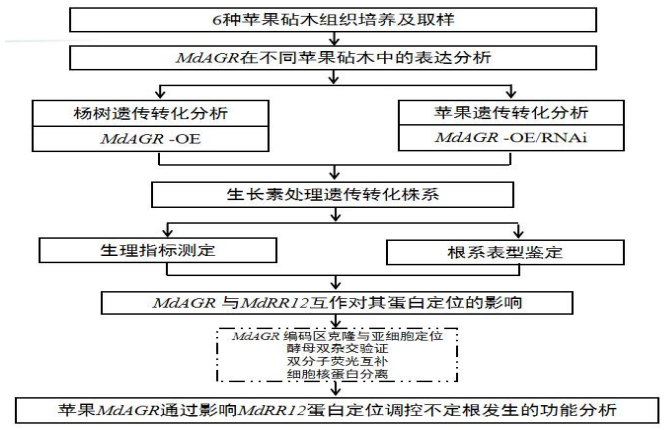
ABSTRACT

In this study, we analyzed the expression patterns of *MdAGR* in apple with different rooting abilities, tissue and the critical period of material adventitious root (AR) development. *MdAGR* gene was cloned using apple rootstock "M9-T337" as template. At present, *MdAGR* overexpressed and silenced transgenic plants of apple are being constructed, which will be treated with auxin and other hormones in the later stage for phenotypic identification, physiological index determination and gene expression level detection, and comprehensive analysis of the function of *MdAGR* in AR development.

INTRODUCTION

Clonal dwarfing rootstock breeding is a unique and urgent problem in the apple industry. At present, apple rootstock is mainly propagated by cutting, layering and tissue culture, and AR generation is the key to the success of asexual breeding. Our research group previously found that the Cytokinin-responsive *MdRR12* can inhibit the occurrence of AR and screened and excavated its interaction gene *MdAGR*. Auxin-responsive *MdAGR* was first discovered to play a role in regulating AR formation.

RESEARCH DESIGN



PERIODIC ACHIEVEMENTS

1. Analysis of *MdAGR* expression patterns

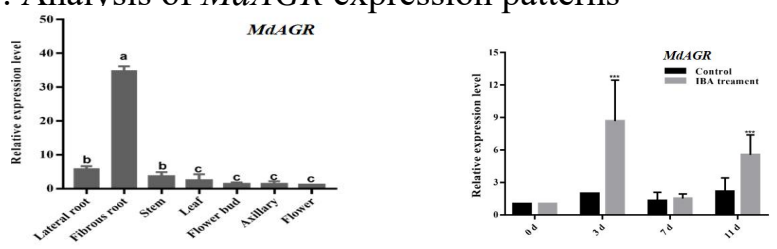


图4.1 *MdAGR* 在侧根、须根、茎、花、腋芽等组织中的表达量　　图4.2 *MdAGR* 在不定根发生过程中的表达量

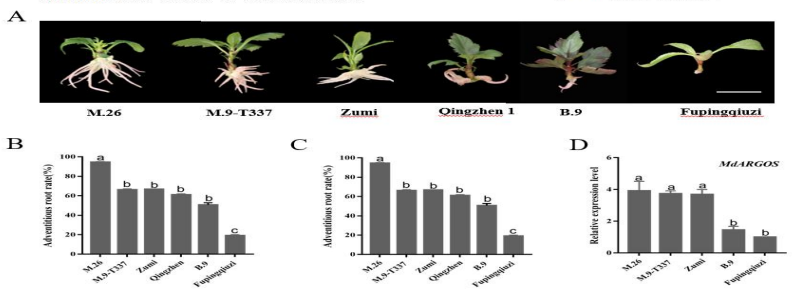


图4.3 *MdAGR* 在不同苹果砧木材料中的表达模式分析

（A）不同苹果砧木材料不定根发生表型；（B）不定根发生率的统计；

（C）生根数目的统计（不定根发生的植株/总植株）；（D）*MdAGR* 在不同砧木材料中的表达量。

2. Functional analysis of *MdAGR* promoting adventitious root occurrence

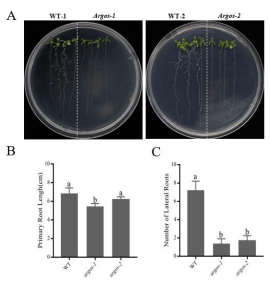


图4.4 *MdAGR* 拟南芥同源突变体的根系表型鉴定

（A）*MdAGR* 拟南芥同源突变体的根系；（B）主根长度；（C）侧根数目。

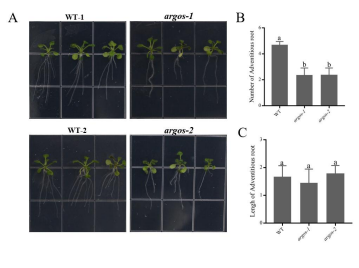


图4.5 *MdAGR* 拟南芥突变体的不定根表型鉴定

（A）*MdAGR* 拟南芥同源突变体的不定根表型；（B）不定根数目；（C）不定根长度。

3.Cloning and subcellular localization of the coding region of *MdAGR*

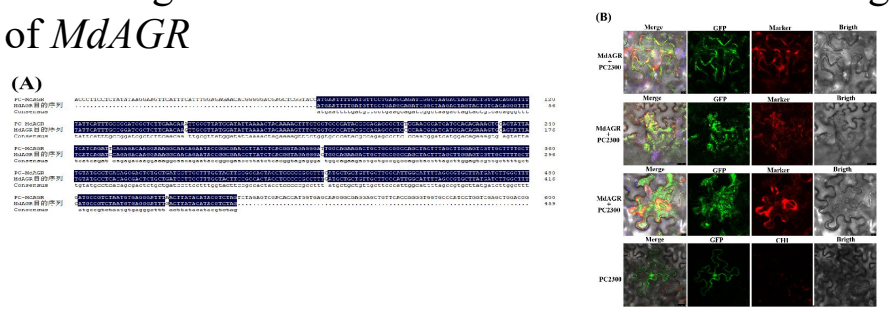


图 4.6 苹果 *MdAGR* 编码区序列比对和亚细胞定位

NEXT PLAN

1.Functional analysis of *MdAGR* regulation of AR formation

MdAGR overexpressed and silenced transgenic plants of apple are being constructed, which will be treated with auxin and other hormones in the later stage for phenotypic identification, physiological index determination and gene expression level detection, and comprehensive analysis of the function of *MdAGR* in AR development

2.The interaction between *MdAGR* and *MdRR12* affects the protein localization of *MdRR12*

we will conduct bimolecular fluorescence complementation (BiFC) experiment to analyze the interaction between *MdAGR* and *MdRR12* and nuclear protein separation experiment to quantify whether *MdRR12* nuclear protein signal is mediated by *MdAGR* protein.

ACKNOWLEDGEMENT

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