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SLARF2A PLAYS A NEGATIVE ROLE IN MEDIATING AXILLARY SHOOT FORMATION

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Abstract: *A detailed expression study revealed that SlARF2a is mainly expressed in leaf nodes and cross-sections of the nodes indicated that SlARF2a expression is restricted to vascular organs. Down-regulation of SlARF2a expression results in an increased frequency of dicotyledons and significantly increased lateral organ development, which is associated with obvious alterations in auxin distribution. Further analysis has revealed that altered auxin transport may occur via altered pin expression.*

Keywords: *SlARF2a; tomato; axillary' shoot formation.*

SlARF2a is expressed in most plant organs, including roots, leaves, flowers and fruit (Fig.l).

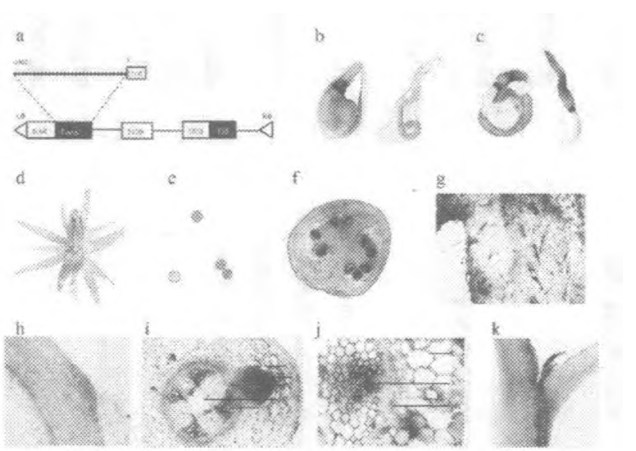
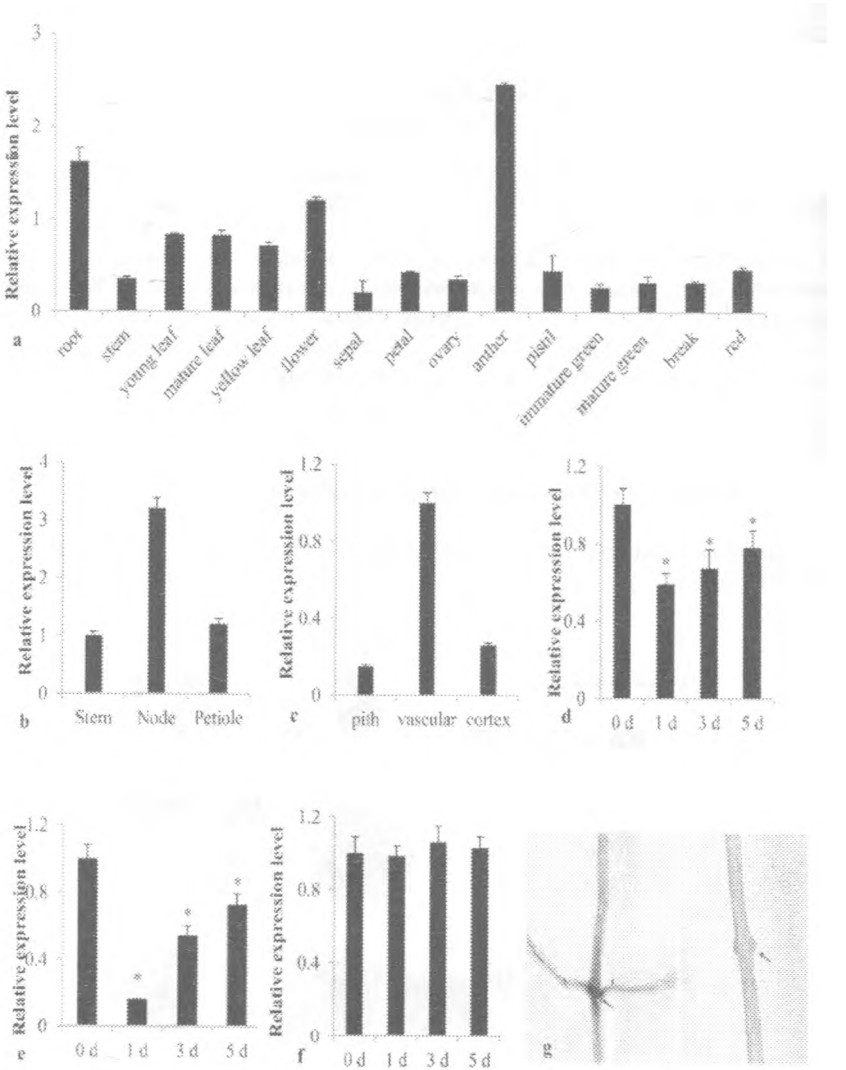


Figure **1 Tissue-specific expression of SlARF2a assessed in transgenic tomatoes expressing a GUS reporter gene driven by the SlARF2a promoter (PSlARF2a::GUS)**

A detailed expression study revealed that SlARF2a is mainly expressed in leaf nodes and cross-sections of the nodes indicated that SlARF2a expression is restricted to vascular organs. Decapitation or the application of 6-benzylaminopurine (BAP)



can initially promote axillary shoots, during which SlARF2a is significantly reduced (Fig-2).

Figure 2 **Analysis of SIARF2a expression patterns during tomato development**

Down-regulation of SlARF2a expression results in an increased frequency of dicotyledons and significantly increased lateral organ development (Fig.3, Table.1). Stem anatomy studies have revealed significantly altered cambia and phloem in tomato plants expressing down-regulated levels of ARF2a, which is associated with obvious alterations in auxin distribution. Further analysis has revealed that altered auxin transport may occur via altered pin expression (Fig.4, Fig.5).

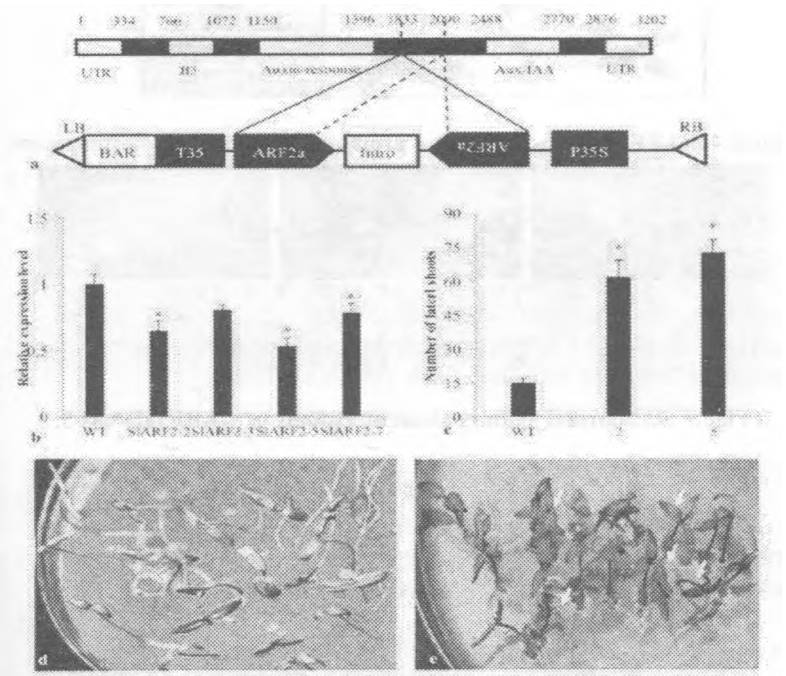


Figure 3 **Down-regulation of SlARF2a alters cotyledon and axillary shoot development**

Table

Polycotyledon phenotype of ARF2aRNAi

	Polycotyledon frequency	Abnormal dicotyledon frequency
WT	$2 \pm 1\%^{a}$	$1 \pm \%^{a}$
RNAi-SlARF2a-2	$25 \pm 5\%^{b}$	$15 \pm 4\%^{b}$
RNAi-SlARF2a-5	$28 \pm 6\%^{b}$	$17 \pm 4\%^{b}$

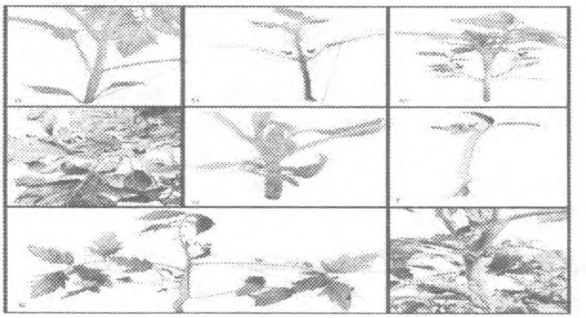


Figure 4 **SlARF2a down- regulation promotes axillary shoot development**

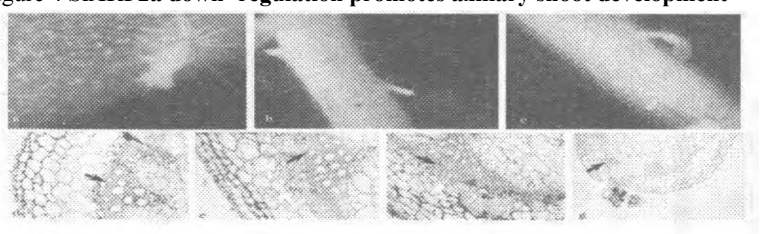


Figure 5 **Abnormal axillary shoot meristems in SlARF2aRN Ai-5.**

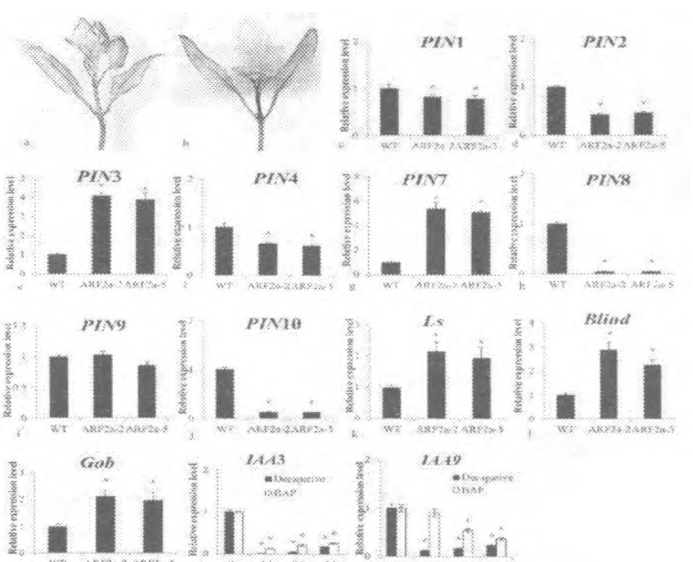


Figure 6 **The distribution of auxin and the expression of pin, blind, gob and** Is **are altered in SlARF2aRNAi seedlings.**

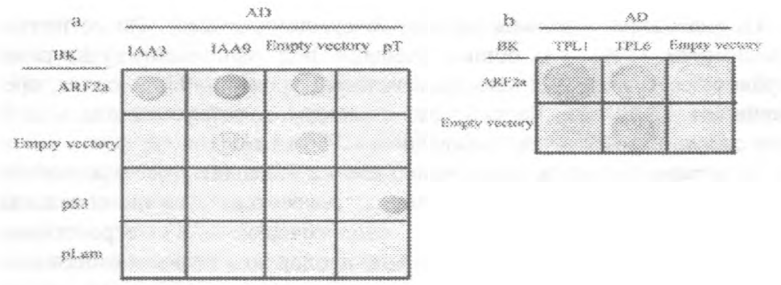


Figure 7 **Yeast two-hybrid interactions between ARF2a**

To identify the interactions of AUX/IAA and TPL with ARF2a, four axillary' shoot development repressors that are down-regulated during axillary shoot development, IAA3, IAA9, S1TPL1 and S1TPL6, were tested for their direct interactions with ARF2a (Fig.7, Fig.8). Although none of these repressors are directly involved in ARF2a activity,similar expression patterns of IAA3, IAA9 and ARF2a implied they might work tightly in axillary shoot formation and other developmental processes.