

Two cassava promoters related to vascular expression and storage root formation



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Introduction:

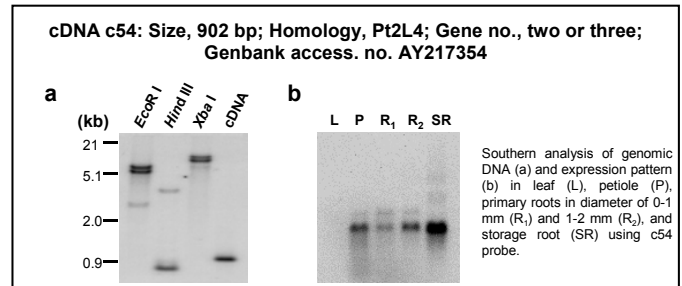
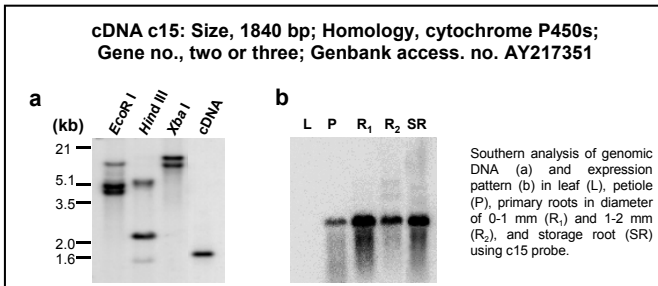
Cassava storage roots develop from primary roots by a peculiar secondary growth and accumulate starch up to 85% of their dry weight. To improve cassava root traits via genetic engineering, the availability of tissue specific promoters is a prerequisite. Here we describe the isolation of two root specific genes, *c15* and *c54*, and their corresponding promoter regions, both of which are related to vascular expression and storage root formation.



Results:

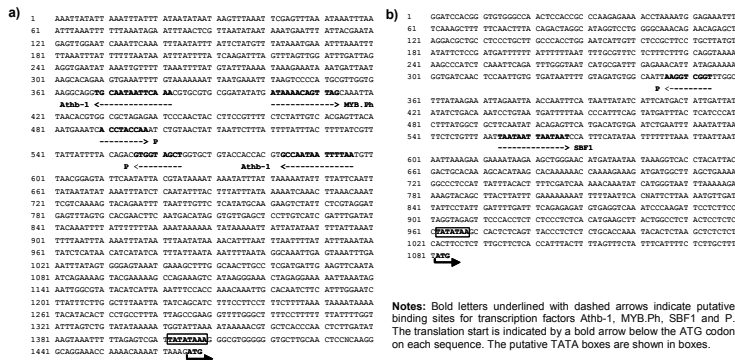
1. Identification and expression analysis of *c15* and *c54*

Two cDNAs, *c15* and *c54*, were identified and purified from a cassava storage root cDNA library in differential screening by hybridising to radioactively labelled storage root mRNA and leaf mRNA.

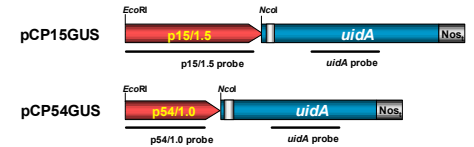


2. Cloning of the *c15* and *c54* promoters and stable plant transformation

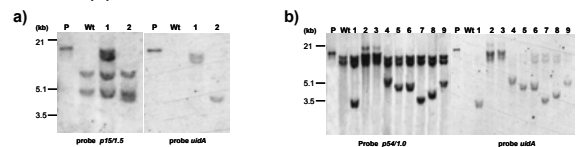
Sequences of promoters *p15/1.5* (a, AY217352) and *p54/1.0* (b, AY217353)



Expressing vectors:



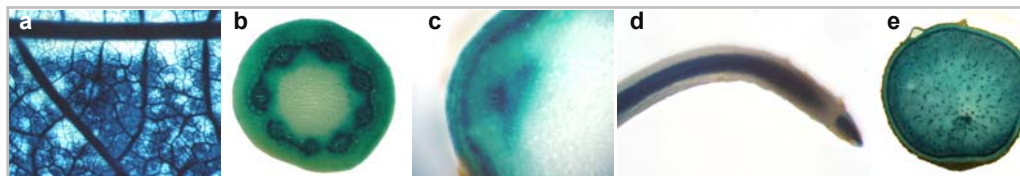
Southern analysis of transgenic cassava containing *p15/1.5::uidA* (a) and *p54/1.0::uidA* (b)



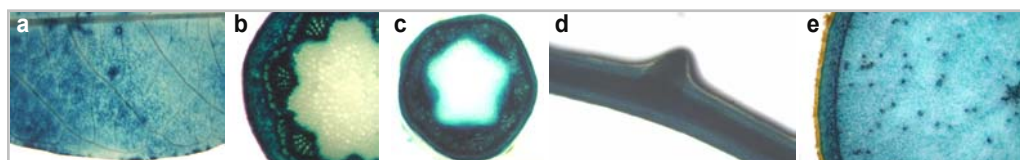
Notes: Total genomic DNA was digested with *EcoRI*. P, plasmid pCP15GUS in (a) and pCP54GUS in (b); Wt, wildtype control; Symbols 1 and 2 of (B) and 1 to 9 of (C) represent different transgenic cassava lines.

3. GUS expression driven by promoter *p15/1.5* and *p54/1.0*

p15/1.5::uidA in cassava

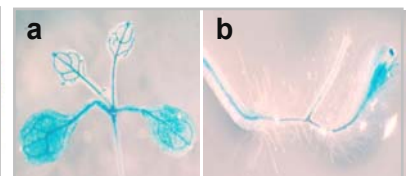


p54/1.0::uidA in cassava

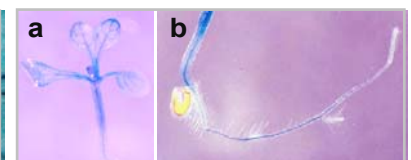


Notes: a, leaf; b, Petiole; c, stem; d, primary root; e, storage root.

p15/1.5::uidA in Arabidopsis



p54/1.0::uidA in Arabidopsis



Notes: a, shoot; b, stem and root.

Conclusion:

Our results demonstrate that the two promoters are related to vascular expression and secondary growth of storage roots in cassava. The results presented here on histochemical localisation of GUS activity in mature cassava organs suggest that these two promoters are valuable candidates for targeted gene expression for genetic improvement of cassava, such as delayed post-harvest physiological deterioration and nutritional improvement of cassava storage roots.