Extension of cassava leaf life by autoregulatory inhibition of senescence

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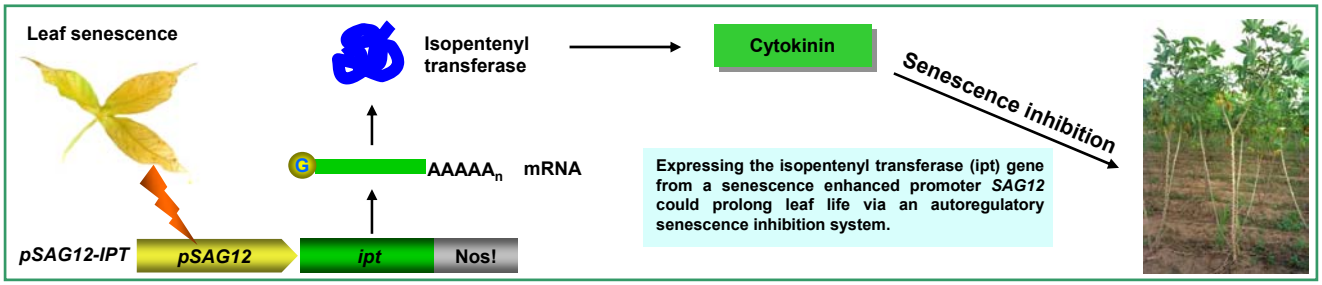
Introduction

Cassava leaves contain high quality protein up to ten times the amount of protein in the storage roots and provide a reliable low cost source of vitamins, minerals and protein. However, the leaf life of cassava is short. Prolonging the life of leaves could improve the root yield and quality as well as permit more frequent foliage harvesting.

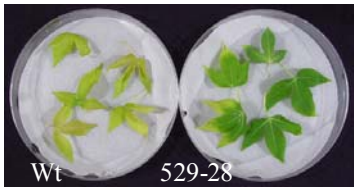
Strategy: Cytokinin-mediated control of leaf senescence



Assessment of *pSAG12-IPT* transgenic plant lines

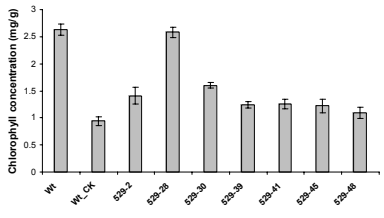
1. Delayed leaf senescence and chlorophyll degradation

a.



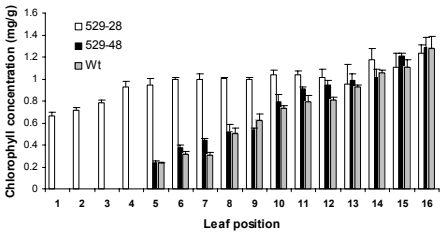
Detached leaves from *in vitro* plants on wet filter paper after 2 weeks in the dark.

b.



Chlorophyll content of detached leaves from *in vitro* plants after senescence treatment.

c.



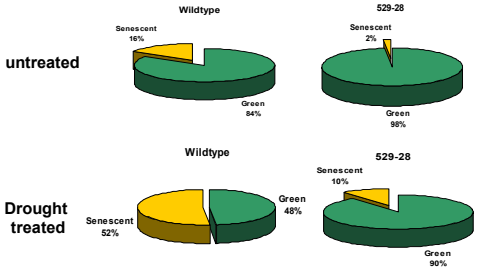
Chlorophyll content of detached leaves from greenhouse-grown plants after senescence treatment.

2. Tolerance to drought stress

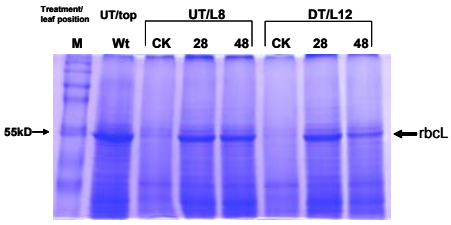
a. Less senescent leaves

After one-month drought treatment

b. More green leaves



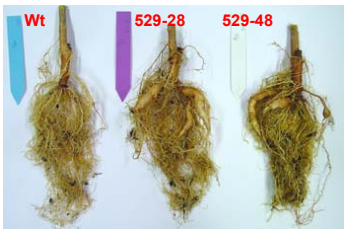
c. Inhibition of protein degradation



Note: UT, untreated; DT, drought treated.

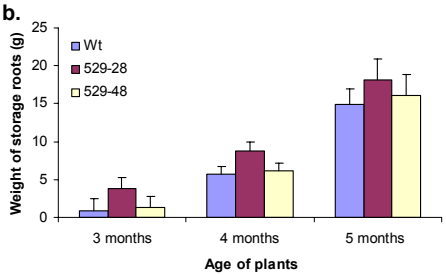
3. Early bulking

a.



3 month old plants

b.



Conclusion and perspectives

Transgenic cassava plants that express a cytokinin biosynthesis gene *ipt* from a senescence enhanced promoter (*SAG12*) showed an extended leaf life. All aspects of senescence are delayed in the leaves of these transgenic plants, including chlorophyll degradation, protein degradation and Rubisco reduction. The transgenic plants were shown to be more tolerant to drought stress than wildtype and to have an early bulking.

Evaluation of the yield of leaf and storage root will be carried out under greenhouse conditions. The "stay-green" cassava provides a new germplasm for subsistence farmers to allow frequent leaf harvesting with improved root production.

Acknowledgements:

We thank Dr. Richard M. Amasino for kindly providing *pSG529* vector. The research was funded by the Swiss Center for International Agriculture (ZIL), Zürich.