Chestnut and poplar RAV genes in tree seasonal dormancy

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Plants from temperate regions adapt to changing environmental conditions along the year. Trees have evolved mechanisms that allow them to monitor and anticipate the seasons, and cycle between growth and winter dormancy states. Dormancy is initiated by shortening of photoperiod, and afterwards, as a result of a drop in temperature, trees reach a state of endodormancy, the inability of resume growth in response to inductive conditions. Chilling requirement needs to be fulfilled in order to release from endodormancy and gain the ability to resume growth in response to good conditions.

The signalling networks that regulate dormancy in perennials are poorly understood. We had previously shown that *CsRAV1,* a chestnut homolog of Arabidopsis *TEM1* and *TEM2,* induced sylleptic branching in poplar [1]. In this work we characterize the role of chestnut and poplar *RAV* genes in dormancy.

The expression profile of *CsRAV1*, *PtaRAV1* and *PtaRAV2* along the year showed that all three genes were induced during winter and maintained high expression levels until early spring. These data suggested that CsRAV1, PatRAV1 and PtaRAV2 were involved in the regulation of winter dormancy in trees. To test this hypothesis we have used over-expressing *CsRAV1*, and knock-down *PtaRAV1* and *PtaRAV2* transgenic poplars. The phenology of the transgenic lines will be discussed.

It has been reported that Arabidopsis TEM1 binds to the FT promoter. An *in silico* screening of TEM1 DNA recognition sites in the promoter region of the *Populus trichocarpa* homologous *FT* genes revealed that the RAV1 motif was not conserved. Moreover, the over-expression of *CsRAV1* in Arabidopsis did not phenocopy the over-expression of *AtTEM1* and *AtTEM2,* suggesting a functional divergence of RAV family members. To gain insight on the molecular function of tree *RAV* genes, we performed a transcriptomic analysis with RNA from the poplar transgenic lines, and protein-binding microarrays to identify the *cis*-acting elements for CsRAV1, PtaRAV1 and PtaRAV2. The identification of the binding elements and their occurrence in the genes differentially expressed will be presented.

In conclusion, our study reveals a possible function of RAV transcriptional regulators in the control of winter dormancy in trees.

References

1- Moreno-Cortes A., *et al.* (2012). *New Phytol*, 194:83-90

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