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MECHANISM REGULATING THE SIZE OF PLANT ORGANS

INZE D.

VIB-UGent Center for Plant Systems Biology (Belgium)
dirk.inze@psb.vib-ugent.be

Plant organ growth is regulated by an exceedingly complex interplay of many genes and their interaction with the ever changing environment. The long-term goal of our research is to obtain a holistic understanding of plant organ growth. Numerous genes of which the modified expression enhances plant organ growth have now been identified, and a detailed study of these genes provided novel insights in the molecular machines driving growth. Furthermore, evidence obtained both in the model plant Arabidopsis and in maize, demonstrated that the combination of multiple growth enhancing genes can have very profound effects on organ sizes. Field experiments with transgenic maize also show that genes enhancing leaf growth have profound effects on seed yield.

Tremendous progress has also been made in understanding how environmental cues, such as mild drought stress, negatively affect plant growth. In unpredictable environments, growth reduction enables plants to redistribute and save resources, ensuring reproduction, even when the stress becomes extreme. However, when the episode of stress does not threaten plant survival, and from the agricultural point of view, growth reduction can be seen as counter-productive, leading to unnecessary yield loss. Limiting growth reduction may thus provide a strategy to boost plant productivity under stress.

I will discuss how our insights open up new perspectives for the identification of optimal growth regulatory networks that can be selected by advanced breeding. Ultimately, the ability to improve growth of crops could have a major impact in providing food security.