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Manipulating auxin transport: different strategies leave different signatures

Auxin is a key hormone in plant development. Among its roles is the determination and maintenance of root meristem identity. When a root forms a lateral organ, differentiated cells turn into a *de novo* meristem, with the aid of auxin.

From a developmental perspective, Legume roots are a particularly interesting example: they can sprout two different lateral organs: lateral roots and nitrogen fixing root nodules. Both of these are formed in the same region of the root, the differentiation zone. In both cases auxin accumulation is found at the location of the organ primordium. The primordia, however, originate from different cell layers and the organs are induced in different ways. This implies that the mechanism behind the local auxin accumulation most likely differs between the two cases.

Inspired by this, we analyzed the general characteristics of three plausible generic strategies for increasing the local auxin concentration: increasing influx, decreasing efflux and local production.

Each strategy results in a pattern with its own characteristic signature. This holds in a simple 1D model, but also shows up in a more complex root-like environment. Returning to the legumes: are the differences large enough to explain the early differences between both lateral organ primordia?