
DAVID HOLLOWAY, British Columbia Institute of Technology

What makes cotyledon numbers so variable in conifers?

Flowering plants are characterized by having one (e.g. grasses) or two (e.g. broadleaf plants) embryonic leaves, or cotyledons. In contrast, conifer trees have a variable number of cotyledons, commonly ranging from 2 to 12 even in clonal cultures. What underlies this developmental freedom in number? I will present results using a hierarchical two-stage reaction-diffusion model to explore the pattern forming dynamics involved in forming the ringed arrangement of conifer cotyledons. This leads to a model of mutual inhibition between gene expression domains and the factors that can vary the cotyledon ring radius and produce the experimentally observed range of cotyledon number. The variability in conifer cotyledon ring size may have similarities to spatial scaling in fly embryos, in which gene expression pattern variation compensates for embryo length variability. The model provides a framework for quantitative experiments on the positional control of lateral organ initiation in embryos and mature plants. This could further understanding of the factors that control the leaf arrangements, or phyllotaxy, characteristic of plant species.