

**Visser - CBSG - Poster Flash**

**Explaining tomato fruit growth by a multiscale model on cell cycle control, cell growth and carbohydrate dynamics**

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Models of the cell cycle, cell dynamics and fruit growth were combined in a first draft of a multi-scale model on the mechanisms of tomato fruit growth, with the aim to explain the interaction between gene functioning and growth conditions with regards to temperature and carbohydrate supply. The ultimate goal is to explain the fruit phenotype of various genotypes in multiple growth environments. Observations at gene, cell as well as tissue scale were selected based on input requirement of the initial model. Division and expansion of cells in tomato fruit tissues were examined at various, controlled conditions of temperature and carbohydrate supply. Data were used to calibrate the model part on cell dynamics. The gene transcriptional network that regulates the expression of some key cell cycle genes was studied in various inbred lines of genotype MoneyMaker with introgressions of wild type. The environment-sensitivity of the observed gene expressions and molecular processes form a unique feature in the model part on genetics. Currently, a second cycle of model adjustment and experimentation is being carried out. First results indicate that cell numbers and hormone action are pivotal in determining potential fruit growth, but assimilate supply acts upon processes in the cell expansion phase and determines the actual, environment affected fruit size. The need of a multidisciplinary team of scientists and modellers to build such a multi-scale model is recognised.