Biology Seminar

"Plant Resource Utilization Is Crucial During Growth and Stress Response: How Is It Controlled?"

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ABSTRACT

Plant growth, morphology, and fitness are dependent on allocation of carbon and nutrients to specific growing sink tissues and partitioning to particular biochemicals at specific times during development. Experimental manipulations suggest that carbon fixation and sink carbon utilization are tightly co-regulated; maintenance of high photosynthetic rate is dependent on the rate of carbon utilization and/or capacity for carbon storage of sink tissues. Although the crosstalk between source and sink tissues occurs in part through phloem transport from source to sink, we still do not fully understand the mechanisms driving phloem transport or the regulation of those mechanisms. I will discuss our recent results using a combination of functional genomics, biochemical, and physiological approaches to develop a mechanistic understanding of carbon transport and allocation to different tissues, and the regulatory system that coordinates photosynthesis and carbon allocation. For example, the prevailing model of phloem transport, the Münch pressure-flow hypothesis, requires loading of osmolytes – primarily sugars – into the phloem to drive sap flow. Using a previously characterized maize *sucrose transporter1* (*sut1*) knockout mutant, we found that phloem sap transport speeds were only moderately reduced from 1.5 m/hr to 0.75-1.0 m/hr, despite the near elimination of carbohydrate export from *sut1* leaves (95-99%). While our results suggest that loading of sugars into the phloem does indeed have an impact on phloem sap flow, sugar loading only accounted for 25 – 50% of the force driving sap flow. In addition to studies of carbon transport and allocation, I will discuss new and future directions, including a focus on nitrogen transport, and determining the mechanisms that regulate carbon and nitrogen transport under the stressful environmental conditions that plants frequently encounter.

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12:00 noon
130 School of Medicine

Dr. Babst is a candidate for an Assistant Professor position in the Department of Biology.