lapse videos of expanding roots and leaves of dicot plants with high spatio-temporal resolution. The techniques have successfully been applied to a wide variety of species and questions, ranging from investigating the effects of external nutrient availability on growth dynamics in maize roots to identifying the genes controlling diel growth patterns in *Populus* leaves. On the basis of these results, the hypothesis is developed that the relative importance of endogenous control versus environmental impact on growth dynamics depends on the spatial and temporal variation of the environmental conditions to which the tissue is exposed.

P1784. Function of plant body odour: non-invasive assessment through phytohormones

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Plant hormones mediate phenotypic plasticity in plants. Upon attack by herbivores plants produce phytohormones that are involved in signal transduction resulting in the emission of complex odour blends that may consist of hundreds of compounds. One of the effects of these volatiles is the attraction of natural enemies of the herbivores as a kind of 'bodyguards'. Which of the volatiles released by plants function as such is mostly unknown, especially because it is difficult to make synthetic forms of the plant's bouquets due to the large number of compounds and the unavailability of many of their constituents.
Addressing the ecological role of individual plant volatiles has been greatly enhanced by elucidating the involvement of phytohormones in the induction. This provides an important tool for understanding the contribution of individual plant volatiles in interactions with arthropods. In addition to an important contribution to fundamental knowledge, also novel developments in environmentally benign pest control may be gained. Phytohormones may be used to prime plants so as to enhance their induced defences in response to herbivory.

P1785. Spectral Reflectance Compared with Fluorescence and Absorption Measurements of Seagrasses

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Comparison of three non-intrusive, efficient measurement techniques for physiological responses were carried out sequentially on the same seagrass specimens. The *Thalassia testudinum* specimens (12 specimens each measured 3 times on each of 2 blades) were incubated 24 hr at 32 and 16 ppt. The same specimens in sequence were measured first for fluorescence (after dark-adaptation.), then absorbance , finally spectral reflectance. Results showed that the spectral reflectance low salinity measurements were statistically-significantly different from normal seawater; however, absorbance and fluorescence measurements were not significantly-significant (high standard error). Additionally, spectral reflectance indices (first derivative, NDI, SIPI) delineated effects of the stressor. The questions of recording the entire spectrum of values via spectral reflectance rather than two or three spectral lines of values in fluorescence and absorbance measurements will be discussed, as will differences expected from various optical sensor diameters.

P1786. Leaf cooling curves: a method for estimating leaf temperature in the sun and its application.

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The evolutionary significance of leaf size is commonly attributed to temperature regulation, with theory predicting that small leaves are adapted to hot, dry climates. This is because small leaves have small boundary layers and thus rapid heat transfer, so should therefore be more thermally coupled to ambient temperature than large leaves. A similar theory can be applied to lobed *versus* entire leaves of the same area. Understanding how different leaves cope with heat is important as high leaf temperatures can lead to leaf or plant death. Thermal imagery is increasingly used to estimate foliage temperature, yet a common problem is that leaves cannot accurately be measured in full sunlight because reflectance from the leaf can distort its true temperature. We have developed a method for estimating leaf temperature in the sun using thermal imagery to generate cooling curves. From these curves, the time constant for cooling, Ű can be calculated, from which the original temperature of the sunlit leaf can be extrapolated. Consistent with leaf boundary layer theory, we have found that Ű varies with leaf morphology.

P1787. Thermography- A Potential Technique in Plant Physiology Research

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Infrared thermography has been applied to measure leaf/canopy temperatures giving information of the energy balance of plant leaves that correlates very strongly to the rate of evaporation which in turn is dependent on stomatal conductance. The Iwanow effect (a rapid initial opening of the stomata before a longer-term closure in conditions of water supply insufficiency) was assessed on fully-developed wheat leaves which were cut off from their stems. Infrared thermography was also performed on a field experiment for comparative assessment of presymptomatic visualization of phytotoxicity. A higher average temperature was obtained in one of the fungicide treatments in comparison with the control and a second fungicide treatment for all wheat cultivars screened. Infrared thermography has been proved to have the adequate sensitivity for studies on stomatal dynamics on single leaves. It could be also adapted for use in the field as it seems to be precise enough in outdoor conditions. As a remote technique it does not interfere with stomatal conductance when measurements are being carried out and allows the semiautomatic screening of large areas in a very short time.

P1788. Possible amplification of mature mRNAs in single cells of tomato callus aggregates by direct RT-PCR of cytosolic contents suctioned out with a micropipette

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Two-step PCR (RT-PCR and nested PCR) was applied to single-cell RT-PCR for detecting gene expression *in situ* in single selected cells of leaf-derived callus aggregates of tomato (*Lycopersicon esculentum* Mill, cv. Moneymaker). The cytoplasm from one cell was removed with a micropipette using a light microscope and directly subjected to RT-PCR, followed by nested PCR. This method to remove cytosolic contents prevented the introduction of genomic DNA into the RT-PCR, and only intron-spliced products were amplified when the intron-containing genes were used as PCR targets. In addition, transcription of the intron-free gene was possibly detected by simultaneously tracing the intron-containing and intron-free genes using mixed primers for the targeted genes. The present study indicated that some stimuli-activated genes, such as the acidic extracellular chitinase and TLC1-retrotransposon long terminal repeat genes, were constitutively transcribed in tomato callus cells.

P1789. Long and short-term responses to contrasting irradiances in Copaifera langsdorffii Desf. (Caesalpinaceae)

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It was compared long-term responses of growth and leaf nutrient content in potted young plants of Copaifera langsdorffii at open and shaded areas without water stress. When young plants were transplanted to field under the same irradiance conditions the photosynthesis (A), leaf water potential (Y), and potential photochemical efficiency (Fv/Fm) were measured during daily courses in wet and dry seasons to point out short-term responses of carbon and water balances. The greater biomass accumulation, height, and total leaf area were linked with higher photosynthetic capacity on area basis in open area. All young plants survived in shade and it seems to be related with fast and high biomass accumulation in root. Net photosynthesis value in shade increased periodically when bunches of direct light (sunflecks) reached the leaves. The sunflecks took place in larger amount at dry period, but they were more effective for carbon assimilation in the rainy season. The ability of young plants to persist by long-term in shade could explain the wide distribution of C. langsdorffii in different Cerrado physiognomies.

P1790. Photosynthetic Pathways in Bromeliaceae, Based on Carbon Isotope Ratios of 1873 Species

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