I08 - Photochemical efficiency of photosystem in *Carapichea ipecacuanha* under shading in different seasons of the year

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The *Carapichea ipecacuanha*, known as ipecacuanha, is an undergrowth plant that presents low adaptation to high luminous intensity environments. Information regarding its adaptability to different light intensity level is an important factor for increasing the active principle produced by these plants which have high market value. The aim of this study was to evaluate the photochemical responses of ipecacuanha plants, grown at different levels of shading (50, 70 and 90%) in four different seasons of the year (spring, summer, autumn and winter). Plants were grown in greenhouse with different shading and arranged in lines with space of 0.30m between each plant. Chlorophyll *a* fluorescence analyses were performed at each season of the year, according to the shading. Plants under 50% of shading presented greater energy dissipation flux per reaction centre (DI_o/RC) on summer and lower energy flux dissipation on autumn. In addition, plants under 50% of shading showed greater reduction of the Performance Index (PI_{abs} e PI_{total}) for conservation from exciton to the reduction of photosystem I end acceptors, demonstrating that there was a decrease in the energy conservation capacity, mainly on winter. Therefore, plants under 50% of shading showed a greatness alterations on photosystem functioning compared to 90% of shading in all seasons of the year which demonstrates that both high intensity and prolonged exposure of the plants to radiation may influence negatively their metabolism.

Keywords: Ipecac, chlorophyll *a* fluorescence, light stress, photosystem efficiency, Rubiaceae.

Acknowledgments: CAPES, CNPq, FAPERJ and Embrapa Amazônia Oriental

I09 - Development of a protocol aiming at the estimation of pigment contents in maize leaves by hyperspectral remote sensing

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There is a current trend towards determination of pigment contents in plant leaves by non-destructive methods, especially with the use of spectral images acquired by multi or hyperspectral cameras. Such an approach makes the evaluation process of this characteristic

faster, more precise and dynamic, and enables it to be carried out in the same group pf plants throughout the life cycle. The goal of this study was to develop and validate a protocol for the estimation of photosynthetic pigment contents in maize leaves using algorithms derived from hyperspectral images generated from visible to the infrared region of the electromagnetic spectrum. To obtain a set of data within a broad range of values, maize plants were subjected to drought. Thus, there were leaves with high, intermediate and low levels of pigments. By using algorithms developed through the three-band model, it was possible to estimate the concentration of chlorophyll a, total chlorophyll and carotenoids using the reflectance values obtained from the maize leaves. It should be stressed that the algorithms developed were not specific, i.e., the same algorithm could be used to estimate the concentration of more than one pigment. This is probably due to the maintenance of the ratio between photosynthetic pigments on the grown condition that plants were subjected.
Keywords: *Zea mays*, chlorophyll, carotenoids, drought stress
Acknowledgments: Embrapa/PHENOCORN (SEG: 05.12.12.001.00.00)

I10 - Use of S*etaria viridis* (A10.1) as model plant for validation of genes for cold tolerance

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Cold is an important abiotic stress limiting plant growth and reducing productivity. It causes a decrease in metabolic rates and damage to the photosynthetic apparatus. Cold tolerance in plants can be achieved by the heterologous expression a cold tolerance gene, or by a gene editing strategy. *Setaria viridis* has been used as a model plant in fast proof-of-concept studies aiming gene function validation. To use such a plant for studying a particular type of stress, one must show that it is susceptible (not tolerant) to that stress. The goal of this study was to prove, by the characterization of its physiological response to cold stress, that *S. viridis* (access A10.1) can be used as a model plant for validation of putative cold tolerance genes. Two batches of seeds were germinated in culture medium under a photoperiod of 16/8 hours (light/dark), 25±2 °C, and light intensity of 150 µmol $m^{-2}s^{-1}$. Week-old seedlings were transferred to a substrate and submitted to a light intensity of 500 µmol $m^{-2}s^{-1}$. Plants, fifteen (3rd stage) and twenty-nine (5th stage) days after transplanting, were submitted to 10 °C for six days; returning to 25 °C after that. Results showed a reduction in net CO_2 assimilation rate, stomatal conductance to water vapor and transpiration, and the internal concentration of CO_2 practically doubled, in both development stages. After returning to 25 °C, plants from the 3rd stage recovered the gas exchange rates faster than from the 5th stage. Biomass production at the end of the cycle did not differ, independently of the stage at which stress was applied. Seed production, in turn, was negatively affected by the cold, but only when it was applied in the 5^{th} stage of development.
Keywords: Cold, tolerance, Setaria, stress, abiotic