I11 - Effect of drought on the gas exchange of maize genotypes with different levels of drought tolerance

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Maize genotypes whose tolerance to drought had already been discriminated under field conditions were used in this study. The objective was to determine the effect of drought on leaf gas exchange and grain yield of genotypes considered as sensitive (BRS-1030 and BRS-1010) in comparison to tolerant ones (2B-707 and DKB-390). For this, maize plants of these genotypes were grown under well watered conditions. In the pre-flowering stage, a group of plants of each maize genotype was subjected to drought by water withholding until the soil reached a very low range of water potential (-1.5 to -2.0 MPa). From there, this water potential range was maintained during 12 consecutive days by controlled water replenishment. Another group of plants continued under the same irrigation manner used for cultivation (control). On the third day after water withholding, the rates of stomatal conductance (*gs*), transpiration (*E*) and net assimilation of CO_2 (*A*) dropped abruptly to close to zero and remained low for 12 days in all stressed maize genotypes. In parallel, these genotypes showed an increase in the internal CO_2 concentration of (*Ci*) in comparison to controls. In spite of such widespread fall in the leaf gas exchange, tolerant genotypes showed slightly higher rates than sensitive ones under drought, but only DKB-390 had no reduced grain yield.

Keywords: *Zea mays,* water deficit stress

Acknowledgments: Embrapa/PHENOCORN (SEG: 05.12.12.001.00.00)

I12 - Effect of drought on the photochemical apparatus of maize plants as evaluated by parameters derived from chlorophyll fluorescence

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Maize genotypes whose tolerance to drought had already been discriminated under field conditions were used in this study. The objective this work was to determine the effect of drought on the photochemical apparatus of the genotypes considered as sensitive (BRS-1030 and BRS-1010) in comparison to those considered as tolerant (2B-707 and DKB-390). For this, maize plants belonging to these genotypes were initially grown under normal conditions. In the pre-flowering stage, a group of plants was subjected to drought by withholding water, while another group remained under full irrigation. Drought resulted in a decrease in the total chlorophyll content, especially in chlorophyll *a*, for all studied genotypes over the stress period. As a consequence, there was a reduction in the absorption of photosynthetically

active radiation. On the other hand, there was an increase in initial fluorescence (Fo), while the maximum fluorescence (Fm) practically did not change, resulting in a decrease in the maximum quantum yield of photosystem II (Fv/Fm). Regarding the partitioning of the absorbed light energy, there was a decrease in the effective quantum yield of photosystem II [Y(II)], a concurrent increase in the quantum yield of regulated energy dissipation [Y(NPQ)], while quantum yield of nonregulated energy dissipation [Y(NO)] practically did not change. Taken together, these results mean that, although there was some disorganization of the chloroplast antennae and membrane system due to drought, it was not enough to prevent the functioning of the regulated systems of dissipation of absorbed light energy. Even upon 12 days under stress, most of these parameters were recovered after re-watering, except chlorophyll content and maximum fluorescence (Fm).

Keywords: *Zea mays*, light curve, water deficit stress
Acknowledgments: Embrapa/PHENOCORN (SEG: 05.12.12.001.00.00)

I13 - Water restriction and recurrent rehydration acting in *Copaifera langsdorffii* Desf. photochemical process

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Understanding plants adaptive potential against water restriction is a key process to clarify physiological adjustments that guarantee their survival. *Copaifera langsdorffii* Desf. is a tree species with wide distribution in Brazilian *Cerrado*, being a prototype for studies that integrate responses to different environmental regimes. The objective of this study was to evaluate if drought stress and recurrent rehydration has influences on physiological adjustments, focus on chlorophyll *a* fluorescence and water relations. We measured chlorophyll fluorescence variables, relative water content (RWC) and leaf water potential (Ψw) in *C. langsdorffii* youngers plants under greenhouse conditions. They were submitted to three treatments: constant irrigation, single drought stress event and three drought stress events with subsequent rehydration. The first analysis occurred before hydration in single and recurrent event treatments, while the second occurred until 96h after rehydration in these treatments and in another of constant irrigation. The higher initial fluorescence values (F_0) on recurrent stress treatment indicate that even after rehydration, there are still photochemical apparatus damage, but the potential quantum yield of PSII (F_V/F_M) maintained similar responses to constant irrigation treatment. However, the single deficiency event group showed photoinhibition, not recovered even after rehydration. The high F_V/F_M of the recurrent stress were due to high light energy dissipation for photochemical reaction (qP), indicating there is an electrons efficient distribution by photosystems. The decrease in electron transport rate (ETR) may have been responsible for lower effective quantum yield of PSII (Φ_{PSII}). In terms of non-photochemical quenching, the single stress group showed higher heat dissipation in the antennas (*D*), while the recurrent stress plants have used the photoprotective heat dissipation in the reaction centers (*E*). In water relations, the recurrent stress group kept their leaves hydrated even with water restriction, with RWC and Ψ_W similar to control group since the beginning of the evaluations,