Effect of Temperature and Osmotic Stress on *Ricinus communis* Seedling Performance

Vasconcelos, P.C.T.[1,2,3]; de Castro, R. D.[2]; Ribeiro, P.R.[2]; Ligterink, W[3]; Fernandez, L. G.[1,2].

[1]Post Graduate Program in Biochemistry and Molecular Biology (PMBqBM), Federal University of Bahia, Salvador, Brazil;
[2]Laboratory of Biochemistry, Biotechnology and Bioproducts, Institute of Health Sciences, Federal University of Bahia, Salvador, Brazil.
[3]Wageningen University, Laboratory of Plant Physiology, Wageningen Seed Lab, Wageningen, The Netherlands.

Introduction: *Ricinus communis* is an important oilseed crop mostly cultivated throughout semiarid tropical regions worldwide. Its oil is demanded for multiple industrial applications. In Brazil, it is primarily cultivated by family farmers in the Northeastern semiarid region, i.e. characterized by frequent periods of severe drought and hot conditions, causing drastic impacts on the crop, livelihood and economy of the region. **Objectives:** This study aims at elucidating the physiological, biochemical and molecular responses of *R. communis* seedlings to combined stress conditions (osmotic x temperature). **Material and Methods:** Seeds of *R. communis* cv. Paraguaçu and MPA34 were incubated in water at 25°C for 48h and thereafter incubated for another 5 days at 4 temperatures (20, 25, 30, 35ºC) in combination with 4 osmotic potentials (0.0, -0.2, -0.6, -1.0MPa polyethylene-glycol solutions). The percentage of normal (%NS) and abnormal seedlings (%AS), dead seeds (%DS), root length (RL), dry weight (DW), and ratios of dry root weight/length (rDW/L) were measured. Cotyledons and roots were subsequently isolated for primary metabolite profiling and transcriptomic analysis (microarrays). **Results and Discussion:** In general, the osmotic stress at 20°C reduced RW and DW for both genotypes. At 25 and 30°C, there was an increase in RL and DW at -0.2MPa compared to the control (0,0MPa), but RL and DW decreased gradually at -0.6 and -1,0MPa, whereas rDW/L decreased compared to the control. Seedlings were very sensitive to 35°C under control conditions, but acquired tolerance when submitted to -1.0MPa at this temperature (increased %NS and reduced %AS and %DS). **Conclusions**: The osmotic stress of -1.0MPa seemed to have primed *R. communis* seedlings by inducing tolerance to elevated temperatures (e.g. 35°C), whereas the metabolomics and transcriptomics analysis elucidated some of the biochemical and molecular mechanisms possibly responsible for the improved seedling performance of *R. communis* under such combined stress conditions.

Key words: Castor bean, combined stresses; metabolomics and transcriptomics.

Acknowledgment: CNPq, FAPESB, CAPES/PNPD, PETROBRAS