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Reaction of photosynthetic apparatus of Miscanthus plants (*Miscanthus x giganteus* Anderss.) cultivated under deficiency of one of four selected macronutrients

Summary

An attempt to detect the deficiency of chosen macronutrient using Chlorophyll Fluorescence method was undertaken in the Ph. D. thesis. The research was performed with Miscanthus grown in long term fertilization experiment design. Deficiency of one of the four chosen macronutrients (calcium, nitrogen, phosphorus or potassium) was the factor. The chlorophyll fluorescence measurements were performed at three canopy layers (upper with young and yet not enough developed, medium with fully developed and at the bottom with senescing and degenerated leaves) in ca 10-day time interval. Every year the biomass yield for each combination was harvested and evaluated. There were analyzed chosen chlorophyll fluorescence parameters (minimum and maximum fluorescence, maximum PSII quantum efficiency, maximum water splitting on PSII donor site efficiency, area above chlorophyll fluorescence curve), their relation to biomass yield for individual treatments. Also the curves of OJIP test for each of date of measurement (both not and double-normalized were provided. Obtained data for the chosen fluorescence parameters were analyzed with analysis of variance (with Tukey's test at $\alpha=0,05$) and correlation and Principal Component Analysis (to find 2 factors responsible for majority of data variances). It was found an exclusion of a given macronutrient significantly negative affects time course of radiation-dependent phase of photosynthesis. Deficiency of a given macronutrient causes substantial modifications in signals of chlorophyll fluorescence and influence on OJIP test curves time course. In the case of the better besides the control yielding treatment substantial increases in PSII and whole photosynthetic apparatus Performance Index was found. It speaks for the occasion to apply chlorophyll fluorescence measurement in diagnostics of potassium deficiency, and thereafter that of phosphorus.