A Chlorophyll-Less Barley Mutant “NYB” Is Insensitive to Water Stress

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“NYB” is a chlorophyll-less barley mutant, which grows relatively slow and unhealthily. The effects of water stress on photosystem II (PSII) of NYB and its wild type (WT) were investigated. Unexpected results indicated that the mutant was more resistant to water stress, because: PSII core proteins D1, D2 and LHCII declined more in WT than in NYB under water stress, and the corresponding psbA, psbD and cab mRNAs also decreased more dramatically in WT; CO₂ assimilation, stomatal conductance, maximum efficiency of PSII photochemistry (Fv/Fm), efficiency of excitation energy capture by open PSII reaction centres (Fv’/Fm’), quantum yield of PSII electron transport (ΦᵦPSII) and DCIP photoreduction in NYB were less sensitive to water stress than in WT, although the non-photochemical quenching coefficient (qₑ) and the photochemical quenching coefficient (qₚ) were almost the same in NYB and WT. Effective chlorophyll utilization and improved PSII protein formation in the mutant may be the reason for the enhanced stress resistance. Other possible mechanisms are also discussed.

Key words: Chlorophyll-Less Barley, Photosystem II, Water Stress