

## Conclusion

- 1) Several symptoms of photoinhibition, *i.e.* decrease in chl *a+b* content and chl *a/b* ratio, decrease in both maximum ( $F_v/F_m$ ) and actual ( $\phi_{PSII}$ ) photochemical efficiency of PS II and an increase in non-photochemical quenching of chlorophyll *a* fluorescence (NPQ), were found in the 4<sup>th</sup> leaf of *Nicotiana tabacum* plantlets grown *in vitro* photoautotrophically under both middle (MI,  $180 \mu\text{mol m}^{-2} \text{s}^{-1}$ ) and high (HI,  $270 \mu\text{mol m}^{-2} \text{s}^{-1}$ ) irradiance. It suggests, that already such moderate level of irradiance, as  $180 \mu\text{mol m}^{-2} \text{s}^{-1}$ , was excessive for these plantlets.
- 2) Leaf area expansion of the 4<sup>th</sup> leaf in photoautotrophically *in vitro*-grown *Nicotiana tabacum* plantlets was accelerated under excess irradiance. However, it could not be said, that excess irradiance caused early start of leaf senescence, because the typical ontogenetic course of  $P_N$  appeared not to be changed.
- 3) Symptoms of photoinhibition appeared very early during the 4<sup>th</sup> leaf development under both HI and MI.
- 4) Before full leaf area of the 4<sup>th</sup> leaf was reached, chl *a+b* content, chl *a/b* ratio and  $\phi_{PSII}$  decreased and NPQ increased also in plantlets grown photoautotrophically under low irradiance (LI,  $60 \mu\text{mol m}^{-2} \text{s}^{-1}$ ), where it could not be due to photoinhibition. Furthermore, on the level of leaf anatomy in all the treatments a decrease in proportion of chloroplasts in both palisade and spongy parenchyma cells was found, suggesting the limitation of development of the photosynthetic apparatus probably by the absence of saccharose in the medium.
- 5) *Nicotiana tabacum* plantlets grown *in vitro* photoautotrophically at MI or HI showed some adaptations found in sun plants: plantlets were smaller and more compact, and leaf area of the 4<sup>th</sup> leaf was smaller in HI plantlets. During leaf expansion, leaves of MI and HI plantlets had lower chl *a+b* content and higher  $P_N$  than LI ones. The leaves of MI and HI plantlets were thicker due to thicker mesophyll layers and chloroplasts in palisade parenchyma cells gradually moved from periclinal to anticlinal cell walls, thus reducing light absorption.
- 6) Both growth irradiance and absence of saccharose in the medium did not influence the ontogenetic course of  $P_N$  and the proportion of leaf tissues in the 4<sup>th</sup> leaf. These features are, due to their importance, probably highly fixed genetically.

## References

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