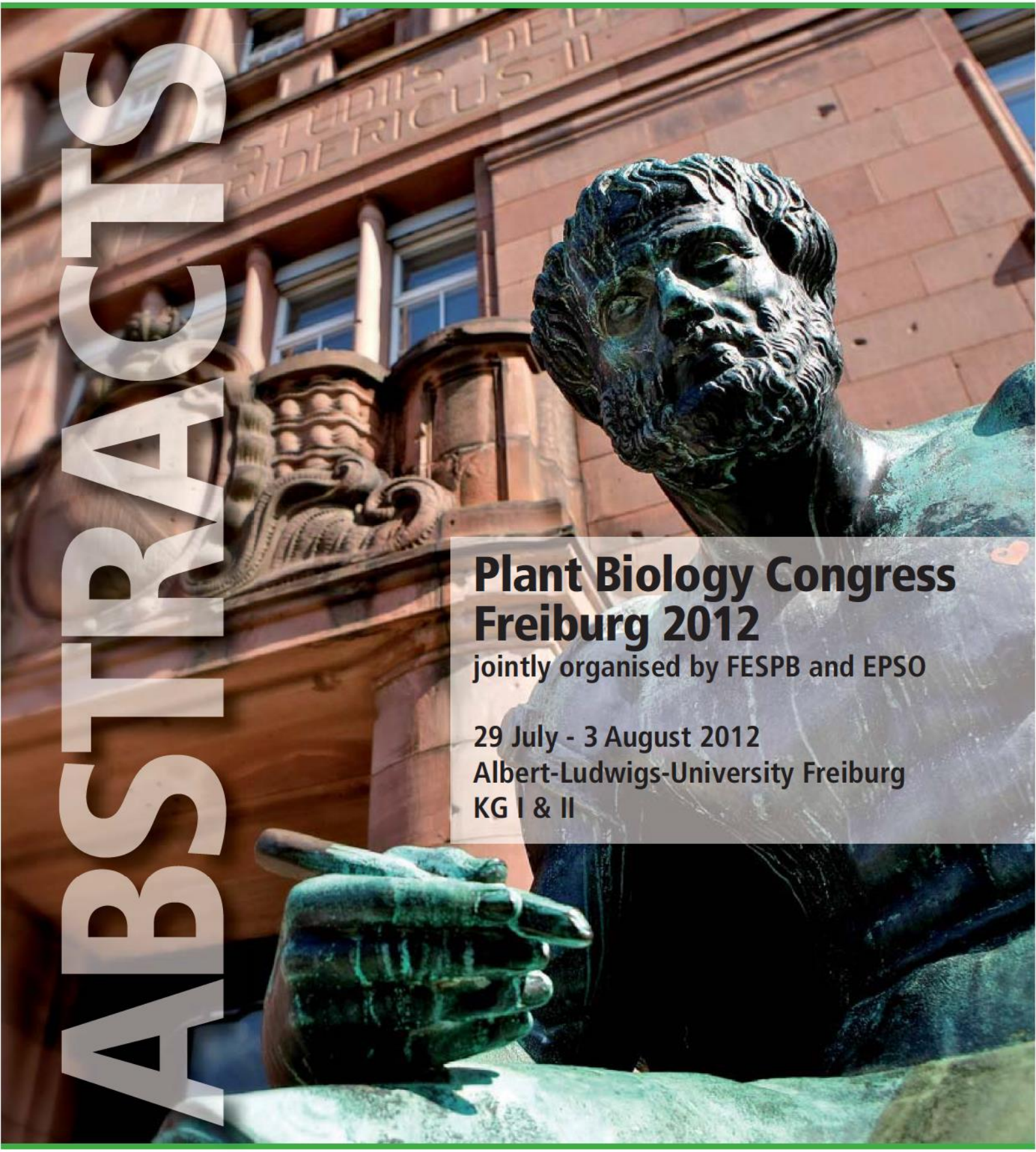

ABSTRACTS

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Acclimation to high light in linden leaves is aided by singlet oxygen neutralizing flavonoids

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It has been known for decades that leaves grown on the sun exposed areas of a plant differ from shade-leaves in morphology, physiology and chemical.composition. These differences reflect long-term adaptation to sunlight (visible and UV radiation). Acclimation to high light is supported by photoprotective mechanisms including physical and chemical defense. However, when these are overloaded, excess irradiation may result in the production of reactive oxygen species, primarily singlet oxygen. The contribution of preventive and antioxidant mechanisms were studied in fully-developed sun- and shade-grown linden (*Tilia platyphyllos* Scop.) leaves, experiencing approx. 20-fold difference in solar irradiances on cloudless sunny days. We found that sun leaves were protected not only by dissipation of excess energy but with reinforced antioxidant defense, having approx. 5-fold better specific singlet oxygen scavenging capacity than shade-leaves. This was mostly realized by their markedly elevated flavonoid contents as determined by HPLC-DAD-ESI-MS. Significantly higher concentrations of quercetin and kaempferol were found in sun-leaves compared to shade-leaves. Myricetin was present in smaller amount in sun-leaves and only in traces in shade-leaves. Our ROS specific antioxidant test showed that all three flavonols have strong scavenging capacities against singlet oxygen *in vitro* in a myricetin>quercetin>kaempferol order, according to (but not proportionally) the number of their hydroxyl groups. To perform this protection *in vivo*, the quercetin:kaempferol ratio significantly increased from 0.2 in shade-leaves to 3.2 in sun-leaves. Our results demonstrate the role of antioxidant defense in acclimation to

natural high irradiances and support the importance of the ROS scavenging role of flavonoids in photoprotection.

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