Inhibition and Uncoupling of Photosynthetic Electron Transport by Diterpene Lactone Amide Derivatives

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Nine diterpene lactone amide derivatives **1**–**9** were synthesized from 6-oxovouacapan-7β,17β-lactone, which was obtained from 6α,7β-dihydroxyvouacapan-17β-oic acid isolated from *Pterodon polygalaeflorus* Benth., and tested for their activity on photosynthetic electron transport. Amide derivatives **3**–**5** behaved as electron transport chain inhibitors; they inhibited the photophosphorylation and uncoupled non-cyclic electron transport from water to methylviologen (MV). Furthermore, **4** and **5** enhanced the basal electron rate acting as uncouplers. Compound **6** behaved as an uncoupler; it enhanced the light-activated Mg^{2+}-ATPase and basal electron flow, without affecting the uncoupled non-cyclic electron transport. Compounds **1**–**2** and **7**–**9** were less active or inactive. Compounds **3**–**5** did not affect photosystem I (PSI); they inhibited photosystem II (PSII) from water to 2,6-dichlorophenol indophenol (DCPIP). Compound **4** inhibited PSII from water to silicomolybdate (SiMo), but it had no effect on the reaction from diphenylcarbazide (DPC) to DCPIP indicating that its inhibition site was at the water splitting enzyme complex (OEC). Compounds **3** and **5** inhibited PSII from water to DCPIP without any effect from water to SiMo, therefore they inhibited the acceptor site of PSII. Chlorophyll *a* fluorescence kinetics confirmed the behaviour of **3**–**5**.

Key words: *Pterodon polygalaeflorus* Benth., Diterpene Lactone Amide Derivatives, PSII Inhibitor, Uncoupler