α-Tocopherol Protection against Drought-Induced Damage in *Rosmarinus officinalis* L. and *Melissa officinalis* L.

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Summer diurnal variations of photosynthesis and α-tocopherol content were measured in relation to natural drought in field-grown rosemary (*Rosmarinus officinalis* L.) and lemon balm (*Melissa officinalis* L.) plants. During the summer relative water contents (RWC) of ca. 40% in *Rosmarinus officinalis* and ca. 30% in *Melissa officinalis* were attained, indicating severe drought. Both species showed similar diurnal patterns of net CO₂ assimilation rates (*A*) with a wide plateau of maximum photosynthesis at midday in the absence of drought and one peak of maximum photosynthesis early in the morning under drought conditions. Net CO₂ assimilation rates decreased by ca. 75% due to drought in both species. *Melissa officinalis* plants showed a significant decrease in the relative quantum efficiency of PSII photochemistry (*ϕ*<sub>PSII</sub>), ratio of variable to maximum fluorescence yield (*F<sub>v</sub>/F<sub>m</sub>) and chlorophyll content of leaves by ca. 25% under drought conditions at midday. In contrast, *ϕ*<sub>PSII</sub>, *F<sub>v</sub>/F<sub>m</sub> and chlorophyll content remained constant throughout the experiment in *R. officinalis* plants. Although the non-photochemical quenching of chlorophyll fluorescence increased from ca. 1.8 to 3 and the α-tocopherol content rose fifteen fold in both species in response to drought, only *R. officinalis* plants were able to avoid oxidative damage under drought conditions by the joint increase of carotenoids and α-tocopherol.