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Duststorm-facilitated improvement of the photosynthetic efficiency of Haloxylon ammodendron in the oasis-desert ecotone, northwest China

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Abstract: The photosynthetic efficiency of Haloxylon ammodendron, one of the major natural plants in the southern oasis-desert ecotone of the Taklimakan Desert, was investigated to assess the ecological effects of duststorms on Haloxylon ammodendron. We measured daily chlorophyll a (Chl a) fluorescence parameters of mature leaves of healthy 10-years old Haloxylon ammodendron during months of July and August in 2008, using a portable modulated Chl a fluorometer PAM-2100 and three duststorm days were singled out to assess the affects of duststorms on the photosynthetic efficiency. Our results showed that duststorms increased the energy absorption and the increased absorption then enhanced the photosynthetic efficiency of Haloxylon ammodendron under duststorm weather conditions. Our results also showed that the qP (quenching coefficients for photosynthesis) was significantly decreased and qN (quenching coefficients for non-photosynthesis) was significantly increased during the maximum period of solar readiation between 14:00 and 16:00 under normal conditions, implying that stress might occur in normal weather conditions, but lowered stress to Haloxylon ammodendron during duststorm weather conditions. In a word, duststorm-facilitated might provide favorable opportunities for constructing and expansing oasis-desert ecotone.

Keywords: oasis-desert ecotone; Taklimakan Desert; Haloxylon ammodendron; sandstorm; chlorophyll a fluorescence;