The Photosynthetic Characteristics of *Hemarthria compressa* in Different Seasons

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Key words: *Hemarthria compressa*, Photosynthetic characteristic, Photosynthetically active radiation, Seasonal variation

Introduction *Hemarthria compressa* is very popular in southwest China for hay production and also a potential turfgrass germplasm for low maintenance turf (Yang, 2006). The photosynthetic variation in different seasons was unknown. The objectives of research were to discover the relationship between the photosynthetic characteristics and environmental factors in four seasons, and to find the photosynthetic productive potential of *Hemarthria compressa*.

Materials and methods The hay producing variety Guangyi' was planted in the Teaching and Research Center in Sichuan Agricultural University (38°08′ N, 103°14′ E) for four years. We took photosynthetic measurements from 2006-2007. Measurements of leaf gas-exchange on fully expanded leaves at the top of the canopy were made in situ every two hours through the diurnal period (from dawn until after dust), using an open gas-exchange system incorporating a CO_2/H_2O vapor IR gas analyzer (Li-6400, LICOR, Lincoln, NE, USA.). Net photosynthetic rate (Pn, $\mu molCO_2 \cdot m^{-2} \cdot s^{-1}$), intercellular CO_2 concentration (Ci, $\mu mol \cdot mol^{-1}$), transpiration (Tr, $mmolH_2O \cdot m^{-2} \cdot s^{-1}$), stomatal conductance (GS, $mmolH_2O \cdot m^{-2} \cdot s^{-1}$) and light-response curves were analyzed by Photosynthesis Assistance Software.

Results The daily variation of photosynthetic rate in different seasons presented a single peak curve (Figure 1). *Hemarthria compressa* has a strong photosynthetic ability in spring and summer. The statistical analysis showed that net photosynthetic rate has a distinct relationship with photosynthetically active radiation in four seasons. It also significantly related to intercellular CO_2 concentration, transpiration, stomatal conductance in summer and autumn. In spring all the determined indicators have no relativity. *Hemarthria compressa* has higher light saturation point in summer, it is 703 mol m^{-2} s^{-1} (350 mol m^{-2} s^{-1} for autumn, 125 mol m^{-2} s^{-1} for winter, 318 mol m^{-2} s^{-1} for spring). And in winter, it has lower light compensation point of 3.91 mol m^{-2} s^{-1} (23.4 mol m^{-2} s^{-1} for summer, 10.1 mol m^{-2} s^{-1} for autumn, 34.8 mol m^{-2} s^{-1} for spring).

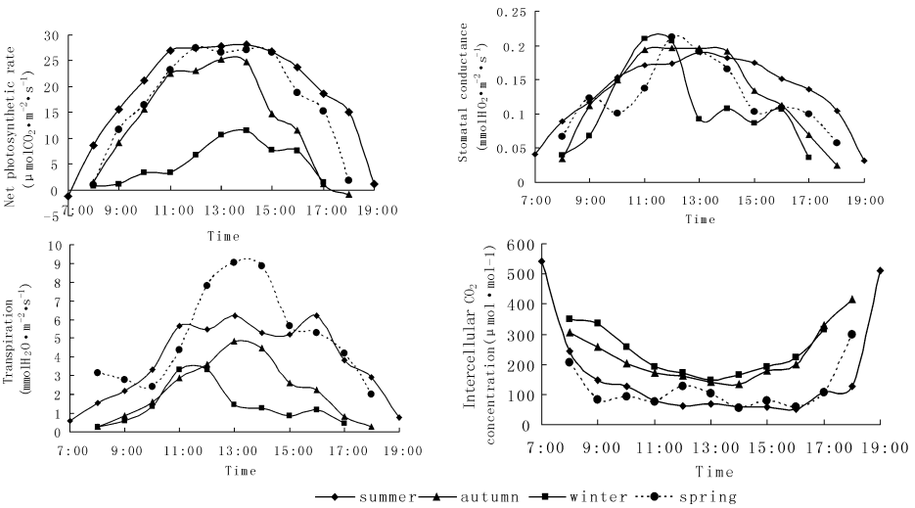

Figure 1 *Diurnal variation of net photosynthetic rate, intercellular CO_2 concentration, stomatal conductance, transpiration rate in different seasons.*

Conclusions *Hemarthria compressa* can make the best of the light and heat condition to cumulate organic matter in spring and summer. The low light compensation point in winter could adapt the low light condition. Due to the lower winter photosynthesis of this grass, we can improve the yield and quality of the hay production fields by overseeding other winter-season annual grasses in the winter.

Reference

Yang C.H., Zhang X.Q., (2006). *Hemarthria compressa*: growth behavior and multipurpose usages. *ACTA Prataculturae Sinica*, 15(suppl.), 215-216.