Changes of CAP of Creeping Bentgrass as Affected by Light Intensity during Summer Stress

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Changes of CAP of creeping bentgrass as affected by light intensity during summer stress

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Key words : turfgrass , creeping bentgrass , light intensity , shade , photosynthesis

Introduction There is no report on colony photosynthesis of creeping bentgrass (Agrostis stolonifera) under different light intensity . The objective of this study was to provide reference for variety selection and heat resistance regulation of evergreen turfgrasses of transitional climate zone by discussing response pattern of the colony apparent photosynthetic rate of creeping bentgrass under different light intensity in high temperature season in Nanjing .

Materials and methods The site was on farm of Nanjing Agricultural University (119°11′E , 32°08′N) . Mean temperature in hottest month was 28 .1℃ . From Sep 2004 to Nov 2005 , treatments were orderly imposed in 4 split blocks with sprinkler irrigation system . Treatments were natural lighting , slight shading , medium shading and heavy shading , maximum daily light intensity were approximately apart 1900 , 1100 , 550 and 90 μmol $\cdot m^{-2} \cdot s^{-1}$. The grass was creeping bentgrass L-93 design with 3 replicates . Area of every plot was 1 .3 × 2 .0 m^2 . The plots were shaded all-day with black PVC shade net . The colony photosynthesis indexes were mensurated with LI-6400 portable photosynthesis system . Colony apparent photosynthesis(CAP) was calculated with the formula :

$$CAP = \triangle C/106 \times V \times 360/\triangle M \times 273/(273+T) \times 44/22.4 \times P/760 \times 1000/L \quad (1)$$

Where $\triangle C$ was concentration difference of carbon dioxide , V was volume of assimilation box , $\triangle M$ was mensuration time , T was temperature in assimilation box , L was land area which assimilation box occupied , P was atmospheric pressure (Li Shaokun , 2000) .

Results Diurnal process of photosynthesis of creeping bentgrass could be generalized five modes under different light intensity in high temperature season in Nanjing area , namely typical single peak , table single peak , siesta single peak , typical double peak and atypical double peak . CAP of creeping bentgrass on the last ten days of Jul was lowest , the value was lower ($P<0.05$) or extremely lower ($P<0.01$) than that in Jun , Aug and Sep . The phenomena of light saturation happened from Jul to Sep under natural lighting and slight shading , in Jun under medium shading (Figure 1) .

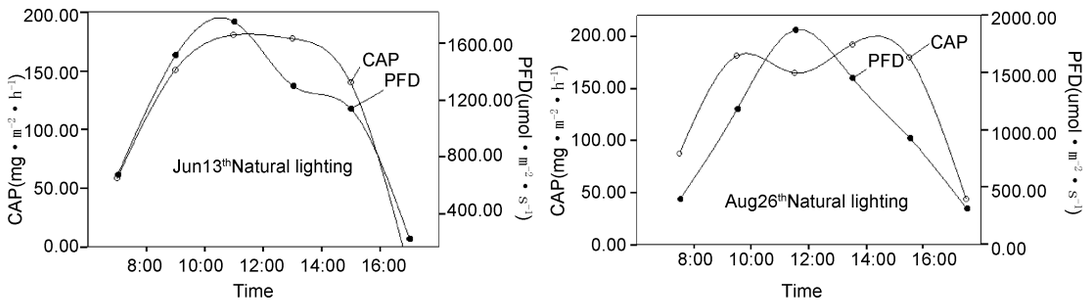

Figure 1 *Light saturation point of photosynthesis of creeping bentgrass under natural lighting .*

Conclusions In high-temperature season , CAP of creeping bentgrass decreased with monthly temperature rising and shade density increasing . As months and shade density increasing , light saturation point from Jul to Sep falled , but the saturated CAP falled with light saturation point reducing . When light intensity was less than 412 .87 μmol $\cdot m^{-2} \cdot s^{-1}$, light saturation phenomena disappeared .