

Light Heterogeneity of Individual Leaf Cause by Cupping Influences Photosynthetic Characteristics in Pima Cotton

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Abstract

Light heterogeneity can lead to the heterogeneity of morphological structure and physiological functions in different leaves. However, little attention has been paid to the effect of nonuniform illumination on morphological structure and photosynthetic performance between the two symmetrical portions along the main vein within individual leaves. This experiment was carried out by the method of combining site determination in the field and shading simulation in the phytotron using pima cotton which have cupping leaves. In the field, maximum net photosynthetic rate, leaf area, and leaf mass per area were positively correlated with daily photo irradiance (DPI), while the chlorophyll content related negatively with DPI. These results indicated that the heterogeneity of photosynthetic characteristics between two sides of along the main vein within individual leaves were related with its intercepted light energy. Further, the shading simulation experiments also verified this conclusion. Interestingly, compared to the both ambient leaves and individual shading leaves, the photosynthetic characteristics of both ambient leaves and shading leaves in shading half leaves were changed. Thus, we also discussed that the development of the photosynthetic characteristics in one side of the main vein in a leaf was systematically regulated by adjacent side.

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