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非充分灌溉对屋顶绿化大叶黄杨生长及水碳通量的影响

Effects of deficit irrigation on growth, water and carbon fluxes of Euonymus japonicas for green roof

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中文摘要:

北京市绿地大面积发展，加剧了水资源和可用于绿化的土地资源短缺的紧张局面，为此，实施屋顶绿化对缓解北京市资源与能源紧缺的严重局面有重要意义。该文以典型的屋顶绿化植物大叶黄杨为研究对象，采用盆栽试验，研究在充分灌溉（CK）（90%～100%FC）、低度水分胁迫（LWS）（75%～85%FC）、中度水分胁迫（MWS）（65%～75%FC）、高度水分胁迫（SWS）（50%～60%FC）4种不同土壤水分控制水平下，大叶黄杨的生理响应、景观功能及生态服务功能。研究发现，大叶黄杨的光合速率、蒸腾速率、气孔导度及水分利用效率在水分胁迫的三个处理中LWS＞MWS＞SWS，LWS处理与CK处理相比，光合速率、蒸腾速率、气孔导度及水分利用效率仅相差1.55%、3.3%、4.13%、7.1%，叶面积大7.8%，叶绿素含量高3.1%；在生态服务功能方面，固碳释氧与降温增湿量在不同水分条件下相差并不明显。低度水分胁迫（LWS）（75%～85%FC）刺激了大叶黄杨的生长，有效地调节了同化物在叶片生长及叶绿素上的分配，同时在生态环境上发挥了巨大作用，是一种切实可行的节水灌溉模式。

英文摘要:

To solve the contradiction between the development of large areas of urban Greenland and scarcity of land and water resources for Greenland in Beijing, the implementation of green-roof vegetation is important. In this paper, the typical green-roof plant (E.japonicus) as the research object, the physiological response, landscape function and ecological serves function of E.japonicus were analyzed with the pot experiments in 4 different treatments of full irrigation (CK) (90%-100%FC), low water stress (LWS) (75%-85%FC), moderate water stress (MWS) (65%-75%FC), and serious water stress (SWS) (50%-60%FC) treatments. The results showed that the photosynthetic rate, transpiration rate, stomatal conductance and water use efficiency of E.japonicus was LWS>MWS>SWS respectively in three treatments of water stress. The difference of the photosynthetic rate, transpiration rate, leaf area, stomatal conductance, chlorophyll content and water use efficiency between CK and LWS was around 5%. In terms of ecological serves function there is no big differences for carbon fixation and oxygen release, and cooling and humidity of E.japonicus under different soil moisture levels. The LWS(75%-85%FC) stimulated the growth of E.japonicus, and effectively regulated the ?distribution of the?assimilation. Therefore, LWS (75%-85%FC) is the optimal water-saving irrigation model.

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