

研究论文

荒漠区固沙植物梭梭 (*Haloxylon ammodendron*) 耗水特征

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摘要 利用SF-300热脉冲树干液流仪, 连续观测了生长季节荒漠区固沙植物梭梭树干液流速率, 研究了荒漠区固沙植物梭梭林木的耗水量及其与气象因子的关系。结果表明: 在生长季节, 梭梭树干液流速率昼夜变化小; 不同的生长日, 梭梭树干液流速率介于(5.9±0.7)~(14.5±3.6)g cm⁻²h⁻¹; 观测期间, 梭梭平均日耗水量为(0.3±0.2)mm, 生长季节单株木耗水量达49~4mm。树干液流速率对气象因子均有一定程度的响应, 且在不同时间的影响程度不同。日耗水量与林冠投影面积、基径、基径的平方乘以树高的积、边材厚度和边材面积呈线性关系。

关键词 [树干液流](#); [耗水量](#); [气象因子](#); [土壤湿度](#); [梭梭](#); [荒漠区](#)

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Water consumption characteristic of *Haloxylon ammodendron* for sand binding in desert area

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Abstract Owing to the result of adaption to drought, salinity, poor nutrition, strong wind, sand movement and high light intensity, *Haloxylon ammodendron* have traditionally been planted to break wind and fix sand against dust storm menace and sand movement for maintaining oasis ecological environment balance and economic sustainable development in arid region of Northwest China. Especially, *H. ammodendron* have been a significant species to planted wind break and sand fixation forest in Hexi corridor, arid region of Northwest China. Sand-fixation forest is 4.46×104 hm² in the middle Reaches of Heihe River Basin and *H. ammodendron* forest cover an area of 70%. In arid area where the precipitation is 100 to 200mm, *H. ammodendron* growth depend highly on the precipitation or (and) groundwater. To explore water consumption in artificial *H. ammodendron* forests, individual *H. ammodendron* sap flow was measured by heat pulse technology (SF300, Greenspan technology Pty Ltd, Australian). The result can help to providing scientific basis for arid-forestation and integrating evaluation for management. *H. ammodendron* forest selected as sampling plots was planted at Pinchuan town in Linze county, Gansu province in 1980. The initial planted density is 5000-6000 individual hm⁻² and the existing density is 1600 individual hm⁻². During the experiment, 8 standard samples of *H. ammodendron* were selected according to different size basal stem class. The measured periods are from May 21 to June 1, June 21 to July 1, July 21 to Aug. 1, and Aug. 21 to Sept. 1. The sap flow was measured by using heat pulses lasting 1.6 seconds every 30 minutes. Soil moisture content was measured every 10 days from 10 May to 1 Sept.. Climatic data were measured by EERIL3 (IMKO, German) include short-wave incoming radiation (CM7B, Kipp& Zonen, Delft, Netherlands), air temperature and relative humidity (HMP45D, Vaisala, Vantaa, Finland), and wind-speed(RS2 rotronic AG, Bassersdorf, Switzerland). Short-wave radiation, air temperature, relative humidity and wind-speed were record

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ed every 5 minutes and stored in a datalogger as mean values of 30min periods, precipitation was recorded an accumulated value everyday.

Daily sap flow of *H. ammodendron* for sand binding was continuously measured by the heat-pulse velocity (HPV) method in desert during growing season to identify its individual water consumption and to determine the relationship between water consumption and environmental factor. The results showed that the sap flow velocity on a sapwood area basis were fluctuated small between day and night and the daily average sap flow velocity on a sapwood area basis varied from $(5.9 \pm 0.7) \text{ g cm}^{-2} \text{ h}^{-1}$ to $(14.5 \pm 3.6) \text{ g cm}^{-2} \text{ h}^{-1}$. The mean of daily water consumption was $(0.3 \pm 0.2) \text{ mm d}^{-1}$ and water consumption was 49.4mm. The response sensitivity of sap flow velocity to climatic variables differs in different growing stages. The multivariate analysis showed association of the sap flow velocity and daily water consumption with climatic variables, respectively. The result also showed daily water consumption and its canopy projective area, basal diameter, product of basal diameter square and height, sapwood and sapwood area were being better linear relationships during growing season.

Key words [sap flow](#) _ [water consumption](#) _ [weather variable](#) _ [Haloxylon ammodendron](#) _ [desert area](#)

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