

Ecological Role of Condensation Water on the Desert Ephemeral Plant *Lappula semiglabra* (Postprint)

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Abstract

Taking the Ebinur Lake Wetland Nature Reserve in Xinjiang in the arid desert region of northwestern China as the study area, the ephemeral plant *Lappula semiglabra*, which is most sensitive to water input, was selected to establish three condensation water gradients through covering treatments: no covering (T1 group), half covering (T2 group), and full covering (T3 group). The effects of condensation water amount on plant height, crown width, leaf area, leaf thickness, root length, root diameter, leaf relative water content, leaf water potential, and biomass allocation of *Lappula semiglabra* were investigated. The results showed that: During the mid-to-late growing season, with increasing condensation water, plant height, crown area, leaf area, leaf thickness, leaf relative water content, net photosynthetic rate, stomatal conductance, and leaf water potential all increased significantly ($P < 0.05$); conversely, root length and root diameter showed no significant difference among the three condensation water levels ($P > 0.05$). Stem mass ratio (SMR) was a relatively stable trait in biomass allocation, ranging from 3.0% to 13.5% across T1 to T3 groups. There were significant differences in individual plant leaf mass ratio (LMR) ($P < 0.05$), while root mass ratio (RMR) gradually decreased but showed no significant difference. Overall, in arid regions, *Lappula semiglabra* leaves can absorb and utilize condensation water, morphological traits are extremely sensitive to water and exhibit high variability, primarily adopting a strategy of altering aboveground traits without changing belowground traits to absorb and utilize atmospheric condensation water.

Full Text

Preamble

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Ecological Effects of Condensed Water on the Seedling Growth of Desert Ephemeral Plant *Lappula semiglabra*

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Abstract

In this study, *Lappula semiglabra*, an ephemeral plant species that is most sensitive to water conditions in the Ebinur Lake Wetland Nature Reserve of Xinjiang, northwestern China, was selected as the research object. Three condensed water gradients were designed: group T1 without cover, group T2 with semi-cover, and group T3 with complete cover. The purposes of the study were to investigate the effects of condensed water on plant height, canopy size, leaf area, leaf thickness, root length, root diameter, leaf relative water content, leaf water potential, and biomass allocation of *L. semiglabra*. The results showed that: In the late plant growth season, plant height, canopy size, leaf area, leaf thickness, leaf relative water content, net photosynthetic rate, stomatal conductance, and leaf water potential increased significantly ($P < 0.05$) with increasing condensed water; conversely, there was no significant difference in root length and root diameter among the three treatments ($P > 0.05$). In biomass allocation, the stem mass ratio (SMR) was relatively stable, varying within a range of 3.0%–13.5%. The difference in leaf mass ratio (LMR) among plants was significant ($P < 0.05$), while the root mass ratio (RMR) decreased gradually, but the difference was not significant. It can be concluded that the leaves of *L. semiglabra* in arid areas can absorb and utilize condensed water, and its morphological characteristics are highly sensitive to water with high plasticity.

Keywords: arid region; ephemeral plant; *Lappula semiglabra*; condensed water; Ebinur Lake; Xinjiang

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