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Title

Response characteristics of individuals to different flooding conditions of submerged plant *Vallisneria spinulosa* Yan in Poyang Lake and implications for ecological restoration

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None

Sub-theme

4. Supporting Aquatic Ecosystem Health and Functions

Topic

4-3. Protection and management of major rivers and lakes, from headwaters to estuaries

Body

Poyang Lake, the largest freshwater lake in China, as an important part of the ecosystem of the Yangtze River Basin, it plays a very important role in the great protection of the Yangtze River. Since 2003, affected by the changes in the "river-lake relationship" between the Yangtze River and Poyang Lake, the Poyang Lake area has shown a normalized hydrological process: low and dry water levels in winter and spring, high water levels in summer floods, rapid water receding in autumn, and early dry seasons. The trend of large-scale degradation of submerged plants in lake districts has intensified. The growth and reproduction of submerged plants are affected by the process of lake water level. However, it is still unclear how the changes of different hydrological processes and the duration of flooding affect the individual adaptability of submerged plants. In this study, we selected typical submerged plant *Vallisneria spinulosa* Yan of Poyang Lake as the target plant, exploring individual adaptability characteristic under the six different flooding conditions by a mesocosm experiment. The results showed that prolonged high flooding level stresses could significantly affect the individual functional traits: plant height, leaf number, leaf length, root length, stolon length, asexual reproduction ability and total biomass. When the flooding level was more than 3.5 m, large number of leaves would apoptosis prolonged flooding stress (over 21 days). However, when the water level exceeded 3.5m for a short period of time (no more than 14 days), with the high flooding level stress

reducing, and the normal growth of *V. spinulosa* YAN could be restored. The results indicated that high water level stress and adverse flooding duration in summer were the main stress factors affecting the reduction of individual adaptability of submerged plants. Ecological adaptive regulation of the water level of the dish lake in Poyang Lake is conducive to the completion of the life stages of submerged plants in the lake, especially the scientific regulation of the water level of the sluice-controlled dish lake in different months, which is one of the effective hydrological regulation ways to inhibit the decline of submerged vegetation in Poyang Lake. This study could provide scientific theoretical support for submerged plant degradation as well as restoration of submerged vegetation.

Keywords

submerged plant, flooding, individual adaptation, degradation, relationship between Yangtze River and connected lakes, ecological restoration