Soil Nutrient Characteristics and Plant Responses in Meadow Wetlands of the Yinchuan Plain: Postprint

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Abstract

To investigate the characteristics of soil nutrients in meadow wetlands and elucidate their influence on plant nutrients, three habitat types of meadow wetlands (swamp meadow, typical meadow, and saline meadow) were selected as study objects in the Yinchuan Plain. Soil nutrients and plant nutrients were analyzed through field investigation, laboratory analysis, and classical statistical methods. The results showed that: In the horizontal gradient, except for total phosphorus (TP), soil nutrient contents among the three meadow wetlands varied significantly in the 0–20 cm soil layer ($P<0.05$). In the vertical gradient, total nitrogen (TN) and alkali-hydrolyzable nitrogen (AN) showed no significant vertical variation in saline meadow ($P>0.05$), but fluctuated considerably in the vertical direction of typical meadow and swamp meadow; TP showed no significant vertical variation in meadow wetland soils ($P>0.05$); available phosphorus (AP) and available potassium (AK) exhibited a certain degree of enrichment in the surface layer of meadow wetlands, and varied significantly in the vertical direction of soil layers across different meadow wetlands ($P<0.05$). The variation trends of C, N, and P contents in soils were consistent; AK showed significant correlation with soil P ($P<0.05$). Plant nutrients in meadow wetlands all exhibited N limitation, among which C N and C P ratios were negatively correlated with soil nutrients, and plant N P ratio was significantly influenced by soil organic carbon (SOC) and AN.

Full Text

Preamble

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Soil Nutrient Characteristics and Plant Response in Meadow Wetland of Yinchuan Plain

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Abstract

In this study, three types of meadow wetlands (marsh meadows, typical meadows and salty meadows) in the Yinchuan Plain were selected as the research subjects. An analysis of soil nutrients and plant nutrients was conducted with classical statistical methods through field investigation and laboratory analysis. The main conclusions are as follows: At the horizontal gradient, except for soil total phosphorus (TP), the difference of soil nutrient level in soil layer of 0–20 cm in depth among the three meadow wetlands was obvious ($P<0.05$). The vertical variation of soil total nitrogen (TN) and soil alkali-hydrolyzed nitrogen (AN) in the salty meadow was not obvious ($P>0.05$), but the vertical fluctuation in the typical meadow and swamp meadow was larger. The vertical change of TP in meadow wetland soil was not obvious ($P>0.05$). An enrichment of soil available phosphorus (AP) and available potassium (AK) occurred in topsoil in the meadow wetland to a certain extent, and the vertical change was very obvious ($P<0.05$). The change trends of C, N and P contents in soil were consistent. There was a significant correlation between soil AK content and soil P content ($P<0.05$). Plant nutrients in the meadow wetland was affected by N, in which the C N and C P were negatively correlated with soil nutrients, and plant N P was significantly affected by soil organic carbon (SOC) and AN.

Keywords: meadow wetland; soil nutrient; plant nutrient; Yinchuan Plain

Note: Figure translations are in progress. See original paper for figures.