

前植物生产层

模拟增温与施肥对高寒草甸土壤酶活性的影响

摘要:

摘要: 采用开顶式生长室模拟增温的方法,研究了气温升高和施肥对高寒草甸土壤酶活性的影响。研究表明,单独增温导致高寒草甸土壤纤维素酶和磷酸酶活性分别提高了12.4%、29.1%,而脲酶活性降低了18.0%,过氧化物酶和多酚氧化酶活性无明显变化,说明增温促进高寒草甸土壤中碳磷循环。在不增温条件下,施肥抑制了土壤纤维素酶、多酚氧化酶和过氧化物酶活性,而施NPK则提高了脲酶和磷酸酶活性。增温条件下,施肥不会引起土壤纤维素酶、多酚氧化酶和过氧化物酶活性的显著变化,而施可溶性碳肥使脲酶活性显著升高($P < 0.05$),施NPK使磷酸酶活性显著降低。增温和施肥的交互作用对土壤纤维素酶、过氧化物酶、磷酸酶和脲酶活性有显著影响,而对多酚氧化酶无明显影响。因此,预测在未来气候变暖背景下,高寒草甸土壤中的多种酶活性对施肥的响应可能不显著。

关键词: 增温; 施肥; 高寒草甸; 土壤酶活性

Effects of simulated warming and fertilization on activities of soil enzymes in alpine meadow

Abstract:

To investigate effects of warming and fertilization on soil enzyme activities in alpine meadows, a simulation study was conducted in situ with OTCs (open top chambers) method. Results revealed that with warming, activities of soil cellulase and phosphatase increased by 12.4%, 29.1% respectively; urease activity decreased by 18.0%, which suggested that warming could accelerate the C and P cycles in the ecosystem. Under unchanged temperatures, fertilization reduced the activities of soil cellulase, polyphenol oxidase and peroxidase but NPK fertilizer applied raised the activities of soil urease and phosphatase. Reversely, there was no significant effect of fertilization on the activities of soil cellulase, polyphenol oxidase and peroxidase with warming; soluble carbon (Glu) fertilizer applied increased soil urease activity but NPK declined phosphatase activity. In addition, the interaction between warming and fertilization had a significant effect on many kinds of soil enzyme activities. In conclusion, compared with unchanged temperatures, simulated warming did not induce significant differences in the activities of soil cellulase, polyphenol oxidase, peroxidase and urease with fertilization. Amidst the background of climatic warming in the future the response of many kinds of soil enzyme activities to different fertilizers would become inertia in the alpine ecosystem.

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