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Temperature effects on growth and photosynthetic lamellae development in *Pogonatum urnigerum* (Bryophyta)

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Pogonatum species are renowned for their photosynthetic efficiency and adaptability, playing significant roles in terrestrial ecosystems. However, their responses to changing temperature regimes remain relatively understudied. Understanding how temperature influences the growth rate of *Pogonatum* spp. can provide insights into their ecological resilience and adaptation strategies. This study assessed the correlation between varying temperatures and the growth rate of *Pogonatum urnigerum*, investigating the variation of biomass accumulation, considering the dry weight change of the plants and height change of the photosynthetic lamellae development of leaves over time. Plant samples of *P. urnigerum* were freshly collected from the natural habitat. After a three-week acclimation period, *P. urnigerum* specimens were cultivated in sterilized sand under controlled environmental conditions in a growth chamber, maintaining different temperature treatments: 30 °C, 26 °C, and 22 °C separately. The plants were watered and treated with a nutrient ion solution, three times daily at consistent intervals. The dry weight of the plants was measured by oven-drying at 70 °C constant temperature and the lamellae height was recorded weekly using a calibrated microscope. The change of dry weight was the highest at 26 °C followed by 22 °C and 30 °C, and the height change of the photosynthetic lamellae showed the greatest increment at 30 °C, followed by 26 °C and 22 °C according to the gradients of the linear trendlines of graphs. The Pearson Correlation Coefficient (PCC) analysis indicated a significant, very strong correlation between average increments in the height of the photosynthetic lamellae, and temperature suggesting the elongation of photosynthetic lamellae at higher temperatures to facilitate photosynthesis. The observed responses underscore the importance of temperature in shaping the growth and photosynthetic capacity of *P. urnigerum*. These findings contribute to our understanding of how climate change, a major driver of global temperature fluctuations, may impact bryophyte populations and their ecological functions across diverse habitats. Further research on broader temperature ranges is necessary to elucidate molecular mechanisms governing these temperature-dependent responses, emphasizing the need for continued investigation amidst shifting climatic conditions.

Keywords: Acclimation, Bryophytes, Climate change, Ecological resilience, Photosynthetic lamellae