

**DEVELOPMENT OF GAMETOPHYTES FROM GEMMAE OF
KILLARNEY FERN (*TRICHOMANES SPECIOSUM* WILLD.,
HYMENOPHYLLACEAE, PTERIDOPHYTA)**

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ABSTRACT

Trichomanes speciosum Willd. (Hymenophyllaceae) is one of the rarest species in the British Isles. One aim of the research programme of which this study formed a part was to understand the requirements for, or tolerance of, extremely deep shade by *T. speciosum* gametophytes. A specific aim was to determine the extent to which macro- and micro-morphological features, in particular reproduction via gemmae, might contribute to the success of this species in deep shade habitats. Another specific aim was to understand how gametophyte growth is affected by different light and temperature conditions.

Gemmae are highly variable in cell number and shape, but typically spindle-shaped or bar-shaped. Once detached, there is no set pattern of growth but photosynthetic cells are typically formed before rhizoids. The highest numbers of photosynthetic cells were produced by gemmae grown in the lowest light level employed in the study: $5\mu\text{molm}^{-2}\text{s}^{-1}$, PAR. Most gemmae proved unable to grow in 60 or $90\mu\text{molm}^{-2}\text{s}^{-1}$. Gemmae grown at 24°C generated the greatest number of photosynthetic cells and rhizoids in the temperature tested; those grown at 28°C produced the fewest in both light levels tested (5 and $30\mu\text{molm}^{-2}\text{s}^{-1}$ PAR). Of the conditions tested, PAR of $5\mu\text{molm}^{-2}\text{s}^{-1}$ and a temperature of 24°C generated optimum gametophyte growth from gemmae cultured on the media used. This is significantly higher than the ambient light levels and temperatures found for most of the time in British field sites, and in line with predictions for a sub-tropical species on the edge of its range. Implications for site and climate perturbation are discussed.