Light Quality Treatments Improve Pine Somatic Seedling Production Efficiency

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Embryogenic cultures of loblolly pine (*Pinus taeda*), slash pine (*Pinus elliottii*), longleaf pine (*Pinus palustris*) and slash pine x longleaf pine hybrids were initiated from immature seeds on an initiation medium containing 3 mg/l 2,4-D and 0.5 mg/l BA. Embryogenic cultures proliferated and somatic embryos developed, matured and germinated following a modified protocol and media originally developed for radiata pine (*Pinus radiata*) somatic seedling production. A discrete, light-sensitive pre-germination stage and a later germination (radicle emergence) stage were identified by the differential response of somatic embryos to light of different wavelengths. Different light quality treatments were applied during the pre-germination and germination steps, using cool white fluorescent bulbs and/or light-emitting diodes (LEDs). In general, red wavelengths provided by LEDs during these steps resulted in higher frequencies of somatic embryo germination and conversion, longer tap roots and more first order lateral roots than the standard cool white fluorescent treatments or treatment with blue wavelengths from LEDs. In addition, exposure to red light allowed germination of somatic embryos of some clones that failed to produce any germinants under fluorescent light. Germination and conversion were further enhanced by sequential application of cool white fluorescent light and red light, resulting in up to 100% germination in one experiment.