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### **Phenology of curlyleaf pondweed (*Potamogeton crispus* L.) in the southeastern United States: A two-year mesocosm study)**

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Curlyleaf pondweed (*Potamogeton crispus*) is a submersed invasive aquatic plant that first appeared in the U.S. in the 1840s and has since been distributed throughout the lower 48 states. In northern populations, curlyleaf has the growth cycle of a winter annual, however, little is known about the phenology of curlyleaf in the southern U.S. Therefore, research was conducted to better understand the phenology of curlyleaf pondweed in the southern U.S. In this study, total plant biomass and turion production peaked ( $>3,000$  individuals  $[N] m^{-2}$ ) in winter, which coincided with minimum annual water temperature and photoperiod. Unlike northern populations, plant growth occurred throughout the year. Turion production occurred year round, but was lowest in summer months and in excess of  $1,000 N m^{-2}$  of substrate. Turion and biomass production were positively correlated with photoperiod and water temperature. This study indicates that southern populations of curlyleaf pondweed have altered their phenology to climatic conditions present in the southeastern U.S. Knowing that curlyleaf pondweed can grow as an evergreen perennial is both beneficial and detrimental to management efforts. When working with perennial evergreen curlyleaf pondweed populations, resource managers have a longer period to utilize control measures such as herbicides. However, as these populations produce turions year round, they will likely require multiple herbicide applications per year to reduce the turion bank in infested waterbodies, thus increasing management costs. Systemic herbicides should be a larger component of control measures for perennial evergreen curlyleaf pondweed because these herbicides translocate readily to belowground structures.

Key words: Phenology, life cycle, invasive species, submersed plant species.