Title Container production and post-harvest handling of lotus (Nelumbo) and micropropagation of herbaceous peony (Paeonia)

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Abstract

Effects of container soil level, fertilization, planting time and disbudding on lotus (*Nelumbo*) growth were evaluated in container production. Container soil volume influenced EC, pH, plant growth indexes, and plant nutritional contents. The 1⁄4 and 1⁄2 soil levels were more efficient than 3⁄4 soil level for lotus production in containers.

Fertilization significantly increased plant growth and also influenced plant nutrient contents. Fresh underground weight, propagule number, expanded internode number, and emerging leaf number of lotus grown in 29 liter containers linearly increased with increased fertilizer rates from 0 to 8 g of Pro·Sol 20-10-20 per pot and then leveled off at 12 g rate. There was no effect on plant height and flower number by fertility treatment. Fertilization also increased N, P and K and decreased Ca content in young leaves. Soluble fertilizers (Pro·Sol 20-10-20, Miracle-Gro 24-8-16 and 15-30-15) were more efficient for lotus growth than both urea and controlled release fertilizer (Polyon 18-6-12). Miracle-Gro 15-30-15 (higher P rate) was more beneficial for rhizome or propagule production of lotus. Miracle-Gro 24-8-16 and Pro·Sol 20-10-20 were favorable for flower production. Flowering peak of lotus was influenced by the type or composition of fertilizers. Optimum container fertilization of lotus depends on cultivar, growth stage, fertilizer type and rate, container size, soil amount and water volume.

Lotus growth was largely affected by planting time and disbudding. Lotus potted in March and April performed best, while plants planted in February and May performed worst. Flower number was generally not influenced by planting time but flowering peak was different among treatments. Disbudding increased fresh underground weight and propagule number. Positive relationships were observed among emerging leaf number, fresh underground biomass, and propagule number.

Propagules could be stored in the cooler (4°C, 95% RH) over 45 days. Gum acacia, sphagnum-moss and Terra-Sorb ®hydrogel had no effects on moisture and viability of stored lotus propagules. Successful surface sterilization and sanitation were critical.

Optimization of tissue culture protocol for commercial production of herbaceous peony was also investigated. Young stem segments were most favorable for callus induction. Adventitious shoots did not develop from callus and were only generated on apical or axillary meristematic regions. Young nodal stems and dormant-released buds were most suitable for shoot induction. TDZ was more effective than BA for shoot induction. Gibberellic acid (GA_3) had positive effects on explant growth, shoot induction and stem elongation. Plantlets rooted in IBA-containing medium or in PGR-free medium following a short pretreatment with high-concentration IBA.