Propagation of Gordonieae Trees by Hardwood Stem Cuttings

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Significance to Industry: Trees in the Theaceae tribe Gordonieae have exceptional ornamental merit and considerable potential for breeding and improvement, but some taxa can be difficult to propagate from stem cuttings. Hardwood stem cuttings of *Franklinia alatamaha, Gordonia lasianthus, Schima wallichii,* and *Schima khasiana* were successfully rooted with rooting percentages ranging from 23 to 69%. There was no benefit of K-IBA application (2500, 5000, 7500 or 10000 ppm) on rooting percentage for *Schima* spp., and rooting percentages of *F. alatamaha* and *G. lasianthus* were reduced at K-IBA concentrations > 2500 ppm.

Nature of Work: The Theaceae tribe Gordonieae contains three genera of trees (6). Two of these, *Franklinia* (Bart. ex Marshall) and *Gordonia* (L.) Ellis, are native to warm temperate and subtropical regions of the New World (including the southeastern U.S.) while the third, *Schima* (Reinw. ex Bl.), is restricted to warm temperate to tropical regions of the Old World. All three genera have large white flowers that vary in bloom time from mid-summer to early fall (4,8). Each genus has desirable foliage characteristics including bright red fall foliage of *Franklinia alatamaha* (Bart. ex Marshall) (4), evergreen and sometimes variegated foliage of *Gordonia lasianthus* (L.) Ellis (4,7), and glossy, bright red new foliage of some *Schima* species (5). Gordonieae trees have also been shown to be adaptable to a wide range of environmental conditions. *F. alatamaha* has been reported to be cold-hardy at temperatures as low as -36°F (-38°C) (2) and *Schima* can tolerate soils that are dry (10), wet (5), or infertile (1).

Previous work on vegetative propagation of these genera is very limited, particularly in regard to hardwood stem cuttings. For *F. alatamaha*, Dirr and Heuser (3) recommended that softwood stem cuttings be taken from June to August and treated with a basal dip of 1000 ppm IBA solution. Another study on softwood cutting propagation of *F. alatamaha* indicated that IBA solutions at concentrations lower than 1000 ppm were not as effective and that concentrations higher than 1000 ppm actually inhibited rooting (9). For *G. lasianthus*, Dirr and Heuser (3) indicated that cuttings may be taken in March or from June until August and treated with a 3000 ppm IBA solution. There is no published work on vegetative propagation of *Schima*, but preliminary findings have indicated that *Schima* spp. can be difficult to root from softwood stem cuttings (Ranney, personal observation).

In this study, terminal, hardwood stem cuttings from *F. alatamaha*, *G. lasianthus, S. wallichii,* and *S. khasiana* were collected on February 1, 2008. Cuttings from each taxon were trimmed to 3 to 4 in. (7.5 to 10 cm) in length and the basal 0.4 in. (1 cm) was dipped in either 0, 2500, 5000, 7500 or 10000 ppm of the potassium salt of indolebutyric acid (K-IBA) dissolved in water. The cuttings were then inserted 0.4 in. (1 cm) in plastic flats (15.75 in L x 15.75 in W x 6.0 in D) filled with a rooting substrate of 2 peat:3 perlite (v/v). Stem cuttings were misted intermittently for 8 sec every 10 minutes between 0600 and 1800 HR. The experimental design was a randomized complete block with five K-IBA treatments and 6 replicates, with each replicate consisting of 6 stem cuttings (subsamples) per treatment. Each taxon was considered a separate experiment. After twelve weeks, cuttings were harvested and percent rooting and number of roots were determined. Data were subjected to analysis of variance and regression analysis using SAS, version 9.1.

Results and Discussion: Rooting percentage was significantly influenced by K-IBA concentration for *F. alatamaha* and *G. lasianthus*, but not for either of the *Schima* species (Fig. 1). In *F. alatamaha,* rooting percentage had a negative linear response with increasing K-IBA concentration (Fig. 1). The highest rooting (~69%) occurred in the untreated cuttings. *G. lasianthus* demonstrated a linear and quadratic response to increasing K-IBA concentrations with a predicted maximum rooting percentage at 2500 ppm K-IBA (~69%). *S. wallichii* and *S. khasiana* had mean rooting percentages of only 23% and 43%, respectively, averaged over all K-IBA concentrations.

Root number was significantly affected by K-IBA concentration only in *S. khasiana* (Fig. 2). Rooted cuttings of *S. khasiana* had a linear and quadratic response to K-IBA concentration with the optimum of 22 roots per cutting occurring at 7500 ppm (Fig. 2). Mean root number did vary between species. *G. lasianthus* had the largest mean root number at 33, followed by *S. khasiana* (mean=15), *F.alatamaha* (mean=9), and *S. wallichii* (mean=4). Research is continuing to evaluate responses to K-IBA in softwood and semihardwood cuttings.

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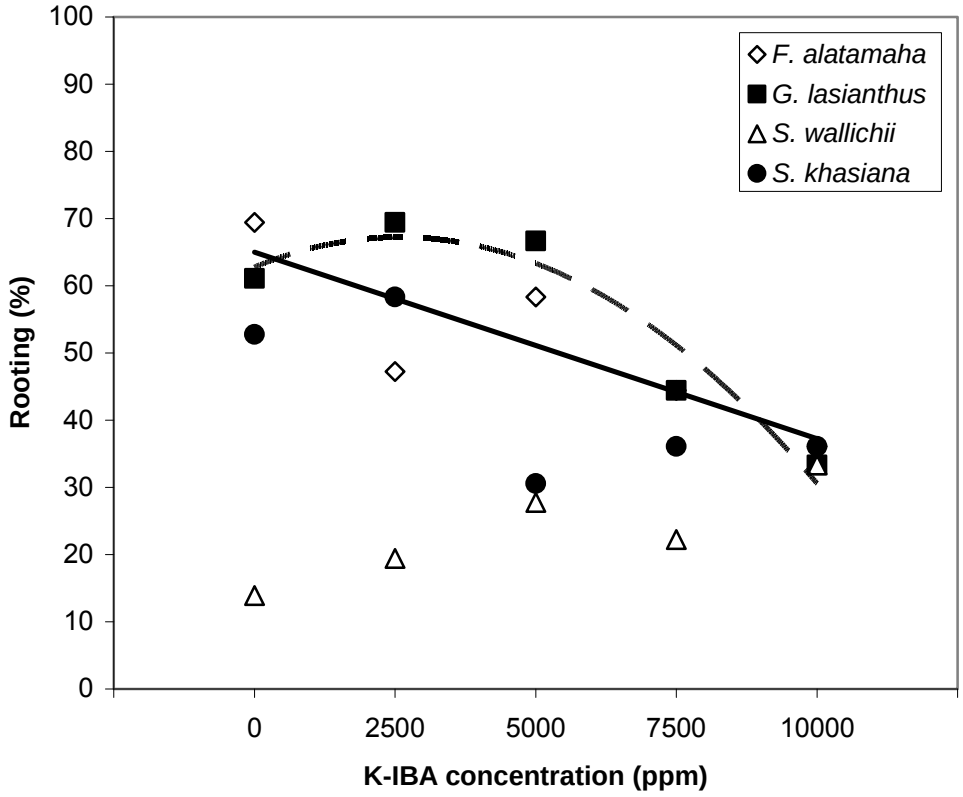

Figure 1. Effect of K-IBA concentration on rooting percentage of hardwood stem cuttings of *F. alatamaha* (solid line—R^2=0.72, *P*=0.01), *G. lasianthus* (broken line—R^2=0.93, *P*=0.07), *S. wallichii,* and *S. khasiana*.

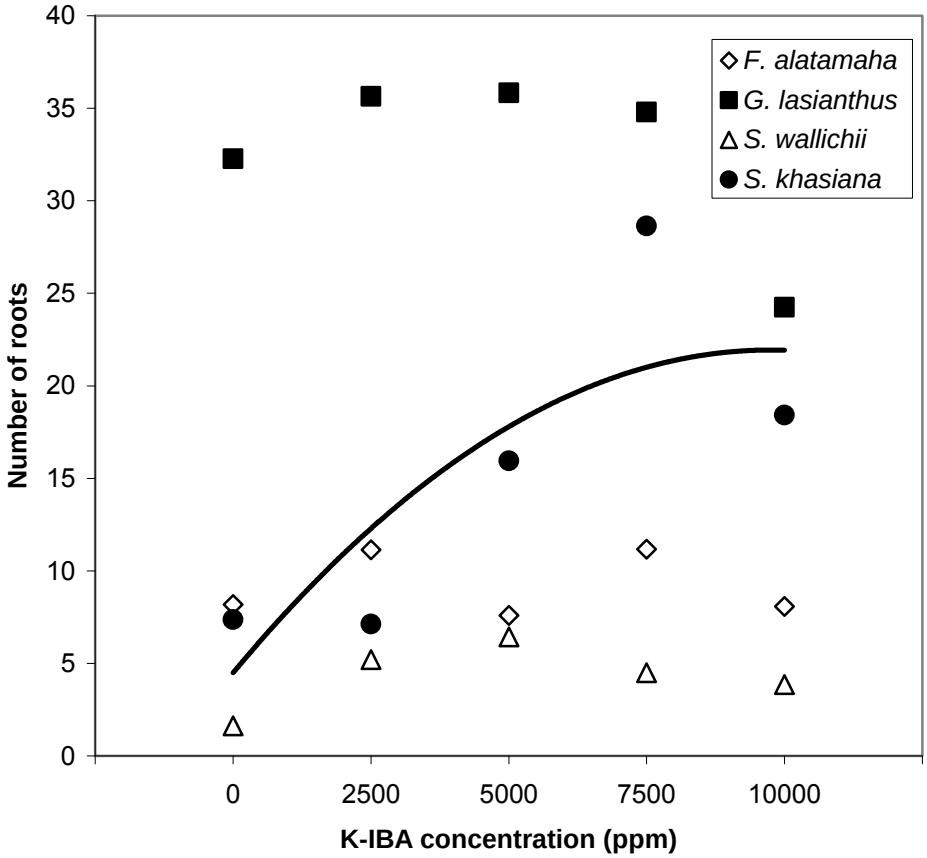

Figure 2. Effect of K-IBA concentration on number of roots of hardwood stem cuttings of *F. alatamaha, G. lasianthus, S. wallichii,* and *S. khasiana* (solid line, R^2=0.43, P< 0.05).