# Using a novel cover crop blend to increase the sustainability of ornamental plant nursery production©

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Standard nursery ornamental tree production is conducted in fields maintained by extensive use of mechanical (tillage) and chemical (herbicide) inputs. Not only is this costly and labor-intensive, but multiple passes over fields results in soil compaction and formation of deep plow layers that impede drainage and root growth, and the absence of plant cover leads to soil erosion. Cover crops are a logical means of increasing sustainability, however studies have shown that the highly-competitive cover crops traditionally used in agronomic settings (e.g. buckwheat, winter rye, perennial ryegrass and trefoil) can reduce nursery crop growth. The tillage radish (*Raphanus raphanistrum* subsp. *sativus*), a relatively new cover crop to the U.S., is being used in agronomic settings to reduce soil compaction, hold nutrients, limit runoff, and reduce herbicide applications during the winter months. The ability to aerate the soil well below compacted plow layers has intrigued farmers and opened the avenue for uses in other industries, including perennial plant nurseries. However, the use of tillage radish as a cover crop in nursery settings has yet to be tested in a controlled, replicated production setting. In addition, combining the annual tillage radish with a perennial such as red clover (*Trifolium pratense*) offers the opportunity for a single seeding pass to provide cover crop for the duration of multi-year crops such as those in woody plant nurseries, where the perennial clover establishes during tillage radish growth and fills-in the following season after the radish has died. Three tree species were lined-out in fields prepared using standard nursery practices: honeylocust (*Gleditsia triacanthos* f. *inermis* 'Skycole', 'Skyline' honeylocust, red oak (*Quercus rubra*) and White spruce (*Picea glauca*). The cover crop blend consisting of the annual tillage radish and perennial red clover was sown in late August into September. Seeds were sown in a single pass using a rear mounted Land Pride Primary Seeder (drop seeder with packer rollers) with light soil agitation from belly mounted cultivators. Data collection included tree caliper, measurement of leaf chlorophyll content using an Opti-Sciences CCM-300 fluorescent ratio chlorophyll content meter, and a visual evaluation of weed pressure and overall appearance of the trees using a 1-5 scale. An unexpected finding of this study was that Honeylocust canker (*Nectria* spp.) infection was greatly reduced in the cover crop plot (5% infection vs 94% infection in the control plot managed using tradition weed control measures). It is believed that these trees arrived from a west-coast producer with the canker fungi already present, and environmental factors related to the presence of the cover crop and/or reduced exposure to herbicides affected the trees' susceptibility to canker symptom development. Caliper measurements of red oak revealed slight (although not statistically significant) increases in diameter of trees in the cover crop treatments. This is unlike previous studies that found reduced growth in production fields using other species of cover crops. This is an important finding, since reduced growth has been a major barrier to the widespread use of cover crops in the nursery industry. Caliper data for honeylocust was skewed due to the high incidence of canker and subsequent early harvest in the control plots and is therefore not reported here. Chlorophyll content measurements of the three species did not reveal any statistically significant differences between the cover crop and control treatments. Ordinal evaluations of general tree appearance and within-row weed pressure were both superior within the cover crop treatments. In addition, soil erosion was noticeably reduced in the cover crop plots. Cost analysis revealed that over the first two years total costs of the cover crop treatments

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averaged \$130 acre$^{-1}$ vs. \$250 acre$^{-1}$ for traditional nursery practices in the control plots.