Compost Application to Eastern Redcedar, Leyland Cypress, and Virginia Pine Christmas Tree Seedlings

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INTRODUCTION
The City of Douglas Georgia generates a compost material consisting of yard trimmings and dewatered biosolids (treated sewage sludge). The compost consists mostly of organic matter with a carbon:nitrogen (C:N) ratio of 15:1 and 21:1 and has a nutrient value containing nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), sulfur (S), boron (B), copper (Cu), iron (Fe), manganese (Mn), and zinc (Zn). Heavy metal concentrations of cadmium (Cd), chromium (Cr), lead (Pb), and nickel (Ni) are low making the biosolids land applicable material that may benefit plant growth. In 2000, a study was initiated on a Christmas tree farm in Coffee County, Georgia to investigate the benefits of biosolids and yard waste compost applied to Eastern redcedar (*Juniperus virginiana*), Leyland cypress (*Cupressocyparis leylandii*), and Virginia pine (*Pinus virginiana*).

METHODS (2000-2001 Studies)
The compost was applied in the first year trial 6 weeks after planting @ 0, 5, and 10 lbs per tree. There were 10 trees row plots and four replications per treatment per species. Treatment means were tested for significant differences using Duncan’s Multiple Range Test at the 0.05 alpha level. Irrigation, no irrigation, no inorganic fertilization, and standard NPK (6-6-18 @ 1 lb per tree) fertilization were also part of the set of studies. We measured groundline diameter at the end of the first growing season to determine the benefits of the compost. Total height was not measured as all the trees were pruned for Christmas tree production.

RESULTS

Study A - Compost application to Leyland cypress and Virginia pine starting their first growing season with NPK fertilization at planting and irrigation
There was no large growth gain at the end of the first growing season with the compost @ 5 and 10 lbs/tree for Leyland cypress and Virginia pine. Yet there was a general trend of increased groundline diameter growth with the compost especially with the Virginia pine.

Study B - Compost application to Leyland cypress and Virginia pine starting their second growing season with NPK fertilization in year one and irrigation
This study indicated no benefit of the compost application to Leyland cypress and Virginia pine starting their second growing season with fertilization at planting and irrigation.

Study C - Compost application to Eastern redcedar and Virginia pine starting their second growing season with NPK fertilization in year one and without irrigation
At the end of the second growing season, the groundline diameters of the compost treatments (5 & 10 lbs/tree) for Eastern redcedar were significantly different than the untreated control. However, the groundline diameters between the Eastern redcedar compost treatments only were not significantly different.

Virginia pine mean groundline diameter for the 5 lbs/tree compost level was significantly greater than the 10 lbs/tree compost level. However, the 5 and 10 lbs/tree treatments provided no significant gain over the untreated control.

METHODS (2001-2002 Studies)
In this study compost treatments were: (1) incorporated at 10 lbs/tree on 7 February 2001; (2) surface applied at 10 lbs/tree on 19 February 2001, or (3) received no application of compost. The study area was irrigated but no NPK fertilizer was applied.

RESULTS
Study D - Surface and incorporated compost application to Leyland cypress starting their first growing season with irrigation and without fertilization
Compost applications significantly increased mean groundline diameter and total height (Table 5). While trees in the incorporated compost treatment had a greater mean groundline diameter and total height as compared to trees in the surface applied compost treatment, they were not significantly greater.

Study E - Surface and incorporated compost application to Virginia pine starting their first growing season without irrigation and without fertilization
There was a 14 percent reduction in survival with the surface applied treatment as compared to the untreated control and incorporated treatment. However, this difference was not statistically significant. Overall there was no difference in groundline diameter or total height among the three treatments at the end of the first growing season.

SUMMARY
Study A and B
The compost appears to have no adverse effect on growth of Eastern redcedar, Leyland cypress, or Virginia pine. However, on sites receiving irrigation and NPK fertilization there was no large benefit of compost application at planting or at the beginning of the second growing season on Leyland cypress and Virginia pine. On plot without irrigation, Eastern Redcedar groundline diameter was significantly greater for the 10 lbs/tree compost level compared to the untreated control.

Study C
There may be a dual benefit of fertilizer value and reducing evaporative losses when compost is applied to second year Eastern redecder without irrigation if NPK fertilization occurs only in year one. There were no discernable trends for non-irrigated Virginia pine when the compost was applied in the second growing season following NPK fertilization in year one.

Study D
Under irrigation without NPK fertilization, surface application and incorporation of 10 lbs/tree of compost did significantly increase Leyland cypress groundline diameter and total height in the first year after planting.
Study E
The compost, whether incorporated or surface applied, did not significantly increase Virginia pine groundline diameter or total height.

Overall, compost application provided little growth benefit to all species in these studies. Irrigation may be the most important factor to the survival and early growth of Eastern redcedar, Leyland cypress, and Virginia pine under less than normal rainfall patterns assuming reasonable soil fertility.

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CITATION