INEXPENSIVE WAYS TO IMPROVE HOMEBUILDERS TREE SURVIVAL

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Abstract. Observations of trees around recently built single- and multiple-family dwellings in two expanding Georgia cities showed that more than 85% of hardwoods and 95% of pines survived construction, but more than half showed signs of stress. The results suggest guidelines for builders who want to promote the survival and health of trees following home construction on wooded lots.

Résumé. L'observation des arbres situés autour de résidences unifamiliales et multifamiliales récemment construites dans deux villes de Georgia in développement a montré que plus de 85% des feuillus et 95% des pins ont survécu à la construction, mais que plus de la moitié des arbres montraient des signes de dépérissement. Cet article présente les moyens à prendre par les constructeurs pour promouvoir la survie et la santé des arbres suite à la construction de maisons sur les lots boisés.

Much of the recent expansion of Georgia cities has occurred on wooded land. The trees that builders leave on wooded acreage become the instant urban forest for these new neighborhoods. Builders' practices in clearing the lots and protecting remaining trees during construction affect the composition and health of the new landscape.

Georgia builders have come to recognize the economic incentives for leaving trees on construction sites. Two groups of builders in the Piedmont region of Georgia reported having lower costs when they cleared only the areas essential for the construction of house, driveway, and septic tank (6, 7). They also reported an average 7% increase in the sales prices of new homes on wooded lots. In the same region, Anderson and Cordell (1) documented a 3 to 5% increase in sales prices of single-family homes landscaped with trees.

On the other hand, casual observation shows that many trees left around new homes decline within a few years. One reason is that builders seem to understand the economics of trees better than they understand trees' physiological limits and environmental requirements. For example, Seila and Anderson (7) found that builders defined "tree preservation" as simply not cutting trees down (Fig. 1). Few builders had any interest in procedures to protect trees during construction. At most, builders may erect posts or barricades immediately around tree trunks. This action may protect the bark from skinning by heavy equipment, but it does not protect roots, which receive the worst damage from construction.

Not surprisingly, construction damage has become the major cause for urban tree mortality in the region (3, 4, 8). Grade changes can scalp away a tree's roots, utility trenches sever them, and fill dirt or altered drainage can cut roots off from necessary oxygen. Roots can be poisoned when chemicals like paint thinner or cement are poured out on the ground.

Buyers of the new homes lose twice: they pay a higher price for a home on a wooded lot, and within a few years they have to pay again for removal or replacement of dead or dying trees. Large trees left close to a house are especially costly and hazardous to remove. Furthermore, because sizeable trees in poor condition are more likely to be hazardous, construction damage increases the risk of tree-related accidents and property loss (2).

Urban foresters are available to consult with builders about selection of trees to save and about protection of them during construction. Many builders, however, may be more interested in steps they can take independently and at lower cost. Our goal here was to identify low-cost practices that promote the health of the new urban forest left by builders.

Methods

We made two surveys of trees in housing developments in Gwinnett County, near Atlanta, and Clarke County, which includes Athens, Georgia. One survey looked at all homes in 31

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subdivisions in the two counties. This "subdivision survey" was carried out one time. The second survey involved close observation of all trees on the lots of 116 homes, and was made annually for 3 years.

Subdivision survey. In September 1985, we surveyed trees in the front yards of 434 homes in 23 subdivisions of single-family homes, and 8 multiple-family developments. Home prices varied, but averaged $113,000 for single-family units, and $89,000 for multiple-family units. The homes also varied in age, but most (85%) were less than 1 year old and none was more than 7 years old. We determined from existing vegetation that a pine/hardwood mix predominated on 49% of the lots prior to construction. Hardwoods alone were on 23%, and pines alone were on 13% of the lots. The remaining 15% of the lots were treeless, having recently been in agricultural use. We recorded the number of living and dead conifers and hardwoods between the front face of the structure and the street, including any stumps we could locate.

Individual lot survey. Also in September 1985, we selected a random sample of 116 of the homes from the forested subdivisions. At each lot we made detailed observations of each tree over 4 inches in diameter 4½ feet above ground. A total of 974 trees were observed. We revisited the trees in May 1986 and August 1987. For each tree we noted the species, diameter, and condition, plus two features of each tree's growing situation: whether it was part of a relatively undisturbed stand or was alone; and whether it was within 15 feet of any detectable soil disturbance, such as for foundation, driveway, grading, fill, trenching, or drainage. In recording each tree's condition, we noted whether it was dead, showed stress, or showed no apparent injury. We inferred stress if the percentage of dead branches or dieback in the crown, calculated according to Horsfall and Barratt's (5) system for estimating disease incidence, exceeded 10%. We also considered stressed any tree with skinned bark, discolored or thin foliage, and sprouting of green shoots on trunks and main branches (epicormic branching).

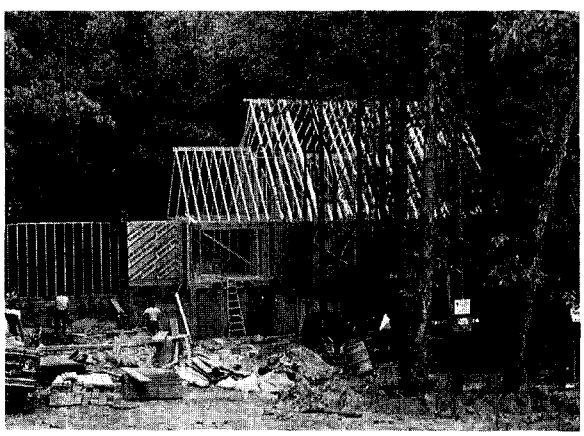

Figure 1. Protecting the roots of trees during construction is as important as protecting the trunk. The shade over this new home may be shortlived because of the extensive soil disruption around the trees.

Results and Discussion

Subdivision survey. We analyzed the number of living and dead trees using the chi-square statistic. Only the statistically significant results (P 0.05) are reported here. The one-time survey of 434 lots indicated that survival was high for both hardwoods and conifers. Mortality of hardwoods peaked at 14% 2 to 3 years after construction. Mortality of conifers occurred at the same low rate (2%) regardless of time after construction.

Hardwoods died in the greatest numbers (12%) on multiple-family lots, and in the lowest numbers (6%) on the more expensive single-family home sites. Conifer mortality was the same on multiple- and single-family developments, but was lower (1%) on the more expensive single-family developments. Survival differences are probably best explained by differences in lot size, with trees on larger parcels exposed to less risk of construction disturbance.

Individual lot survey. Of the 974 trees we observed over 3 years, 879 fell into one of four genera: *Quercus* (oak), *Pinus* (pine), *Liquidambar* (sweetgum), and *Liriodendron* (yellow poplar). The few trees in other genera were omitted from our analysis because our data showed that survival depended upon genus, and we had too few individuals in the other genera to draw reliable conclusions.

The 1985 observations, when construction was most recent, revealed stress symptoms in 27% of the trees. In May 1986, following an exceptionally

dry spring, 55% of the trees were stressed. By August of 1987, after more normal rainfall, there was some recovery and 50% of the trees had stress symptoms. To see what factors contributed to survival or injury for these trees, we analyzed the data using the chi-square statistic (P 0.05).

We found that oaks and yellow poplars fared poorest in terms of survival and condition after construction. Survival for both species was 89%, but 69 and 62%, respectively, were stressed 3 years after construction. Sweetgum was the most robust hardwood, with 93% survival and only 41% of trees showing stress after 3 years. Pines survived best (96%), with 42% showing stress after 3 years.

Trees around multi-family residences were more likely to die (79% survival) or be stressed (70%) than trees around single-family dwellings (95% survival and 40% stressed). Trees located within 15 feet of a soil disturbance were also more likely to die (89% survival) or be stressed (66%) than trees over 15 feet from such disturbances (95% survival, 42% stressed).

Clusters of trees fared only slightly better than trees standing alone (survival 93% and 91% respectively, stress shown in 55% and 58%, respectively). We speculate that the beneficial effect of the undisturbed soil within such clusters was counterbalanced by the continued competition from neighboring trees. During years of normal rainfall, the beneficial effect of leaving clusters of trees might be more apparent than it was here, where the dry 1986 season clearly took its toll on vegetation.

The best survival was among small trees, those under 10 inches in diameter. The condition of trees over 10 inches in diameter often deteriorated as our study progressed, with oaks especially susceptible.

Our data also revealed something about homeowner preferences. Between the 1985 and 1986 surveys, 27 of the study trees were removed by homeowners. Only 16 of the removed trees had been in poor condition in 1985. Homeowners removed 11 healthy trees, all loblolly pines (*P. taeda*). By the following year, another 72 trees had been removed by homeowners. Most of these were rated as dead or in poor condition during the prior survey, but some healthy trees were removed, again with pines more likely to be targeted. We concluded that a small handful of homeowners preferred to remove some pines as part of their landscaping plan. The more important point is that a large majority of homeowners retained every surviving tree left by builders.

Guidelines

Our study suggests some guidelines for the builder who recognizes the economic advantage of wooded lots and wants to improve the chances of buyers enjoying the trees that they have paid for. If there is one idea about trees that we want to impart to builders, it is this: *What's below the ground is as important as what's above ground.* All of our suggestions have to do with protecting the tree root systems to the extent it is practical.

1. Where lots are small, with setbacks of 30 feet or less, leave a cluster of trees standing together; do not leave individual freestanding trees. The cluster becomes a cost-free construction barrier protecting the root systems within the clump.

2. In multiple-family developments, where much open space is used for parking lots, do not leave a few individual trees in narrow open spaces beside such structures. Instead, leave clumps of trees between and behind structures, or wherever there will be a larger area of undisturbed soil.

3. On lots with setbacks of more than 30 feet, establish disturbance-free zones at least 15 feet away from construction activities. Again, leaving clusters of trees in each area provides a cost-free construction barrier.

4. Trees greater than 10 inches in diameter that are within 15 feet of construction, trenching, or grading activity, should be removed unless the builder is willing to take extra steps to protect such trees. Without protection, these trees are especially vulnerable to construction damage.

5. Because large trees are significantly more valuable to most people, builders can easily recover the costs of protecting such trees. A protective barrier should extend outward from the trunk at least 15 to 20 feet to protect as much of the root system of the tree as possible. Chemicals should not be disposed of near this area, and all heavy equipment should be kept off it. No grade

changes should be made in it.

These steps do not guarantee survival. They may, however, improve the odds that new homeowners will reap the benefit for which they have paid a premium. And the true quality of a builder's product will be improved.

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Abstract

ROBINSON, DIANE. 1987. **Of moths and men: the nursery industry battles the voracious gypsy moth.** Am. Nurseryman 166(4): 116-118, 120, 122.

Despite eradication attempts, defoliation by the gypsy moth is severe and widespread. The moth's larvae currently defoliate over 500 species of trees and shrubs. The hungry gypsy moth caterpillars descend on trees each spring in infested areas, causing damage to forest, ornamental and shade trees. There is no organized program to eradicate the moth in the infested Northeastern US, although APHIS does become involved in eradication of isolated cases. The treatments for gypsy moth infestations consist mostly of a bacteria insecticide called Bacillus thuringensis, or B.t. Also used occasionally in gypsy moth control are pesticides such as Sevin, Dimilin and Orthene. Another way to control the moth is with parasites. So scientists are working toward other ways to rid the world of the pesky moth. One of these methods involves second-generation sterilization of male gypsy moth. The future in research appears bright, with new controlling techniques on the horizon. Gypsy moth control has not been the world's greatest success story.