

STREET TREE LOCATION AND SIDEWALK MANAGEMENT PREFERENCES OF URBAN HOUSEHOLDERS

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Householders can be used to evaluate the suitability of individual species of street trees (2,3,4). This paper extends the application of householder surveys to planting location and maintenance of root-damaged sidewalks. The technique assumes that householders are "experts by experience" in regard to street trees that impinge on their lives directly.

The present study describes the use of householder mail surveys to evaluate response to two city planting and maintenance programs. The first program involved the location of street tree plantings as either in the lawn or the house side of the sidewalk, or between the sidewalk and the curb. Using observer's ratings of photographs, Schroeder and Cannon (1) found that both curb and lawn trees contribute significantly to the visual quality of residential streets. Lawn planting has raised some complaints from residents in regard to roots in their lawns. On the other hand, curbside planting has resulted in considerable sidewalk damage and the potential for pedestrian accidents (5).

A second issue is householder response to trees whose roots damage sidewalks. What would householders like the city to do when this occurs? Options included in the survey are 1) installation of an underground barrier to reduce sidewalk damage, 2) sidewalk realignment, 3) replacement by another species less likely to cause damage, and 4) removal of the tree without replacement. Tree location and sidewalk damage are related, in that trees closest to the sidewalk in curbside locations can be expected to cause the most damage. On this basis, we predict that a curbside tree will be associated with greater householder annoyance with sidewalk damage than will a lawn tree.

The goal of the study is to demonstrate the value of householder opinion on planting and maintenance issues. The information can provide useful feedback and guidance for planting and maintenance programs, particularly during lean budget times when programs must be highly selective.

Method

Specific questions about planting location (lawn versus curb) and the most acceptable solution to sidewalk damage were added to the street tree questionnaire used in previous studies. The next step was to choose households associated with any one of eight street trees selected for the survey. The six trees selected in Sunnyvale, California were *Magnolia grandiflora* (Southern magnolia), *Liquidambar styraciflua* (American sweet gum), *Pistacia chinensis* (Chinese pistache), *Geijera parviflora* (Australian willow), *Podocarpus gracilior* (Fern pine), and *Celtis sinensis* (Chinese hackberry). *Fraxinus velutina* 'Modesto' (Modesto ash), and *Platanus occidentalis* (American sycamore) were studied in Redwood City, California. Repeating the procedure used in earlier surveys (2,3,4), a representative sample of households on streets lined with a particular study tree was selected for a mail survey. The return rate was 53 percent of delivered questionnaires, which is relatively high for a mail survey among randomly selected households, indicating the high level of interest among householders in street trees. The respondents in Redwood City were asked to express a preference between lawn and curb street trees. We identified two species within our sample in which there were sufficient numbers of both lawn and curbside trees to permit a within-species

comparison. In Sunnyvale, which has instituted a sidewalk realignment program in cases of root damage, we studied public response to this practice. Circumstances created the opportunity for a mini-study of a single species, *Platanus occidentalis* comparing households whose sidewalks had already been realigned with others for whom this had not yet been done.

Results

Response to Sidewalk Damage. Householders were asked what they would like the city to do in the event of extensive sidewalk damage caused by a street tree. Table 1 shows that the most popular response in the two cities was saving the tree and installing an underground barrier to inhibit further root disturbance. This practice was selected by approximately 40 percent of respondents in both cities. In the city doing sidewalk realignment this was the second most popular option chosen by 34 percent of the respondents. In the city not doing sidewalk realignment, only 9 percent supported this option. The greater favorability shown towards sidewalk realignment in the city using this program relative to the other city was statistically significant, $X^2(4) = 35.0, p < .001$.

In the city doing sidewalk realignment there was a sub-set of households containing *Platanus occidentalis*; in half the cases, the sidewalks already had been realigned and in the other half, sidewalk

repairs had not yet been done. The percentage of householders preferring sidewalk realignment was virtually identical among those for whom this had already been done (42%) and for whom it had not yet been done (43%). However, respondents whose sidewalks had been realigned were significantly less favorably disposed toward their street tree, giving it a lower overall rating, than householders whose sidewalks had not been realigned $X^2(1) = 5.7, p < .05$. The seeming paradox of greater dissatisfaction with their street tree among householders whose sidewalks have been realigned can be explained by the way in which sidewalks were chosen for realignment. The most damaged sidewalks, where tripping liability was highest, were repaired first. Thus, it is not surprising that this group of householders had the most complaints about their tree even though their sidewalks were subsequently realigned.

Preferred Location. Table 2 shows that 74 percent of the respondents presently had a street tree between the sidewalk and the curb. When asked for a preference if they could have a choice, 77 percent opted for the same curbside location, 14 percent had no preference, 7 percent wanted a tree between the house and the sidewalk, and 2 percent gave no answer. Approximately one-quarter of the sample had street trees planted between the house and the sidewalk. Of this number, 40 percent desired a similar location if given a choice, 43 percent had no preference or gave no answer, and 16 percent preferred a curbside location.

The results are similar when one looks at a single species planted in the two locations. Among

Table 1. Preferred remedy for sidewalk damaged by tree roots.

Remedy	City using sidewalk diversion N = 83	City without formal diversion program N = 274
Save tree and insert underground barrier	40%	40%
Save tree and divert sidewalk	34%	9%
Replace tree with another species that won't damage sidewalk	19%	36%
Remove tree and do not replace	4%	4%
Don't know/no answer	4%	11%

Table 2. Preferred location for street tree.

Preferred location	Current location	
	Between house and sidewalk N = 67	Between sidewalk and curb N = 202
Between house and sidewalk	40%	7%
Between sidewalk and curb	16%	77%
No preference	37%	14%
No answer	6%	2%
Total	99%	100%

residents whose *Pistacia chinensis* was located curbside, almost 91 percent preferred this again. However, for those whose *Pistacia* trees were planted in the front lawn, only 29 percent favored the current location and the remainder expressed no preference or desired a curbside location. These results are very interesting in that households with curbside street trees continue to prefer this location. However, familiarity is not such a strong determinant among those residents with city trees planted in the front lawn. Most of this group were undecided or preferred a different location.

Relationship between Planting Location and Annoyance with Sidewalk Damage. Of the six species for which planting location preference had been requested, there were two, the *Pistacia chinensis* and the *Liquidambar styraciflua*, with a sufficient number of lawn and curbside plantings to permit within-species comparison. The other four species showed such a predominance of a single planting location that no internal comparison was possible for this variable. Table 3 shows that both species and planting location had significant effects on householder annoyance with sidewalk damage, in that *Pistacia chinensis* was significantly less annoying than *Liquidambar styraciflua*, $X^2(3) = 6.4, p < .05$. Comparison of the best and worst species-location combinations in Table 3 are striking. Of those residents with lawn plantings of the pistache, only 6 percent expressed major or moderate annoyance with sidewalk damage compared to 83 percent of those with curbside plantings of sweet gum. Conversely, the degree of annoyance of sidewalk damage is roughly equivalent for sweet gums on the lawn

relative to curbside pistache. The combination of planting location and species seem even more important than either factor considered alone.

Discussion

The survey results indicate that householder opinions on tree location and sidewalk damage are neither stereotyped nor simplistic. On both issues, there is statistically significant preference among the residents for one policy over others. However, experience with the non-preferred option tends to increase its favorability.

There were three species in our survey that were also included in the Wagar and Barker (5) inspection of sidewalk damage caused by street trees in cities on the eastern side of San Francisco Bay. The three varieties included in both studies were the American sweet gum, Modesto ash, and the Southern magnolia. All three were in the top half of the ten trees identified by Wagar and Barker as causing sidewalk damage. This was also true in the householder surveys, in which 62 percent, 70 percent, and 71 percent, respectively, of householders asked about the tree species expressed major or moderate annoyance about sidewalk damage caused by tree roots.

Other things being equal, curbside trees are preferred but also cause more annoying damage. Householders must realize that some items which are visually pleasing, such as large trees planted at curbside, may have significant maintenance costs which they will be expected to pay in one form or another. Public education by professionals must convey species characteristics and growth patterns over the life cycle.

Table 3. Relationship between planting location and annoyance with sidewalk damage.

Species and location (n)	Degree of annoyance with sidewalk damage			
	Major	Moderate	Minor	None
<i>Pistacia chinensis</i>				
lawn (n=17)	6%	0%	18%	76%
curb (n=32)	25%	25%	22%	28%
<i>Liquidambar styraciflua</i>				
lawn (n=43)	33%	21%	14%	33%
curb (n=17)	71%	12%	6%	11%

Acknowledgment. This research was supported by a cooperative agreement between the North Central Forest Station and the University of California, Davis. Dr. Phil Barker provided helpful comments.

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