TREE/TURF INTERACTIONS

James Kielbaso
Forestry Department
Michigan State University

Trees and grass evolved, generally, under different ecological regimes. Except in savannahs, they seldom occur together. When we move into cities, we are often desirous of having both on the same piece of real estate. When it comes to golf courses, grass is a necessity, and in my opinion, trees are the addition that makes an otherwise good golf course exceptional and memorable, both as aesthetic enhancement and challenge.

Much of what I know about tree/turf interactions came from Dr. James Beard several years ago when he spoke to the mid-Michigan City Foresters. More came from teaching arboriculture for several years in the Ag. Tech Turf Management program, as well as the occasional round of frustration following the little white ball, or visiting a course in an effort to save trees or advise on hazardous tree situations.

The most obvious tree/turf interactions occur in the shady environment under a tree or trees. In this environment, there is: reduced light intensity; filtered light arriving on the ground with changed qualities; moderated temperature extremes - warmer lows and cooler highs; restricted air movement as compared to open areas; increased relative humidity; less frequent, but heavier dews; increased CO_2 level; and finally, a competition between tree and grass roots for available water and nutrients.

Initially, it seems that all of this favors the tree as the dominant vegetation. In this environment, the grass growth is reduced for both shoot and root. The grass blades are thinner and more succulent, with an increased length and reduced width. Turf is less dense and more upright (etiolated). The grass plants have lower carbohydrate levels and a reduced root system. Finally, with all of the above unfavorable conditions of microclimate and plant physiology and morphology, a disease is able to become established and is highly favored. Disease is what administers the *coup de gras*.

The Compromise

Since both plants are highly desirable on a memorable course, or a beautiful landscape, managers are forced to accept some compromises in an effort to maximize benefits. Use adapted grasses, usually fescues, more tolerant of the shaded environment. Raise the mowing height to 1½ - 2 inches so as to leave a higher shoot/root ratio. Fertilization must be done more cautiously. Fescues do not tolerate much over 1-2# N/ 1000 ft^2/yr. When trees are fertilized, it is usually recommended that 3-6# N/yr. be applied. Trees can normally be adequately fertilized with surface application, but where there is a problem with grass, the old standard of subsurface is suggested, preferably 12" (16-18 better) minimum.

Irrigation should be infrequent and deep. Disease is favored by evening or night irrigation. Morning is best. Red fescue is a dry situation grass. Since grass leaves are thinner and succulent, traffic of any kind should be avoided in these shaded situations.

The compromise from the tree perspective would be to prune lower branches to raise the crown to at least 10 feet, thin the tree from the inside to remove leaf surface, and fertilize deeper. The crown could be thinned so that at least 25% sky can be seen through the crown; this also helps a tree to stand against a windstorm.

Removal of shrubs in the vicinity will allow more wind movement to lower humidity, etc.
When all else fails, another ground cover plant may be used, although this is not likely acceptable for a golf course. In other landscape situations, it may be both acceptable and a best alternative.

Compaction may be a very serious problem from the perspective of both the trees and grasses. Aeration may be one of the most appropriate management techniques where trees and turf interact.

Another possible interaction involves allelopathy as opposed to competition. Much could be said on the subject as to which is the appropriate word. Some suggest that allelopathy is nothing more than competition, while others may take an opposite view.

A Tree Hurts, Too

One of the most severe interactions is the all-too-frequent "mower disease" inflicted on trees by errant mowers. Just because the tree is not knocked down and cut up is not evidence that it has not been injured. Many injuries to the bark and roots result in premature rot, decline and death of otherwise beautiful, well-situated trees. Almost as bad, but affecting young trees especially, is the weed whacker. This wonderful labor saver can render useless a tree that may have cost in excess of $200-$300. A band of wood chips or other mulch might prevent such damage. A band of herbicide, such as Roundup, around the base of valuable trees can do much to assure survival of the tree with a minimal aesthetic loss.

The above are examples of tree damages that can be avoided with only small modifications of practices and training. The unavoidable damage from stray golf balls is another story. Trees near tees often have severe wounding on the tee-side, and small branches are occasionally broken, and even tops of some small trees have been totally broken out.

Trees as Hazardous Interactions

In our litigious society, hazardous trees should be carefully avoided on golf courses. All trees will fail sometime, perhaps prematurely as noted above, but it is prudent to prevent that failure from causing damage. To become a hazard, there must be a potential to fail, a size sufficient to injure or damage, and a target to be damaged. The ISA has published a Guide for Evaluation of Hazard Trees, including a Tree Hazard Evaluation Form. The Minnesota DNR has produced a similar booklet, as has the Bartlett Tree Research Laboratories. Bartlett Labs have adopted a 33% Strength Loss standard for tree removal decisions based on the formula:

$$\%SL = \frac{d^3 + R\,(D^2 - d^2) \times 100}{D^3}$$

Where SL = Strength Loss
d = Diameter of hollow/decay column
D = Stem diameter
R = Ratio of cavity opening (when present) to stem circumference

New tools have been introduced in recent years to offer assistance for hazard evaluation. The Fractometer tests for strength of wood in a tree, and the Resistograph produces a chart of the soundness of wood in a tree.

The fact that trees and turf interact in undeniable. Such interaction implies and requires compromise and vigilance to assure rewarding experiences for all involved.