DR. JAMES B. BEARD

TURFGRASS RESEARCH REVIEW

TREES IMPAIR TURFGRASS GROWTH

Competition between established tree roots and newly seeded Kentucky bluegrass. *C.E. Whitcomb and E.C. Roberts. 1973. Agronomy Journal. 65:126-129. (from the Department of Ornamental Horticulture, Florida Agricultural Experiment Station, Gainesville, Fla. 32603).*

The objective of this study was to determine the effects of silver maple and honey-locust tree roots on the establishment of seeded Kentucky bluegrass as well as on subsequent root and shoot growth. A special connecting-pot technique was used to maintain comparable light intensities over the tree shaded turfgrass plots, with and without tree root competition present. The silver maple and honey-locust trees were grown in four-inch plastic containers. Following potting, each container had 14 major roots extending from the container. These roots were inserted into the bottoms of eight-inch plastic containers and allowed to root for 4½ months prior to planting the Kentucky bluegrass. The soil utilized was a 1:1 volume mix of sand and shredded peat moss, amended with dolomite, superphosphate and a micronutrient fertilizer. The specific root treatments included (a) no tree roots present, (b) one tree root per pot and (c) two tree roots per pot, with and without a turfgrass stand and including both tree species.

After a 4½ month tree root establishment period, the eight-inch pots containing the tree roots were seeded with Kentucky bluegrass and topdressed with a light covering of soil. The existing soil surface and associated tree root system were undisturbed by this planting procedure. Following establishment, the turfs were mowed weekly at a cutting height of 1.5 inches and irrigated twice daily to prevent wilt. Data was collected when the experiment ended. The soil was washed from the root system and dry weight determinations of the grass roots and tree roots were determined as well as the dry weight of the above ground shoot growth. Six replications were utilized.

Results of this investigation showed that both the silver maple and honey-locust roots established prior to seeding Kentucky bluegrass had a significant effect on growth of the Kentucky bluegrass. The Kentucky bluegrass had no significant effect on tree root growth under these experimental conditions. The tree roots reduced Kentucky bluegrass shoot growth by 8 to 15 per cent while root growth was reduced by 63 to 80 per cent. This is a very drastic reduction in root growth. The silver maple roots had a greater effect than honey-locust in reducing Kentucky bluegrass shoot and root growth. In fact, it was observed that the Kentucky bluegrass roots growing in containers with silver maple roots were restricted to the surface soil root zone. Very few roots intermingled with the underlying silver maple roots. This was not the case with the honey-locust where intermingling of roots of both species occurred. The reduction in root and shoot growth of Kentucky bluegrass was greater where the number of tree roots present per plot was increased.

Detailed plant density counts during the establishment period revealed that the tree roots reduced

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the number of bluegrass plants established from seed but had no effect on subsequent tiller development. The authors proposed that the growth inhibition could be the result of allelophathic effects of the tree roots.

Comments: Turfs growing under the shade of trees have a drastically altered microenvironment. There is not only a reduction in light intensity, but also (a) an alteration of light quality, (b) moderation in temperature extremes, (c) decreased wind movement, (d) a higher water vapor content, (e) increased atmospheric carbon dioxide content and (f) competition from the tree root system for both water and nutrients.

The effects of tree shading include three major aspects. One involves a severe reduction in the amount of light energy available for conversion to carbohydrates by photosynthesis. These carbohydrates are vitally important in the maintenance of root and shoot growth and subsequent shoot density-turfgrass quality relationships.

The second aspect involves a modified microenvironment in terms of (a) increased moisture and (b) reduced temperature extremes and wind movement that favors disease development. The shaded, moist environment also produces a succulent, delicate turfgrass tissue that is more prone to fungal infection and subsequent disease development.

The third aspect involves the detrimental effects of the tree root system in competing for water and nutrients. The study of root interrelationships among species in a soil media is very difficult to achieve. The techniques developed by the authors have facilitated an evaluation of tree root-turfgrass root interrelationships when growing in a common soil media. Most of GOLFDOM'S readers recognize the significance of tree roots in competing for light and nutrients. This particular investigation indicates that there are other factors that also affect turfgrass root growth. The allelophathic effects proposed by the authors may involve the volatile release or excretion of organic compounds from the tree roots into the adjacent soil solution or atmosphere where they are capable of adversely affecting turfgrass root and shoot growth. This is a very interesting aspect of shade turf culture, which needs additional investigation.

The main point which should be stressed to GOLFDOM readers reviewing this paper is that even though you are able to maintain adequate nutrient and moisture levels on a specific turfgrass area, the presence of tree roots in the turfgrass soil root zone may still seriously impair turfgrass growth. This situation most commonly occurs on golf course putting greens where large old trees are growing in the immediate vicinity. Over a period of 20 to 40 years a high proportion of the total tree root system can become concentrated under the putting green or tee even though the tree may be growing at some distance from the putting green. The reason for this is the continual supply of moisture and nutrients that is applied to the green throughout the

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growing season, which provides an extremely favorable environment for tree root growth. On the other hand, the presence of these tree roots can create a very adverse effect on turfgrass growth and quality.

The next question is what can be done. The most common practice on greens and tees is to utilize a trenching machine to cut a vertical trench of from 24 to 30 inches in depth completely around the portion of the area into which tree roots might be growing. In the process of this operation, the existing tree roots extending through this soil profile will be severed. The trench can then be refilled and the sod (previously stripped from the area to be trenched) can be transplanted back into its original position.

This technique may have to be practiced at intervals of from four to six years, depending on the particular tree species and conditions involved. As was shown in this study, certain tree species result in greater root competition than others. One is continually amazed at the improvement in shoot density and growth obtained where this root pruning technique is utilized around greens and tees that have previously suffered from tree root competition. It has also been utilized effectively along the edges of fairways.

In summary, ask yourself the question, "Is there a tree root competition problem on my golf course?" Usually the problem will be most severe on greens. It will not result in total loss of turf, but can seriously restrict the surface quality, even though the tree itself may not shade the green for any significant period of time during the day. If a potential problem exists, trenching of one or more greens might be attempted to see if a response can be obtained. It is not an excessively high cost operation, but can pay great dividends in improved turfgrass quality plus a reduction in the maintenance requirements of the turfgrass surface. If a positive response is shown from these initial trials, the operation can then be extended to all tree-root affected green and tee areas on the golf course. □

NEW PRODUCTS

CHIPMAN, Div. of Rodia, Inc., announces EPA clearance of Chipco Spot Kleen for use as a turf fungicide. Spot Kleen is a long residual, nonmercurial, systemic fungicide for control of dollar spot, fusarium blight, large brown patch and stripe smut. A wettable powder, it is uniquely packaged in a plastic jug for easier handling. Spot Kleen is an addition to the Chipco line of professional turf products.

Circle No. 105 on reader service card

CENTURY ENGINEERING CORP., Spray Equipment Division, offers an answer to area control of mosquitoes and flies—the Century Mist Blower/Sprayer, which offers both blower speed with wide coverage, and handgun sprayer convenience and accuracy as standard features. The blower can reach up to 150 feet, depending on air conditions. The valve offers accurate control around breeding areas and hard-to get places. Century points out that features, such as built-in parking stand, safety guards for blower and shielded telescoping PTO drive, are standard for more convenience and safety.

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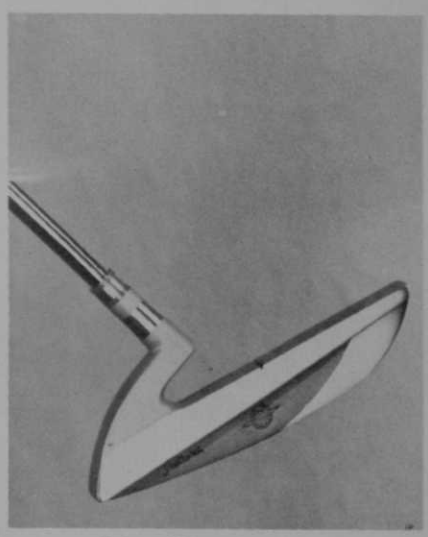
RED HOT PUTTERS, INC., introduces its new chipper iron. The only chipper designed with toe to heel balance and slotted sole. Beautiful bronze head, True Temper shaft and distinctive red grips are also included. Red Hot Putters also features its "Futura" putter, a futuristic putter of unique styling and superb performance. Features include: bronze alloy head, slotted sole, toe to heel balance. True Temper chrome shaft and distinctive red grips.



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W. A. CLEARY CORP. offer Bromosan Systemic Turf Fungicide for year-round prevention and control of all major turf diseases. Used as directed on tees, fairways and greens or on any fine turf area, Bromosan is said to effectively curb dollar spot, brown patch, Helminthosporium, red thread, *Fusarium* blight, Pythium and snow mold—it's a truly all season fungicide. Bromosan is a blend of Cleary's 336 and Thiram. It is systemic, and according to its manufacturer, when sprayed weekly as the only fungicide additive in your spray tank, you're assured of disease-free turf all season long.

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