



*Turfgrass damage caused by golfers moving through a confined area.*

# Bruised, Battered, and Bare

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**W**E'VE ALL SEEN them — the large bare areas near the first tee, the scarred turf at the end of a cart path, the deep worn path between bunkers, the cumulative effect of thousands of rounds of golf and of golfers moving over the course by foot and in carts. We all complain about traffic, but can we do anything about it?

Wear injury is the term we now use to describe the effects of concentrated traffic on turf. Bruising of the leaves is probably the most common type of turfgrass wear. Some cells are ruptured, and frequently the leaf blade dies. Bruising can also create points of entry for disease organisms.

Moisture stress increases the potential for turfgrass damage. Dr. Marvin Ferguson, former Green Section Director, cites the example of a tire filled with air to describe what happens to turfgrass

plants under moisture stress conditions. A tire with adequate air pressure supports the weight of a vehicle with no harm to the tire. If it goes flat, the tire is soon destroyed. Similarly, a turgid cell (one with adequate water) supports weight without injury, but the flaccid cell (one under moisture stress) does not.

Although bruising of the leaves can cause problems, the grass plant normally recovers from this type injury. Injury to the crown or the roots of the plant caused by concentrated and prolonged traffic (either vehicular or foot) over a small area is of greater concern. When the regenerative cells of the crown are damaged, the plant's ability to recover is lessened. As turfgrass managers, we strive to spread traffic over a wide area and adjust our management practices to prevent permanent damage to the turfgrass plant.

Traffic damage is usually obvious to even a casual observer; damage to the underlying soil, however, may not be as noticeable. Foot and vehicular traffic can press soil particles together and create compaction. On clay soils, compaction reorients the clay particles into flat platy layers that restrict air and water movement. Compaction reduces non-capillary pore space, inhibits water infiltration and percolation and reduces oxygen diffusion in the soil, leading to a buildup of carbon dioxide and other gases that are toxic to the root system. As compaction increases, root growth ultimately decreases.

Soil compaction is influenced by soil texture, soil moisture, the severity and type of pressure applied, and the type of vegetation involved. Finer texture clay soils are more easily compacted than sandy soils. Soil modification in the





upper two to three inches with medium to coarse sands can reduce the potential for compaction. Soil is difficult to compact when it is very dry. The potential for compaction increases as soil-water content increases. For example, a 200-pound golfer exerts less pressure per square inch on turf if he is wearing smooth, rubber-soled shoes or golf shoes with recessed spikes than if he is wearing golf shoes where the points of contact with the ground are reduced to the raised areas around each golf spike. Maintenance equipment with narrow tires also exerts more pressure per square inch than equipment with wider tires. Higher mowing heights and thatched turf can also dissipate some of the compaction because of the cushioning effect of plant mass on the soil.

Traffic is a fact of life for present-day golf courses. Many of our older courses were originally designed to accommodate 250 to 300 rounds of golf a week; today they must handle that many rounds in a single day. Turfgrass wear and compaction will result unless management practices are tailored to counteract the effects of traffic in congested areas. Some solutions to our traffic problems can be achieved by agronomic practices; others must be solved by design and routing changes. The first step is to evaluate the reasons why the problem

areas develop, then devise corrective programs to cope with problem areas.

#### Introduce Tougher Grasses

Certain cultivars are more resistant to wear injury than others. Warm-season grasses (except when dormant) are tougher and more resistant to wear than the cool-season grasses. The bermuda and zoysia grasses will tolerate more traffic than species of cool-season grasses, such as the ryegrasses, the bluegrasses, the fescues and the bentgrasses. Of the cool-season strains, perennial ryegrasses are proving to be most wear-resistant. The more wear-tolerant grasses usually have a tougher, coarser stem, a higher shoot density and a higher lignin content. On northern courses, the use of a perennial ryegrass at the end of a cart path would be a better choice over any of the bentgrasses. In areas where bluegrass is the dominant grass, a perennial ryegrass/bluegrass mixture in high traffic areas is worth consideration. It is beneficial to overseed traffic-worn areas regularly, using equipment that places the seed directly in contact with the soil.

#### Use Fertilizers Wisely

As the soils in wear areas become compacted, the root system is weakened. Roots are shortened, and the ability of



*(Top) Properly constructed cart paths are turf savers. Leaf rake used to groove fresh concrete on path to help prevent slippage.*

*(Above) If ball washers and benches are permanently installed, paving, gravel or stone chips are more attractive than bare ground.*

the plant to take up nutrients and water is affected. The plant can no longer reach deep into the soil for the nutrients it needs for recovery. Excessive nitrogen fertilization stimulates rapid shoot growth and produces a soft, succulent growth and makes the plant more injury-prone. An optimum balance of nitrogen to stimulate growth for recovery is needed. This balance is best accomplished with light applications of fertilizer at two- to four-week intervals during the growing months.



Higher potassium levels also seem to increase the wear-tolerance of grasses by increasing leaf turgidity. More frequent application of potassium-containing fertilizers to heavy traffic areas near cart paths, tees and greens may be justified.

### **Adjust Mowing Heights**

Several researchers have documented that soil compaction is reduced when the amount of vegetation is increased. Many courses could benefit from using higher mowing heights in traffic areas that are out of direct line of play — for example, adjacent to cart paths near the tees. The only area that needs to be mowed at a low height is the actual teeing ground. The banks of the tee and areas adjacent to the tee and car path could be maintained at rough height. The added height in those locations could be the difference between a good turf cover and bare ground.

### **Be Sure to Aerate**

Aeration is another means of relieving compaction to provide a better environment for turfgrass growth in traffic areas. The removal of a soil core to a depth of two or three inches encourages better water infiltration and root development. Compacted areas at the end of the cart paths, or adjacent to tees that receive heavy traffic, would benefit from more frequent aeration. If we truly want improved turfgrass in these areas, then more frequent aeration is necessary.

Timing of aeration is important. Soil is most easily compacted when it is wet; therefore, in most areas of the country, compaction is most likely to increase in the spring. Aeration in late spring or early summer is good practice. Also, after a summer of heavy play due to the compactive influence of summer irrigation, aeration would be beneficial in late summer or early fall to relieve compaction prior to winter. On warm-season grasses, aeration is scheduled in summer for best results.

Within the past few years, fiber matting has been introduced for use under turf to protect plants and soils in problem wear areas. This material has been used extensively on athletic fields in Europe, and it is now being tried on a limited scale on golf courses. How extensive its use will become on golf courses remains to be seen.

### **Judicious Irrigation**

The manner in which compacted traffic areas are irrigated will influence the ability of the turfgrass to survive. Once

the soil is compacted by traffic, water infiltration rates are substantially reduced. Water should be applied only as fast and as long as it will move into the soil. This translates into repeated short irrigation cycles on compacted turf. If your irrigation system is not designed to accomplish this, then perhaps use of slow-delivery movable sprinklers is warranted. At the Waverley Country Club, in Portland, Oregon, Rich Schwabauer, the course superintendent, makes extensive use of small lawn-type sprinklers on compacted soils with remarkable success. These small, low gallonage sprinklers are moved several times daily by the sectionmen. It has resulted in less runoff, fewer puddles and standing water, and happier golfers.

All of these agronomic practices are time-consuming, of course. The total acreage affected by these practices will be different at each golf course. However, these practices will reduce the scars caused by heavy traffic. If we expect improvement and good turfgrass, then our budget and planning processes must reflect the added expense to accomplish these goals.

### **Correct Any Design and Construction Problems**

We sometimes encounter traffic and compaction problems because of original design features of the course or the way in which cart paths or similar installations are added. There has been much written and said on this subject and many ideas presented in the past are still relevant today. They should be kept in mind if your course is adding, relocating or improving existing cart paths.

Cart paths leading from tees should curve gently away from the intended direction of play into the rough area or trees. This will encourage a dispersion of traffic over a wider area as the golfers realize that the path is not taking them where they want to go. If this doesn't work, then the use of directional signs and barricades can be used to good advantage.

In areas where golfers have a tendency to pull off the path onto the grass, a low curb can be valuable. The turf and soil should be raised to the level of the curb for ease of maintenance. The curb will help stop the breakdown on the side of the path and will keep the soil and turf near the tee protected.

Another common problem is the entrance and exit areas of tees and greens. Every effort should be made in design to disperse the traffic over as wide an area as possible. On tees, use of portable ball washers and benches is helpful in spreading traffic. If immovable washers are used, paving around the washer is helpful. Narrow paths that funnel around greens and between bunkers may require widening by slightly reshaping one or more bunkers to better disperse traffic.

Problems associated with traffic present a constant challenge. To cope with traffic is part of every good management program. Without heavy play, many courses, but especially our public courses, would not survive. Good management includes intelligent fertility, aeration, irrigation and mowing practices to minimize the effects of traffic. Turfgrass plants can survive if we create a healthful growing medium for them.

*Curbs at strategic locations can help reduce turfgrass wear.*

