Disaster Relief

Promoting Turf Recovery after Hurricanes

Devastation by hurricanes can leave turf managers wondering how to cope with immediate and future problems left by the storm. Obvious damage from uprooted trees, demolished maintenance facilities and damaged irrigation systems are certainly of prime importance, but saltwater brought inland by the storm also has the potential to cause great damage. The following are suggested guidelines for determining and correcting problems caused by hurricanes.

A golf course's greens, tees and fairways are the most important areas to protect from such damage. Of secondary importance are the roughs, driving-range and out-of-play areas. Uprooted trees should be immediately removed from greens and tees. Small indentations made in the putting surface by these trees can be corrected by topdressing lightly (e.g., 0.5 to 1.0 cubic yards) with sand weekly for 2 to 3 months. This topdressing should be incorporated by dragging it in. If the indentations in the greens are quite deep, then physical lifting using a hay fork should be attempted to smooth the surface. Additional topdressing will still probably be needed to smooth the surface. If the indentations are very deep, the sod should be removed, and the area re-graded using shovels and rakes and then re-sodded. Again, light topdressing will be needed to provide a smooth surface.

If a tidal surge or flooding has left debris or a layer of mud or silt on the greens, these should be immediately removed to allow sunlight to reach the turf shoots. Debris is raked and removed by hand. The mud or silt layer should be removed as much as possible by hand using a flat-headed shovel. The area should then be washed with a stream of fresh water to force as much of this material as possible off the surface of the green. The green should then be heavily irrigated in order to flush this material off the leaf surface into the subsoil. The concern with this material being deposited on the greens is that much of it is fine-textured and may clog or reduce internal drainage of the greens.

Test all irrigation sources for salinity levels. Pump out any contaminated irrigation lakes and refill with fresh water. Irrigate from a well or canal if they are not contaminated with salt.

Salinity levels approaching 1200 ppm total soluble salts may damage the turf unless sufficient rainfall or fresh irrigation sources are used to flush the area. Lower levels of soluble salts (e.g., 500 to 600 ppm) can also be problems unless the turf is periodically flushed with fresh water. Blending a water source that has excessive salt with a better quality source often produces an acceptable source. The quality of the poor water source should improve proportionally to the mixing ratio with the better quality water.

In addition to flushing turf periodically with fresh water, good drainage is the other key to salinity management. Verticut and aerify if undesirable silt or clay was deposited onto greens. Aerifying to deep depths (e.g., 8 to 12 inches) may be required to provide adequate internal drainage.

Test the soil for salt. The electrical conductivity (EC) of soils is generally two to ten times greater than the irrigation water applied to them. Soils with electrical conductivity readings between 4 and 12 dS/m have medium levels while those above 12 dS/m are considered to have high salt levels. If a fresh water source is not immediately available and a brackish water source is used, irrigate at rates exceeding evapotranspiration to leach excess salts through the soil. If the soil is allowed to dry out, salt deposits may form on the leaf or soil surface, causing dehydration to the turf. This excess watering should be approximately double that normally used to meet ET demands.

Gypsum (calcium sulfate) can be used to flocculate the sodium off the soil exchange and replace it with calcium. Due to its low water solubility, gypsum works best when it is incorporated directly into the soil. Core

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aeration followed by application provides the best method for turf managers to incorporate gypsum into established turf. Irrigation also is needed to move the gypsum into the soil profile. Once the gypsum reaches and reacts with the salinity in the soil, a minimum of one foot of water through the soil is needed to leach the salt. More may be needed on higher sodium-containing soils. A method to determine whether gypsum is beneficial follows:

- Take a one-quart soil sample from the surface of the area; thoroughly dry and pulverize it until the largest particles are about the size of coffee grounds. Add one heaping teaspoon of powdered gypsum to one pint of the soil and mix thoroughly. Leave an equal amount of soil untreated.

- Prepare two cans, each three to four inches in diameter and four to six inches tall. One open end should be covered with a piece of window screen so water can percolate but soil cannot. Put the treated soil in one can and the untreated soil in a separate can. Fill each about ¾-full and pack each by dropping the can from a height of about one inch onto a hard surface about ten times.

- Fill the can with the irrigation water in question, being careful not to disturb the soil. Collect the water as it drains, and when ½ pint or more is collected from the gypsum-treated sample; compare this volume with that obtained from the untreated sample.

- If less than half as much water has passed through the untreated soil as through the gypsum-treated soil in the same length of time, this indicates that the soil contains excess exchangeable sodium. If so, the addition of gypsum is likely to improve permeability and help reclaim topsoil.

- Increments of approximately 50 pounds of No. 8 sieve gypsum should be applied per 1,000 square feet until a positive response in terms of reducing the EC level occurs. Irrigate with at least one inch of water after each gypsum application.

Bermudagrass, zoysiagrass, seashore paspalum, and St. Augustine grass have good salt tolerance. Grasses used for overseeding generally have less. Perennial ryegrass and creeping bentgrass have medium to good salinity tolerances. Fine fescue and roughstalk bluegrass (*Eoa trivialis*) have poor salinity tolerance. Therefore, those areas with high soil or water salinity levels should be overseeded primarily with ryegrass and/or bentgrass.

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