How to Improve your Cool Season Turfgrass

If your facilities are suffering from unsightly or inadequate recreational, athletic, or grounds turfgrass, you don't have to live with the situation. Here's how to put the green back in turfgrass.

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Quality turf controls erosion, dust, and mud and provides a safe surface for recreational and athletic activities. When conditions become intolerable, however, turf managers may decide to improve turfgrass areas. The process can be as simple as upgrading turf culture and pest control, or as complicated as completely removing the existing vegetation and then reestablishing the turf area. Intermediate between these two options is changing the species of turfgrass grown or replacing turf plants that have died by planting new plant material into existing live or dead turf.

The first step in the renovation process is identifying the cause of damaged or thinned turf. A turfgrass stand may decline for many reasons, including:

- Improper cultural practices
- Drought, heat, or cold stresses
- Weeds, insects, or diseases
- Excessive thatch
- Unfavorable growth environment (shade, poor soil conditions, etc.)
- General neglect, abuse, or overuse

One or more of these conditions may exist. If the cause for poor turf is not obvious, consult a turf expert for assistance.

Once the cause of turf decline is identified, select a turf improvement program that will best upgrade the turf by considering the existing conditions and the desired turf quality. Select a turf improvement program from these three: 1) initiate a program of sound cultural practices, 2) renovate turf by planting into existing live or dead vegetation, or 3) totally reestablish the turf area. In each program, the turf grasses, soil conditions (fertility, pH, and drainage/aeration), thatch levels, environmental conditions (light quantity, quality, and duration), and existing perennial grassy weeds are evaluated.

Initiate a program of sound cultural practices. Many turfgrass areas can be brought to acceptable quality levels by simply altering turf management practices. Turfgrasses that can be improved in this fashion have many acceptable characteristics, but are in an undesirable condition due to improper mowing, irrigation, fertilization, cultivation, and/or pest control practices. For this program to work effectively, the existing turf must be comprised of an acceptable turfgrass species and/or cultivars, have adequate density (or be capable of becoming more dense), have acceptable soil conditions, have a moderate thatch level (1/2 in. or less), have adequate light, and have perennial grassy weeds in small quantities.

To implement this program, you must first evaluate current management practices. Then integrate proper mowing, irrigation, fertilization, cultivation, and pest control practices with existing environmental conditions and turf species to bring turf into desired condition.

Renovate turf by planting new grass seed (overseeding) into existing live or dead vegetation. Often, poor turf requires more than improved cultural practices to reach an acceptable quality. In such a case, planting new seed into existing live or dead turf can be beneficial. This program can upgrade turf by bettering turf appearance, density, disease resistance, weather tolerance, and shade and drought tolerances.

To overseed into live existing turf, proper soil drainage/aeration, pH, and fertility should exist, thatch levels should be less than 1/2-in. thick, and perennial grassy weeds (e.g., nimblewill or quackgrass) should only be present in small numbers. When the area in need of improvement has large populations of perennial grassy weeds, use a nonselective herbicide (e.g., glyphosate) to kill the existing turfgrasses and other vegetation in the area and then plant through the dead plants. When soil conditions are unacceptable, or if excessive thatch is present, use total reestablishment techniques.

How to Repair Small Areas of Dead or Damaged Turfgrasses

1. Roughen the area's soil using a hand rake.
2. Broadcast enough seed into the area to provide about 10 to 20 seeds per sq in.
3. Use a rake to work seed into the soil.
4. Begin irrigation. Continue until germination is complete.
5. As new seedlings grow and develop, begin mowing at normal timing, removing no more than 1/3 of the grass blades at any one mowing.

Live or Dead Turf Planting

Timing: As in establishing turf from seed, there are two periods when reno-

vating by seed is most successful. The first choice time to seed cool season turfgrasses is late summer-early autumn. Seeding at this time allows cool season grasses to develop adequate root systems before the onset of heat and drought the following summer. There is also less competition from annual weeds, and the maturing turf plants usually face fewer disease problems. Spring seeding is an alternative, but a poor second choice compared to seeding in late summer-early autumn. During the spring annual weeds can be troublesome. Also, supplemental irrigation may be necessary to keep spring-seeded turfgrasses alive during hot and dry summer weather.

SELECTING GRASS SEED: Use high-quality seed in adequate quantities to successfully complete the operation. Table 1 provides seeding rates. In general, Kentucky bluegrass, because of low seedling vigor and slow germination, does not perform well when overseeded into dense, actively growing turf. Alternatively, renovating with Kentucky bluegrass can be successful when it is planted into live turf that lacks density due to insects, traffic, diseases, or drought, or into dead turf.

Perennial ryegrass works well when planted into live or dead turf and is normally planted into Kentucky bluegrass or Kentucky bluegrass/perennial ryegrass mixtures. Perennial ryegrass seed is large, germinates vigorously, and its seedlings can compete adequately when seeded into other turfgrasses. Kentucky bluegrass and perennial ryegrass mixtures can be used to seed into dead turf or turf that is open.

Tall fescue seed is also large and germinates well. It is useful for planting into established tall fescue turf to increase density, or it can be planted easily into dead areas of tall fescue turf.

SOIL/SEED CONTACT: It is critical for successful overseeding, whether planting into live or dead turf, that seed be placed into contact with the soil. Seed scattered on top of live or dead turf rarely produces a decent stand. Several methods of placing seed in contact with soil exist. Soil in damaged or small, dead areas can be roughened with a hand rake to open soil to accept seed. After raking and broadcasting seed, use the rake's back side or a stiff-bristled broom to work seed into the soil.

To open soil for seeding in large areas, use gas-powered vertical mowers, slicers, core aerifiers, spikers, or slit-seeders. These types of equipment are often available from rental outlets. Vertical mowers have vertically arranged, rotating blades that can be lowered through the turf to scratch the soil. Scratch soil 1/8 to 1/4 in. deep, and work soil in two directions to produce a crisscross pattern. In large areas, seed is broadcast and worked into the soil by hand, or by using a drag made of a piece of chain link fence or cocoa mats. Slicers are similar to vertical mowers, but make intermittent slits into the existing vegetation and soil.

Core aerifiers open soil by inserting hollow tines into soil and removing plugs of soil. When using a core aerifier for overseeding, it is important that at least 20 plugs per sq ft be extracted. Depending on the type of core aerifier employed, multiple passes may be necessary to achieve this number. After broadcast seeding, allow the plugs to dry and use a drag to work seed into soil and crumble the plugs. Spikers are similar to core aerifiers, but use solid tines to open soil and do not remove soil plugs.

Slit-seeders or mechanical overseeders are considered to be the most convenient method of placing seed in contact with soil. The machine combines a vertical mower with a seed spreader. A slit-seeder opens the soil with a vertical mower, and seed is then metered at a predetermined rate from a holding hopper through feeder tubes and dropped into the slits made by the vertical mowers. Machines often have a roller that firms the soil after seeding. Adjust the slit-seeder to one-half the desired seeding rate, and plant the area twice using a crisscross pattern to obtain uniform seed distribution.

AVAILABLE MOISTURE: To renovate successfully, adequate water must be available from seeding through completion of germination. Try not to allow newly overseeded areas to dry once watering has commenced. Initially, maintain a constantly moist seedbed with frequent waterings of short duration. As newly germinated seedlings begin growth, decrease the frequency and increase the duration of watering to encourage rooting.

TOTAL TURF REESTABLISHMENT. In some cases, existing turfgrasses are in such poor condition or the environment is so unsuitable for supporting turfgrass growth that it is necessary to go through a process of completely reestablishing the turf area. This drastic method of turf improvement is necessary when soil conditions are unsuitable to sustain turf growth and health, when thatch levels are excessive and uncontrollable, or when the existing vegetation (turf or weeds) is in unacceptable condition and cannot be improved. General reestablishment steps include the following:

- Use a nonselective herbicide like glyphosate to kill existing turf and weeds.
- Correct soil pH, drainage, and/or fertility problems by properly preparing the planting bed.
- Select and plant new turf by seeding or sodding the area.
- Supply proper culture for establishment and long-term health.

Turf in Shade

Inadequate light quality, quantity, or duration can lead to turf decline and

Table 1. Overseeding Rates (lb/1,000 sq ft)

	Core Aerifying, Hand Raking, Slicing, Spiking, Vertical Mowing		Slit Seeding
	Live Turf	Dead Turf	
Kentucky Bluegrass	1 to 3	1 to 3	1 to 3
KBG/Perennial Ryegrass Mixes	3 to 6	3 to 4	3 to 4
Perennial Ryegrass	4 to 7	4 to 6	4 to 6
Tall Fescue	6 to 10	6 to 9	6 to 9

poor quality. Use shade-tolerant grasses wherever turf is desired and shade exists. If possible, selectively prune or remove shade-producing plants to open the area and allow additional light to reach the turfgrasses. When shade is desired and existing light is inadequate to support turf growth, select an alternative, shade tolerant ground cover, or an organic or inorganic mulch to cover the area. GE

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Renovating by Overseeding into Large Areas of Live or Dead Turf

1. When overseeding into *live* turf, mow existing vegetation to 1 in. or less.
2. When overseeding into *dead* turf, use a nonselective herbicide like glyphosate to kill existing vegetation. Always read, follow, and understand all label instructions for the safest and most efficient pesticide use. Wait at least seven days, and then mow existing dead vegetation to 1 in. or less.
3. Open soil to accept seed by hand raking, vertically mowing, core aerifying, slicing, spiking, or slit seeding. Unless slit seeding, broadcast adequate seed into seedbed.
4. Mat or rake to obtain good soil-seed contact
5. Begin irrigation. Continue until germination is complete.
6. Two weeks after germination has begun, fertilize with 1/2lb of N per 1,000 sq ft.
7. As new seedlings grow and develop, begin mowing at normal timing, removing no more than 1/3 of the grass blades at any one mowing.

OCWD Invention Helps Fulfill Increasing Water Demands

While the rest of the world continues to use old technology to clean percolation lakes, Orange County Water District (OCWD) is now using four full-scale versions of its patented Basin Cleaning Vehicle (BCV) hood technology. OCWD's cleaning method is unique in that a BCV hood—similar to a swimming pool cleaner—cleans the lake while it is full of water. Traditional methods involve emptying the lake, drying it out, and scraping the bottom with heavy equipment to remove a 1/4- to 1-in. thick clogging layer. The four new barge-like BCV's cost $4 million and are projected to help increase the amount of water available for Orange County residents.

"In a tight urban environment like Orange County, we have been forced to push the envelope to find new ways to put more water into our groundwater basin," said Board President Denis R. Bilodeau. "Since it is difficult and expensive to obtain additional land to build more percolation lakes, developing the BCV significantly increases the efficiency of our existing lakes."

OCWD's percolation lakes act as both a filter and funnel to replenish Orange County's deep groundwater basin with Santa Ana River water and imported water from the Colorado River or Northern California. The groundwater stored beneath Orange County is later pumped out by retail water agencies that provide that water to more than half of Orange County's citizens.

As the water is filtered by the sand and gravel at the bottom of the lake, the clay and silt in the water collects at the bottom. Under the pressure of millions of gallons of water in the lake, the silt is compacted to form a thin "clogging layer"—similar to concrete—that stops or slows percolation into the groundwater basin below.

"We started a six-month percolation study in January of this year to document the specific impact of operating the new shallow lake BCVs on groundwater percolation rates," said OCWD General Manager Virginia Grebbien. "Previous full-scale tests in 2001 and 2002 in another basin not only showed a 30 percent increase in percolation, but also that a basin can operate perhaps twice as long before needing cleaning in the conventional way."

After ten years of research and development, OCWD is now using two models of the BCV—one to clean deep lakes and one for shallow lakes. The shallow lake version—recently installed in four different lakes and currently being tested—are towed along the lake bottom by a cable system, while the deep lake model, still under development, can actually drive itself back and forth along the lake bottom using a global positioning system (GPS). Both versions of the BCV stir up the clogging layer at the bottom of the lake and pump the clay and silt ashore.

For further information, contact Jenny Wedge, Communications Specialist, Orange County Water District at 714-378-3228 or jwedge@ocwd.com.

One of the basin cleaning vehicles (BCV) is for shallow lakes, where it is towed along the bottom by a cable system. Four are now in use.