benches and everything else to high ground. By the time we got there, the water on the soccer fields was from 1 to 2 feet deep. Our three boat docks were 2 inches away from going over their safety pipes. We worked for two hours in water up to our necks securing them and pulling them to high ground to avoid losing them altogether. We worked late into the night, and by early the next morning, water was 4 to 5 feet deep on the soccer fields.

Alternate Fields
With 124 teams coming in two days, Roser had his work cut out. Fortunately, the complex is located in a large industrial park, and the state mental hospital is just up the road with several large plots of land. "We needed 10 fields by 3 p.m. Friday," says Roser, "and only four of our 12 fields were usable. I spent Wednesday going to the state hospital and area factories and businesses, and was able to secure six additional fields."

The response was phenomenal, says Roser. "My crews and I set up fields at the state mental hospital, Dierks Food Warehouse and Atwood Mobile Products. We worked 15 hours Wednesday, Thursday and all day Friday. We bought lumber for makeshift goals, laid out and pointed the fields. We hauled benches, bleachers, cans, nets and all the other paraphernalia needed for soccer. Play started on time.

"We used these off-site fields throughout the season, naturally assuming all insurance coverage and taking over all maintenance. This allowed us to salvage our summer tournaments, but we suffered big losses on concessions."

The flood waters began to recede in late July, after the fields had spent a total of 10 weeks under water. The sight was horrifying for Roser. "The fish population was so extensive that we had bow and arrow fishing on the fields," he says.

"Debris was scattered everywhere. Over our eight main fields, we lost 60 to 70 percent of our turf. The turf on fields 6, 7, and 8 was 95 percent destroyed. Field surfaces were covered with silt up to an inch deep.

Rebuilding the Fields
"Luckily, soccer takes a four- to five-week break in August, and the weather was cool and dry. For the first seven to 10 days all we could do was let the fields dry. Once the fields could support activity, we removed the large debris. Then one crew member spent two days running a Gill spiker over the surface, chipping the dried silt and pulling it into piles. Other crew members raked up the piles and hauled the silt away.

"We had several hundred pounds of grass seed on hand, and immediately ordered another 2,000 pounds. We used a combination of our regular bluegrass blend of Medalist Athletic ProTurf II and a blend of three premium perennial ryegrasses mixed with a starter fertilizer. Following specifications from George Toma and past STMA articles, we began pre-soaking the seed."

The Sportscore staff made full use of the facility's three tractors. They used a 6-foot swath Ryan core aerifier behind a Gill spiker to double- and triple-aerate the fields. They rented a slicer seeder for two weeks and borrowed one from a local golf course for another week to apply pre-soaked seed to the most heavily damaged areas of the field. Dry seed was broadcast over the less-damaged spots, and they mixed their own topdressing to fill in the low spots.

With high school teams, fall leagues and four tournaments scheduled to begin in September, the crew had just a few weeks to get the turf established. As Labor Day approached, the results of their efforts began to show. "One by one we put our fields into play, still using our neighbor's fields to limit turf wear," relates Roser. "By the week after Labor Day we had a decent stand of grass — not great, not good, but decent."

Roser and his staff kept working on the weak areas, aerifying the fields and applying topdressing. They also continued seeding and used nearly 100 bales of straw.

"By October, the fields were looking pretty good and with a cool, moist fall, we eased into winter in fine shape," admits Roser. "We overseeded the entire complex, spending well over $10,000 on seed and fertilizer alone. Fortunately, 80 percent of that cost was covered by the Flood Disaster Act."

Along with the Chicago suburbs, Rockford is a hotbed for soccer in the Midwest, and 1994 turned into a banner year for Sportscore. "Rockford ranks very high in the U.S. in soccer participation per capita," notes Roser. "In 1970 we had one field with limited use. In 1974 the city's first American Youth Soccer Organization (AYSO) program was established with a total of 16 teams. In 1994 Rockford had the third largest AYSO per capita in the U.S., with 4,000 participants that play well over 800 games at our facility."

Several premier soccer clubs use the Sportscore facility to host both spring and fall seasons, pretty much dominating the scheduling on those weekends with 30 to 40 games. The clubs also host several summer tournaments that involve up to 164 teams. "We've had to turn away some of the 180 to 190 teams that wanted to participate in these tournaments," admits Roser. "We also have 10 to 12 local high schools, both private and public, that use Sportscore regularly, five of which designate us as their home field. All of the high schools run a girl's season in the spring, a boy's season in the fall and also bring us some excellent tournaments. Several middle and grade schools use Sportscore for their leagues and games each spring and fall. The Rockford Park District Adult League runs 30 to 40 teams in the fall divided into three groups: men's open, men's 35 and over, and women. This league runs from September 1 through early November and combines with club soccer to keep us at capacity each fall. Finally, Sportscore hosts one or two soccer clinics each summer."

Sportscore hosted a total of 3,700 games in 1994: 2,000 in tournaments, 800 for AYSO, 500 for clubs, 200 high school games, 100 for middle and grade schools and 120 for adult leagues. The demand continues to grow. "We hope to sign a five-year lease on a plot of land adjacent to the complex where we'll be adding five more soccer fields," says Roser.

Roser says cooperation from the park board, user groups, the city and the convention and visitors bureau has been great. "It's an excellent working relationship," he adds.

Aggressive Maintenance Program
Even without the flooding, the extensive field use at Sportscore requires an aggressive maintenance program. "We mow the soccer fields with reel mowers to a height of 1.75 inches in the spring and fall, and 2 inches in the summer," says Roser. "We trim with a 60-inch deck mower. Generally, we'll mow the fields twice a week, on Mondays and Fridays, and fall divided into three groups: men's open, men's 35 and over, and women. This league runs from September 1 through early November and combines with club soccer to keep us at capacity each fall. Finally, Sportscore hosts one or two soccer clinics each summer."

Sportscore hosted a total of 3,700 games in 1994: 2,000 in tournaments, 800 for AYSO, 500 for clubs, 200 high school games, 100 for middle and grade schools and 120 for adult leagues. The demand continues to grow. "We hope to sign a five-year lease on a plot of land adjacent to the complex where we'll be adding five more soccer fields," says Roser.

Roser says cooperation from the park board, user groups, the city and the convention and visitors bureau has been great. "It's an excellent working relationship," he adds.

Aggressive Maintenance Program
Even without the flooding, the extensive field use at Sportscore requires an aggressive maintenance program. "We mow the soccer fields with reel mowers to a height of 1.75 inches in the spring and fall, and 2 inches in the summer," says Roser. "We trim with a 60-inch mower. Generally, we'll mow the fields twice a week, on Mondays and Fridays,
Soccer Field
continued from page 11

though this is adjusted to match turf
growth rates. We always mow prior to
a tournament.

"We have both 72-inch and 30-inch core
aerators. Fields are aerated between
four and six times per year during the
spring and fall. We usually leave the cores
on the field since the gang mower rollers
do a good job of pulverizing them.

"Our commissioners approved
the purchase of a 72-inch Land Pride
seeder to supplement our smaller one.
Overseeding has become a regular part
of the program. We like the strong recu-
perative ability of bluegrass and use
the bluegrass blend as our prime seed.
We supplement this with a perennial rye-
glass blend only when fast fill-in coverage
is needed."

Roser was able to establish an on-site,
irrigated sod field by "borrowing" a 30-
by-400-foot strip around one of the base-
ball diamonds when the outfield was
reduced from 320 to 300 feet. "It meant
a lot of work, moving the fences and
swapping places between the warning
track materials and the established
turf, but the sod is a perfect match when
needed for field repair," says Roser.

"We use soil testing every other year
to tailor our fertilization program. We com-
bine our seasonal orders with the local
parks and golf courses to qualify for
quantity discounts. To further reduce
costs, we purchase our spring and fall
complete fertilizer, with slow-release nitro-
gen in 1,000-pound bags. We
generally fertilize three times per year
and have used 50-pound bags of a fast-
release form of nitrogen as an in-season
supplemental feeding as needed. We'll
be using even more slow-release nitro-
gen in this year's program.

"The complex is equipped with under-
ground piping and a quick-coupler sys-
tem of approximately 280 couplers. We
have a two-person watering crew that
works from 10 p.m. to 6 a.m. and han-
dles 90 percent of the irrigation. Day crews
water or syringe fields as necessary."

Because the fields are in an open
area, broadleaf weeds can infiltrate
easily, says Roser. "We spray all weedy
areas in May, then spot-treat as
needed in the fall. We use preemerg-
ence controls to combat crabgrass and
goosegrass in the walkways that receive
the heaviest use. We've had a few

patches of dollar spot and some areas
where white grubs appeared. These
problems are handled as they arise."

The staff paints the 15 soccer fields
each week. For tournaments a 4-inch line
is applied with a five-gallon power
sprayer. Otherwise, two crew members
handle the painting with three-gallon
compressed air sprayers to save time.

Innovative Problem-Solving

Roser has also developed some
innovative problem-solving practices.
"Our cleanup crew moves the players'
benches every Monday, Wednesday and
Friday as part of their general routine.
A four-person crew moves the bleachers
every Thursday. At the beginning of
each month — or sooner if necessary —
we rotate the bench and bleacher sides
of the fields. On busy weekends, we
may move the players' benches several
times during each day. Occasionally,
we close one side of a field, putting the
benches and bleachers on the same side.
This allows for special maintenance on
the closed side of the field."

Between 1983 and 1985, Sportscore
spent thousands of dollars resodding
goal areas. After close study, Roser
found that goal areas actually get very
little action during a game. "The major
wear is inflicted by the 10 to 12 players
who continually dive and slide in the goal
mouth during pre-game warm-ups," he
admits. In the spring of 1986 the facil-
ity posted signs to inform teams that no
pre-game warm-ups could be conducted
in the goal mouths. The signs are put out
before each game with the corner flags.
"Though we did get a few hassles over this
the first few years, local leagues and
teams that play at Sportscore have come
to understand and appreciate our efforts,"notes Roser. "Several have even put it into
their league rules."

The staff paints the 15 soccer fields
each week. For tournaments a 4-inch line
is applied with a five-gallon power
sprayer. Otherwise, two crew members
handle the painting with three-gallon
compressed air sprayers to save time.

The Sportscore Complex hosted a
total of 3,700 games in 1994, and
demand continues to grow.

FOR PRODUCT INFO FAXED TO YOU NOW! DIAL: 1(800) 817-1889
basically in charge of the seeding and aerification, and Tommy Edell, who is foreman of all the soccer fields, are both full-time employees. Leonard Pinter, who says he's retired, does the lion's share of the mowing.

“Sportscore Manager Bob Papich has been with the park district for 30 years. We've been working together for 25 years and think alike. I couldn't ask for a better arrangement. Papich runs the programs, working with the various facility users, their staffs and associated personnel, such as the umpires and other officials, booster club groups, the park district board, the Rockford city government and the Rockford Convention and Visitors Bureau. While we each concentrate on what we do best, there's lots of interaction, and no one is above doing any task. We'll all pick up trash, move benches or work the concession stands if that's what needs to be done.”

Concessions are a major money-maker for the park district, says Roser. “With all those players and spectators, we sometimes have as many as nine concession stands working.” Roser's wife, Mary, supervises the concession operations. “We kid each other that the only reason she's put up with my long work hours all these years is that she's been out here working, too,” quips Roser. “We celebrate all the major in-season holidays here — Fourth of July, Memorial Day, Labor Day and even our wedding anniversary that falls on May 20th.”

Roser's three children thought of the complex as a very big backyard. Daughter Valerie, who's now in college, works at the complex; Steve Jr., who is in the Army, worked at the complex as well, and even 13-year-old Jennifer helps out where she can.

Roser says joining the STMA was the best decision he has made in his 25 years at the Rockford Park District. “The information provided through STMA-related publications has been highly beneficial,” he notes. “Going to the regional and national conferences has been an outstanding experience. The opportunity to talk to and share information with other sports turf professionals, many of whom are coping with similar challenges, has been instrumental in our successful program.”

Bob Tracinski is the manager of public relations for the John Deere Company in Raleigh, NC, and public relations co-chair for the national Sports Turf Managers Association.

---

Roser solved the sideline-wear problem caused by the three-referee system by making five sidelines for each field. Because the fields are so large, no one is aware of this move except the staff.
Precision Application Depends on Accurate Calibration of Sprayers and Spreaders

By Steve and Suz Trusty

Accurate calibration of sprayers and spreaders allows precise application of material at proper labeled rates in accordance with local, state and federal regulations. The rates listed on product labels have been determined through extensive research and testing to be the most effective to accomplish the task for which the materials are being applied. Using less of the product may not accomplish that purpose and may make a second application necessary, which is more expensive than doing it right the first time. Using more of the product may cause damaging side effects and definitely will be more expensive.

Sprayers

Hand-pressurized and powered sprayers both operate on the same basic principles. Start with clean and well-maintained equipment prior to calibration on both types of sprayers. Calibrate both types using plain water.

Hand-pressurized sprayers

Make sure spray tips are clean. Spray water through the tips to visually check the delivery pattern. On individual tips, check for clogging or uneven delivery of material. Then fill the sprayer tank with a premeasured amount of water, generally 1/2 to one gallon.

Pressurize the unit, but be consistent. For example, always pump 15 times. Once the unit is pressurized, start spraying in a premeasured area of known size. For handheld or backpack sprayers, the best size for a premeasured area is 1,000 square feet. Spray the entire premeasured area.

Then pour the water left in the sprayer into a clean container and measure the amount. Subtract the leftover amount from the beginning amount. The difference is the amount of material actually sprayed based on the walking speed of the person spraying and the pressure level to which the sprayer was set. This determines the amount of liquid sprayed per the premeasured area of the site. Repeat this entire procedure three times to develop consistent results. Always calibrate and spray under standard conditions, with winds of 10 miles per hour or less.

Power sprayers

To check calibration accuracy, check the output of each individual nozzle. First, adjust the operating pressure for your sprayer. Find the numbers on the nozzles that identify the size and style. All nozzles on the sprayer must be identical. Refer to the nozzle manufacturer’s catalog for information on that nozzle. Each specific nozzle will be rated for the capacity of the nozzle in gallons per minute (GPM) at a certain pressure in pounds per square inch (psi). For example, a nozzle may have a capacity of .28 GPM at 20 psi; the same nozzle could have a capacity of .45 GPM at 50 psi.

Calibrate the sprayer by referring to the catalog for the correct pressure setting and the GPM capacity for the nozzles. Adjust the pressure regulator valve to the desired pressure. To avoid excessive wear in actual spraying conditions, run the sprayer at the lowest pressure setting possible to deliver the number of gallons needed.

Make sure the suction-line valve is open. Select a container with easy-to-read measurement marks. Set a specific time interval, such as 30 seconds, and catch the water output from a single nozzle in the container. Measure and record the output. Follow the same steps to check the output from each of the remaining nozzles. Compare the output as delivered by each nozzle.

Any tip with a variance of plus or minus 10 percent should be replaced. Once tips are replaced, repeat the procedure to recheck output accuracy. Continue changing tips until all are within the acceptable, less-than-10-percent range.

When the nozzles are operating properly, recheck the degree of overlap specified by the manufacturer for that nozzle size and type. For example, some nozzles have a 100-percent overlap specified, meaning that each nozzle sprays on each side to the center of the nozzle next to it.

After these adjustments have been made, arrange to test the accuracy of the spray pattern along the boom by operating the water-filled sprayer on a dry portion of an unused paved area, such as a parking lot, with no visible wind movement to alter the spray pattern. Make adjustments as indicated by the spray delivered and recheck for accuracy.

In actual operation, it is essential that the sprayer deliver the precise amount of material per acre (or per 1,000 square feet) recommended by the product manufacturer. The ground speed at which the sprayer travels is combined with all the other factors of the nozzle operation to determine this application rate.

If your sprayer is not equipped with a spray monitor, you’ll need to set ground speed for accurate application of materials. Measure a set distance on a surface similar to that on which spraying will take place. For example, mark off 100 feet for speeds up to five miles per hour; 200 feet for speeds ranging from five to continued on page 16
Dick Butkus says, "KICK-OFF to Terrific Savings with SUPER STRIPER"!

Dick Butkus says, "Tough jobs require the right tool... make the right call with these products!"

Athletic Super Striper

With the Athletic Super Striper you can easily stripe football, soccer and baseball fields with professional results. Well constructed for a lifetime of maintenance free usage, the Athletic Super Striper easily adjusts for 2" - 5" line widths. Get quality, affordability, great features and a lifetime guarantee!

...OR

Stripe Parking Lots! with SUPER STRIPER!

SUPER STRIPE® ATHLETIC

POWER PAINT CARTRIDGES

Specially formulated for bright and beautiful lines and to resist wearing, fading and washing away in the rain. Will not harm grass or turf. Each case of 12 cans has enough paint to stripe one athletic field! Available in White (18 oz.) and Fluorescent Hot Orange (15.5 oz.)

12 cans per case $49.00
Available in quantity discounts!

Also from FOX VALLEY SYSTEMS

easy marker® Perfect for laying out GOLF COURSES, plant locations for LANDSCAPING, underground installation for UTILITY COMPANIES and various marking applications for CONSTRUCTION. Easy Marker Handle Only $8.95

Easy Marker®/Trig-A-Cap® POWER PAINT CARTRIDGES

Made exclusively for use in the EASY MARKER HANDLE and for handheld applications. Comes in paint or in chalk for less permanent marking. Call for the full selection of colors.

U.S. and foreign patents pending 12 (18 oz.) cans per case $28.95

SUPER STRIPE® TRAFFIC

POWER PAINT CARTRIDGES

Perfect for bright crisp lines and comes in a variety of colors. Our paint offers one coat coverage on a variety of surfaces. One case covers about 2,400 linear feet of 3" lines.

12 (18 oz.) cans per case $49.95

SUPER SUPREME® TRAFFIC

POWER PAINT CARTRIDGES

Specially formulated with modified acrylic for a harder finish. Ideal for heavy traffic areas.

12 (18 oz.) cans per case $69.95

See your local dealer for product information or call:

1-800-STRIPES
1-800-787-4737

DEALER INQUIRIES INVITED

HONEST PRODUCTS
HONEST PRICES

FOX VALLEY SYSTEMS
INCORPORATED: CARY, ILLINOIS
DEPT. 4297

©1995 Fox Valley Systems, Inc.
U.S. patent numbers 4126273, 4895304, 4940184, 4943008, 4946104, D320757, D324053 U.S. and other U.S. and foreign patents pending
Speaders & Sprayers
continued from page 14

10 miles per hour. Base the width of the premeasured area on the width of the spray boom. The measuring area should give the equipment a “straight shot” run span appropriate to the type of sprayer being calibrated.

Fill the sprayer tank. Select the gear setting that will be used and run at wide-open throttle at all times. Then operate the unit through the measured area in each direction. Turn the sprayer on and off while at operating speeds and time the spray interval from the beginning to ending point. Average these times. Use the equation or chart below to determine ground speed. With a spray monitor, this determination is done for you.

Repeat this procedure three times for accurate measurement of time and distance. Now that you have determined the time it takes to cover the premeasured area, measure the volume of output from each spray tip for that same time interval. Add the total output from each of the tips to find the total liquid spray rate. That total is the volume of spray that actually will be delivered over the designated area. Again, repeat the procedure to ensure consistency and accuracy.

Individual walking speed may influence the proper calibration of walk-behind spreaders.

With the calibration volume known, you can now mix material according to the calibration rate. To fill a power sprayer with a known output — say 100 gallons per acre — read the product label to find the amount of material that should be applied per 100 gallons or per acre.

GRANULAR SPREADERS

Granular spreaders can be centrifugal-type or drop-type. Drop spreaders deliver material along the base of the hopper directly to the ground below. Centrifugal spreaders deliver material from the base of the hopper onto a dispensing device that rotates, throwing the material in a curving pattern over a distance to the right, front and left of the spreader hopper.

When calibrating either type, always start with clean equipment. Have a premeasured area of known dimensions. Calibrate the equipment with the material that will be applied. Use an amount of material realistic for the size of the spreader, enough to achieve a proper flow.

Drop Spreaders

Place the material in the spreader hopper. Start with some calibration number or letter. This will be easier if you have some experience with the material or if the product label gives a suggested calibration setting. Otherwise, the starting point is a random choice.

With drop spreaders, devices can be attached to the base of the spreader to collect output to measure for calibration determination. Without such a device, use plastic sheeting or butcher paper to collect the material. Walk a known, premeasured distance over this material, opening and closing the spreader while...
walking at a normal, steady pace. Gather the material spread, pour it into a measuring device and weigh it. Be sure to deduct the weight of the measuring device from the total.

Once you know what rate the spreader is delivering material, you can compare that rate to what should be put down. Use the following formula:

\[
\text{rate} \times \text{area} \times \text{analysis of material}
\]

(for example .38 for 38 percent N)

Adjust the calibration number or letter up or down until the proper output rate is achieved. Once that calibration has been reached, repeat the measurement process two or three more times for consistency and accuracy.

**Centrifugal Spreaders**

Centrifugal spreaders have varying kinds of adjustments of distribution. The distribution pattern should be consistent, not skewed to the right or left. The peak of the pattern should be aligned with the center of the spreader.

Determining if a spreader is throwing more heavily to the left or right by sight alone may be difficult; however, kits are available to measure the patterns of some spreaders. For an accurate check without a kit, run the spreader across a series of boxes or grids that catch the material delivered. Measure the material in each container to determine inconsistency.

Most centrifugal spreaders have some form of adjustment to correct pattern skew. The main goal is to make the distribution pattern as even as possible so that the rate of material applied will be the same across the swath of the spreader.

Again, when checking calibration, use a sufficient amount of material to ensure proper flow. Weigh the amount of material put into the hopper. Base your initial calibration setting on product label recommendations if they are available.

To cover the premeasured area, work from the outside pass to the inside passes. Open and close the spreader while moving at a normal, consistent rate. With centrifugal spreaders, speed of movement is important: The faster the spreader moves, the further the material is thrown. At a slower rate of movement, less area is covered with each

---

Kubota’s FZ2100 and FZ2400 with Zero Diameter Turn (ZDT) run circles around the competition.

The power in the innovative FZ front mowers starts with 20 or 24 horsepower, Kubota liquid-cooled diesel engines and continues with the Auto Assist Differential (AAD) drive system that automatically switches between 2WD and 4WD to match operating conditions. With AAD, you get extra power to maneuver easily in wet grass and muddy conditions with the front wheels rotating freely through the tightest turns. The FZ can turn completely around in one spot without damage to the turf, cutting way down the time spent on labor-intensive hand trimming jobs.

For productivity and versatility, Kubota’s F-Series front mowers can’t be beat. The F2400 is 4WD and 24 horsepower, while the F2100 is available in 2WD or 4WD, and has 20 horsepower. Both have Kubota diesel engines, and are equipped with hydrostatic rear-wheel power steering for easy handling. A wide selection of Performance Matched Implements provide the versatility. They include triplex reel, rotary and flail mowers, rotary broom, leaf blower, snowblower, and front blade. Roomy operator’s deck, tilt steering wheel, and excellent visibility increase comfort and productivity.

Your Kubota dealer can show you the complete Kubota turf equipment line with the power and maneuverability to run circles around the competition.

For more information, write to:

KUBOTA TRACTOR CORPORATION
P.O. Box 2992, Dept. ST, Torrance, CA 90509-2992

Financing available through Kubota Credit Corporation.

Circle 105 on Postage Free Card

June 1995 17
Speaders & Sprayers
continued from page 17

pass, and a heavier rate of material is applied. On walk-behind units, the average swath — and therefore the average pass — is 6 to 8 feet. Position each pass so that the leading edge of the swath of the material applied is thrown back to the wheel prints of the previous pass.

Once the area has been covered, pour the material remaining in the hopper into a measuring device and weigh it. Be sure to deduct the weight of the container. Subtract the amount of material remaining from the amount initially placed in the spreader. Use the formula shown above.

Reset the application rate up or down to reach the proper calibration rate for accurate distribution. Once the accurate setting has been reached, repeat the procedure two or three more times to ensure accuracy.

Because material will be applied with each checking process, have multiple premeasured areas on which to apply the product. If a deflector shield is to be used for the outside pass with a centrifugal spreader, check calibration with the deflector attached. Then make appropriate adjustments in the application rates to ensure proper material delivery.

Large, pull-behind spreaders are calibrated in the same manner as smaller, walk-behind units but on a bigger scale. Because emptying a bigger hopper can be difficult, the amount of material left in the hopper usually can be determined from measurement markings inside the hopper or from the difference in starting and ending weight of the total unit.

Adjust for Individuals

Because each person walks at a different rate, each should calibrate walk-behind spreaders or handheld and backpack sprayers individually to arrive at an accurate calibration. Using a tonal stop watch can help set a more consistent walking speed for all personnel.

Once calibrations are set, cross-check them throughout the day. Ideally, this would be done at the beginning of every application. Realistically, check once or twice during the day on areas where measurements are known to ensure accuracy.

Equation for Determining Ground Speed:
Distance (feet) X 60
Time (seconds) X 88
= Speed (MPH)

Chart for Determining Ground Speed:

<table>
<thead>
<tr>
<th>Speed in MPH</th>
<th>Time Required in Seconds to Travel</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>13</td>
</tr>
<tr>
<td>1.0</td>
<td>68</td>
</tr>
<tr>
<td>1.5</td>
<td>46</td>
</tr>
<tr>
<td>2.0</td>
<td>27</td>
</tr>
<tr>
<td>2.5</td>
<td>23</td>
</tr>
<tr>
<td>3.0</td>
<td>20</td>
</tr>
<tr>
<td>3.5</td>
<td>17</td>
</tr>
<tr>
<td>4.0</td>
<td>15</td>
</tr>
<tr>
<td>4.5</td>
<td>13</td>
</tr>
</tbody>
</table>

Accurate application is to everyone's benefit. When applications are done right the first time, results will be more consistent and money will not be wasted.

Compiled from STMA seminar presentations, with special thanks for information provided by Steve Griggs, branch manager of the TruGreen / ChemLawn San Diego Branch, and Don Lindenfelser, field service coordinator for John Deere's Golf and Turf Division.

Befco Cyclone Flex & Super Flex Rotary Finishing Mowers

BEFCO, industry leader with over 750 Flex & Super-Flex units in use across North America, offers flex mowers in cutting widths of 12', 15', 17', 22' and 26' each designed to fit your unique mowing needs.

BEFCO flex mowers offer these outstanding features and many more:
• Quality cut with even thatch disbursement
• 30° up & 15° down flexing; 4" to 6" vertical float
• Zero turning radius capability
• Low tractor HP requirements
• Very low maintenance requirements
• Mowing capabilities of 8 to 18 acres per hour

PRICES START AS LOW AS $8,198
For a 12' unit

Over 1200 dealers across North America
Call Befco for the one nearest you

BEFCO, Inc.
P.O. Box 6036
Rocky Mount, NC 27802-6036
1-800-334-6617
Telefax: 919/977-9718

Befco

18 sportsTURF
Circle 106 on Postage Free Card
How Do Wetting Agents Work?

By Tony Koski

Without water, none of us in this business would have a job. Most of us are constantly trying to develop more efficient ways to irrigate turf. We may reduce the amount of irrigated turf or install more efficient irrigation systems. Most of us pay close attention to soil moisture and plant stress and try to minimize the latter by applying the least amount of water. I would bet that all golf course superintendents use wetting agents somewhere on the golf course, if not everywhere on the course. Have you ever thought about how wetting agents can help you to irrigate more effectively?

Water is a truly unique compound. Individual water molecules have a strong attraction to each other, due to their dipolar nature. (Remember that from high school chemistry?) Water molecules, however, are also strongly attracted to other things in nature such as clay, silt and organic matter. This attraction allows soil to hold water for plant use. Water is not strongly attracted to individual sand grains but rather to the small pores between sand grains of appropriate size (hence the USGA greens mix).

The strong attraction that water molecules have for each other is especially apparent when water is sprayed on a hydrophobic (water-repellent) surface, such as a newly waxed car or a plant leaf. In both cases the waxy surface increases the attraction of water to itself (surface tension), causes the water to “bead up” and prevents it from spreading evenly over the surface. Unfortunately for turfgrass managers, similar hydrophobic conditions can develop in soils, preventing irrigation and precipitation water from moistening soil uniformly. This is why we get hydrophobic soils, thatch and isolated dry spots. In other situations we encounter stratified layers in rootzones as a result of changes in philosophy regarding topdressing materials and/or frequency. Water has difficulty moving between adjacent layers of sand, thatch, soil, peat, sand again, thatch again, and so on. You get the picture.

The time-honored, field-proven method of dealing with these problems is the use of wetting agents. A wetting agent is simply a surfactant (or “surface-active agent”), a material that reduces the attraction of water molecules for each other. This action enables the water to spread more evenly on a hydrophobic surface, to move more quickly through small pores and more effectively across “boundaries,” such as those layers in greens and tees.

As a point of caution, wetting agents should not be considered “miracle cures.” They do not reduce compaction, nor do they affect plant water-use rates. They cannot replace basic cultural practices like proper topdressing frequency, core cultivation, thatch control, installation of proper drainage systems and intelligent irrigation management.

Some of the proven advantages of wetting-agent use include improved water movement in soil, especially in layered soils, and rewetting of hydrophobic rootzones (sands or thatch), which result in reduced turf wilting and improved turf growth and quality. Reduced formation of dew and frost is another valid and proven reason for using wetting agents. Though unproven by research, speculation suggests that wetting agents improve movement of pesticides (particularly insecticides) into the thatch layer and underlying soil.

Potential negative effects are generally seen only with misuse or misapplication. They include phytotoxicity when wetting agents are applied to stressed turf or are not properly watered in; root injury (rare); increased thatch accumulation (healthier turf will form more thatch); and deflocculation (dispersion) of soil particles, which is a potential problem with long-term use of excessive rates.

Brand Choice

Which brand is best? That’s like asking which is the best beer or the best pickup truck. Brands that have large market shares wouldn’t sell if they were not effective wetting agents. Typically, we use the wetting agent with which we have the most experience. They all work in the same manner, and all possess the potential to be misapplied. When trying a new wetting agent, follow the label until you are comfortable with the activity of the wetting agent because the chemistry of various brands can differ greatly. Some of the most effective wetting agents can cause quite severe phytotoxicity when misapplied, but that is the fault of the applicator and not the wetting agent. Treat wetting agents as you would any other chemical tool, and you will avoid trouble.

Residual activity will also vary with the brand that is used, application rates, soil types, amount of thatch, temperature, irrigation regimen and the type of problem that you are attempting to solve. Soil microbes will utilize wetting agents as a food source. These materials can be leached through rootzones, especially on sandy soils.

When isolated dry spots or a layered soil is the problem, core cultivation in conjunction with wetting-agent use is always more effective than wetting agents alone. Regular use of wetting agents in these situations is important because they are not eliminating the condition, only temporarily modifying it. Regular use of wetting agents enhances water infiltration and drainage and results in more efficient water use, fewer overly wet/dry spots and better-quality turf.

Tony Koski is an associate professor with the Department of Horticulture at Colorado State University Cooperative Extension in Fort Collins, CO.
Nitrogen application is a key element in the management of turfgrass diseases. For example, both Microdochium patch (pink snow mold) and Typhula blight (gray snow mold) can be exacerbated by nitrogen application. Apply nitrogen cautiously if these diseases are a problem on your turf.

By Dr. J.M. Vargas Jr.

Cultural management is, of course, only one aspect of a comprehensive program for managing turfgrass disease. The other major components of a disease-management program are resistant cultivars and chemical management. This article deals with the effects of soil fertility, soil pH, watering and mowing on turfgrass disease.

Soil Fertility

Adding nitrogen to soil makes some turfgrass diseases worse but reduces the severity of others. Some diseases in each category are listed in Table A.

Once you know the effect of nitrogen on disease development, timing the nitrogen applications becomes the next important consideration. Nitrogen applied in the spring is not going to solve a stem-rust problem in the fall. Timing nitrogen applications to make a particular disease less severe is not as simple as it may seem. In the course of one growing season, a single turfgrass species may be subject to a variety of diseases, all of which must be taken into account. It would be ideal if each turfgrass species were susceptible to only one disease, for then it would be easy to plan nitrogen applications. Unfortunately, as things are, a program of nitrogen fertilization that alleviates one disease may worsen another.

You must balance disease management with the nutrient needs of the turfgrass plant. Grass plants need nitrogen, so you cannot simply eliminate all nitrogen applications in the interests of disease management. You should apply nitrogen at the time of year when it will assist disease management the most.

After nitrogen, the two most important elements for growing plants are phosphorus and potassium. The role of these elements in controlling diseases has not been determined. If most turfgrasses were subject to only one serious disease, it might be worthwhile to maintain relative concentrations of nitrogen, phosphorus and potassium designed to mitigate that disease. But, unfortunately, most turfgrass species have many diseases during a single growing season, and while it is fairly easy to regulate the nitrogen level, it is difficult to alter the amounts of phosphorus and potassium available to the plant. Phosphorus and potassium tend to be insoluble and thus are not readily leached. It is easy to raise the level of these nutrients in the soil but hard to bring it back down quickly. It would be very difficult to implement any program that required raising and lowering the levels of phosphorus and potassium throughout the season. The simplest solution is to maintain adequate levels of phosphorus and potassium and vary the amount of nitrogen.

Sulfur is known to be a fungicide. It may act to reduce disease directly as a fungicide or indirectly as a plant nutrient. R.L. Goss and C.J. Gould demonstrated control of Microdochium patch with sulfur, and P.H. Dernoeden showed take-all patch was reduced by sulfur. While all this may be well and good, other fungicides and cultural practices can be used to manage these diseases without the potential problems that sulfur poses. Sulfur has been shown to be the primary cause of the black layer. Managing Microdochium patch and take-all patch with sulfur is a little like curing the common cold with chemotherapy. It might do the job, but God help the patient. These two diseases can be managed using less drastic means, but it is very difficult to manage a black layer once it occurs.

Iron is a minor element that is applied when turf becomes chlorotic because of an iron deficiency. This deficiency may occur when low levels of iron are present in the soil or when adequate levels of iron are present in the soil but unavailable due to the high soil pH. When soluble iron

<table>
<thead>
<tr>
<th>Disease</th>
<th>Severity increased by nitrogen</th>
<th>Severity decreased by nitrogen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pythium blight</td>
<td>Dollar spot</td>
<td>Dollar spot</td>
</tr>
<tr>
<td>Brown patch</td>
<td>Rust</td>
<td>Rust</td>
</tr>
<tr>
<td>Gray leaf spot</td>
<td>Red thread</td>
<td>Red thread</td>
</tr>
<tr>
<td>Stripe smut</td>
<td>Pink patch</td>
<td>Pink patch</td>
</tr>
<tr>
<td>Microdochium patch</td>
<td>Anthracnose</td>
<td>Anthracnose</td>
</tr>
<tr>
<td>Typhula blight</td>
<td>Necrotic ring spot</td>
<td>Necrotic ring spot</td>
</tr>
<tr>
<td></td>
<td>Summer patch</td>
<td>Summer patch</td>
</tr>
<tr>
<td></td>
<td>Melting-out</td>
<td>Melting-out</td>
</tr>
<tr>
<td></td>
<td>Leaf spot</td>
<td>Leaf spot</td>
</tr>
</tbody>
</table>