high greatly increases the potential for groundwater contamination. The leaching potential for some fertilizers is shown in the last column of Table 2.

Runoff from turf sites probably presents little hazard to water quality. However, sloppy application of fertilizer onto impervious surfaces like driveways and streets will obviously present a problem when that fertilizer (which often is also a pesticide carrier) runs into storm drains with precipitation. The responsible applicator will guard against this altogether, and will clean up any mistakes by sweeping up misapplied material.

Other nutrients

Remember to test for and maintain adequate potassium levels for your soil type. Research is showing that potassium can be an important enhancer of wear, heat, and drought stress on both cool- and warm-season species. Avoid the temptation to use excessive amounts of potassium in the attempt to produce a "super" turf.

Potassium fertilizers can increase the salinity levels of soils, just as any of the other fertilizers. This can be especially true on heavy, poorly drained soils. A good rule-of-thumb is to apply potassium in no more than a 1:1 ratio with nitrogen. In other words, 4 lbs. of N per 1000 sq.ft. of turf would call for no more than 4 lbs. per 1000 sq.ft. of potassium per season.

You might also try reducing the amount of N you use by making iron a more important part of your standard fertility program. Some turf managers have found that they can substantially reduce annual N rates without sacrificing turf quality by using iron.

Anthony J. Koski, Ph.D. is an associate professor with the Department of Horticulture at Colorado State University Cooperative Extension, Fort Collins, Colorado.
What is the minimum amount of sand I need to till into a field to receive benefits?

Table 1.

<table>
<thead>
<tr>
<th>Particles</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.1 mm</td>
<td>less than 3% by wt.</td>
</tr>
<tr>
<td>&gt; 2.0 mm</td>
<td>less than 3% by wt.</td>
</tr>
<tr>
<td>0.25 to 1.0 mm</td>
<td>more than 60% by wt.</td>
</tr>
</tbody>
</table>

This is a very direct question, and you might think it would have a very simple and direct answer. After receiving this type of question, I start the answer by asking some questions of my own.

What are you trying to accomplish by adding sand, and what is your new expectation for the field?

The assumption is often made that rapidly draining sands will translate into more macro-pores and better drainage when mixed with slower-draining soils. In reality, thorough testing of potential materials must be completed before a mixture of sand and soil can be considered. Recommendations for combining sand and soil based on particle size testing alone are misleading. Performance criteria that define water movement and water holding will have a profound effect on plant growth and surface footing during high-moisture conditions. Additional parameters that must be evaluated when designing a rootzone mix of sand/soil include: bulk density, saturated hydraulic conductivity, aeration porosity, capillary porosity, saturation, organic matter content, and coefficient of uniformity. In most cases, an acceptable saturated hydraulic conductivity of eight to 12 inches per hour requires at least 90 percent sand on a weight basis. So, if you're looking for rapid internal drainage, you will need:

1. A very high sand content in the final sand/soil mix (usually greater than 90 percent by weight).
2. Sand that conforms to the specifications in Table 1.
3. Physical testing of a compacted sample of the sand/soil mixture to insure that the final mix ratio will produce adequate internal drainage (infiltration rate between eight and 12 inches per hour).

How do I mix the sand and soil?

Sand/soil mixtures that meet acceptable performance criteria...
guarantees concerning field performance can be made. By not adding enough sand or by adding the wrong size sand, you could increase compaction and make the situation worse.

David D. Minner, Ph.D., is an associate professor with the Department of Horticulture at Iowa State University. He serves on STMA's Certification Committee. If you have any questions, solutions to past questions, or photos related to questions, send them to Dave at ISU, Hort. Dept., Ames, IA 50011; or call (515) 294-2751, FAX (515) 294-0730, or e-mail dminner@iastate.edu

What if I don't have the budget for off-site mixing and I just want to reduce the hardness of my field for better aerifier penetration, better root growth and improved water infiltration?

Some athletic field soils will not improve with addition of sand, while others have shown benefits. Soils with silt contents exceeding 2-1/2 times that of the clay fraction are not suitable for amendment with sand. Soils having silt-to-clay ratios of 2.0 or less are preferred. As a target, amend at least the top four to eight inches of the existing field. I generally find that field hardness is reduced and growing conditions improve when the final sand/soil mixture contains at least 80 percent sand by weight. Use the sand specifications provided when amending soils. Spread half of the sand on the field and till to your target depth. Apply the other half and till again. Do not till too much; it is better to leave some clods of soil and channels of sand to aid water infiltration. Continue with a regular coring and sand topdressing program so that the sand content near the surface will remain high enough to reduce compaction and improve water movement into the field.

Laboratory designed sand based systems that are mixed off-site and are fitted with a subsurface drainage system are the preferred means of building fields that resist compaction and have rapid internal drainage. To guarantee the performance of a sand/soil mixture, it must be laboratory tested and also mixed off-site. Tilling sand into an existing field may improve some conditions, but few
alk about action! Things were moving at STMA's 9th Annual Conference & Exhibition January 14-18 at Disney's Coronado Springs Resort and Disney's Wide World of Sports complex. The whirlwind of activity started early Wednesday morning, when two busloads headed out for the first Seminar on Wheels tour and another busload of golfers headed for the course. The flurry of activity continued until the last of three busloads returned from the second Seminar on Wheels tour on Sunday.

Cameras caught some of the first tour participants "petting the topiaries" during the behind-the-scenes tour of Disney's Horticulture Center, and "digging into the turf" at Scotts Research facility and in the fields on both tours. There were reports of some great golf; and stories of not so great golf.

Conference sessions were "super," "great," "filled with ideas I can use," and "targeted to solving our problems," according to just a few of the comments from session participants. The round-table discussions were a hit again as well. They participants described them as "really stimulating," "great sharing of ideas," and "my favorite part of a super conference."

The flow of information and exchange of ideas continued at the meet-and-mingle trade show exhibition at Disney's Fieldhouse, the tour of the complex, the on-the-field seed plot review, and the "Products on Parade" demonstrations.

Reggie Williams' welcome displayed his passion for and commitment to better and safer sports turf areas. Great items and auctioneer extraordinaire Tom Curran made the live auction action-filled, lot's of fun and a real plus for the scholarship fund. Conversation and camaraderie flowed during the opening and pre-banquet receptions and around the cookie, coffee and soda tables at the breaks.

Don't miss out. Mark your calendar right now for STMA's 10th Annual Conference and Exhibition January 13 -17, 1999, in Mesa, Arizona.

Chapter News

Welcome to STMA's Newest Affiliated Chapter: The Mid-South Chapter STMA has completed all requirements for affiliation. It was officially recognized as an affiliated chapter by the STMA Board at the January 13 Board Meeting. The Mid-South Chapter serves Tennessee, Mississippi, Alabama, Arkansas, and parts of Louisiana, Missouri and Kentucky.

For more information, contact: Chip Houmes at (901) 377-5081 or Jim Calhoun at (901) 755-1305.

Keystone Athletic Field Managers Organization (KAFMO Chapter STMA): On March 17, the KAFMO Chapter will participate in the Northwest Pennsylvania Athletic Field, Turf, and Ornamentals Conference at Allegheny College in Meadville, PA.

For additional information on this event, contact: Jeff Fowler at (814) 437-7507. For information on other upcoming activities, or on the KAFMO Chapter STMA, contact: Dan Douglas, Reading Phillies Baseball Club, at (610) 375-8469 ext. 212.

Florida Chapter #1 STMA: The Florida Chapter #1 will participate in the University of Florida IFAS Field Day on March 12 in Davie, Florida. Originally scheduled for March 18, the meeting at Pro Players Stadium has been tentatively pushed back to March 24. The topic will be "Field and Equipment Safety."

The chapter is also planning a May 19 meeting that will focus on all-purpose sports field maintenance. It will be held in conjunction with the Miami Shores Parks and Recreation Department.

For more information, contact: John Mascaro at (954) 938-7477.

Midwest Chapter STMA: Plans are in the works for the Midwest Chapter's 1998 events calendar. The chapter has appointed Susan Green Executive Secretary.

Please note the Midwest Chapter's new Hot line number: (847) 622-3517.

The Iowa Sports Turf Managers Association: The Iowa Chapter has a new Board of Directors. The board is as follows: Dale Roe (President), Lori Westrum (Executive Secretary), Mike Andresen, Bill Antons, Ron Crooker, Mike Grooms, Doug Hoffman, Jim Lynch, Rick Simpson, Charles Vance, Brad Vermeer, Kevin Vo, Bryan Wood, and Luke Yoder.

For more information on the Iowa Chapter or upcoming activities, contact: Lori Westrum at The Turf Office, (515) 232-8222 (phone) or (515) 232-8228 (fax).

MAFMO Chapter The MAFMO Chapter STMA will hold a "Specification Writing Seminar" from 8:00 a.m. to 3:00 p.m. on April 16 at the Holiday Inn in College Park, Maryland. Further details will be announced soon. To simplify communication, MAFMO will soon be on the Internet!

For information on this event, the Internet "connection," the MAFMO Chapter, or upcoming activities, contact: the Hot line (410) 290-5652.

The Iowa Sports Turf Managers Association: The Iowa Chapter has a new Board of Directors. The board is as follows: Dale Roe (President), Lori Westrum (Executive Secretary), Mike Andresen, Bill Antons, Ron Crooker, Mike Grooms, Doug Hoffman, Jim Lynch, Rick Simpson, Charles Vance, Brad Vermeer, Kevin Vo, Bryan Wood, and Luke Yoder.

For more information on the Iowa Chapter or upcoming activities, contact: Lori Westrum at The Turf Office, (515) 232-8222 (phone) or (515) 232-8228 (fax).

Colorado Chapter: The Colorado Sports Turf Managers Association has elected its 1998 Board of Directors. The new President is Abby McNeal of
Pleasant View Sports Complex, and
the Vice President is Troy Smith of the
Denver Broncos. Past President is
Dave Rulli of Jeffco Stadium, and
Commercial Representative is Richard
McDonald of RBI. Directors include:
John Kasza of City of Westminster
Parks; Jeff Henke of City of Fort
Collins Parks; Jim Lamb of Littleton
Public Schools; Jim Mueller of City of
Westminster Parks; and Dave
Brueggeman of South Suburban Parks
and Recreation. CSTMA Executive
Secretary is Bobbi
Smith.

The Colorado
Chapter will be
hosting a Winter
Irrigation Clinic
presented by
Hunter Industries
on Tuesday, March
3, at the Denver
Broncos Training
Facility. Topics will
include: precipita-
tion rates, nozzle
selections, pipe siz-
ing and irrigation
hydraulics. Space
is limited and walk-
ups will NOT be
accepted.

For information
on the Colorado
Chapter and
upcoming activities,
call the 24-Hour
CSTMA Chapter
Hot line/FAX: (303)
438-9645.

Minnesota
Chapter: The
Minnesota Chapter
of STMA has
recently elected the following Board
Members: Paul Griffin, President; Joe
Long, President-elect; and Lori
Gislason, Treasurer.

The chapter’s Spring Workshop will
be held on March 25, and the location
will be announced soon.

For information on the Minnesota
Chapter and pending activities, con-
tact: Connie Rudolph at (612) 646-
1679.

Nor-Cal STMA: The Northern
California Chapter of the Sports Turf
Managers Association is in the process
of planning its 1998 schedule of
events. Details will be announced
soon.

For general information about the
chapter, contact: Gail Setka at the UC
Davis Grounds Office, (916) 752-5035
(phone) or (916) 752-9631 (fax).

Southern California Chapter
STMA: For information on the
Southern California Chapter or pend-
ing activities, contact: the Chapter Hot
line (888) 578-STMA (toll free in

Minnesota
Chapter: The
Minnesota Chapter
of STMA has
recently elected the following Board
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will be announced soon.

For information on the Minnesota
Chapter and pending activities, con-
tact: Connie Rudolph at (612) 646-
1679.

A New
Chapter is
Developing: The
Great Lakes
Sports Turf
Managers
Association will
include Ohio and
Michigan, and it
will reach into
areas of Indiana
and Ontario,
Canada. The first
general meeting
will be held at
7:00 p.m. on
March 24 at
Sylvania
Pacesetter Park,
8801 Sylvania
Metamora Road,
Sylvania, Ohio.

For informa-
tion on this event
or on the newly
forming chapter,
contact: Joe
Zelinko of
Athletic Field
Services at (800)
897-9714, or Boyd
Montgomery of the Sylvania
Recreation Corporation at (419) 885-
994-7964.

Nevada Chapter STMA: Plans
are moving forward on the formation
of a Nevada Chapter of STMA.

For information on this developing
chapter, contact: Ibsen Dow at (702)
649-1551.

Great Plains Sports Turf
Managers Association: For informa-
tion, contact: Mark Schimming, City of
Wichita, (316) 337-9129.
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