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Circle No. 134 on Reader Inquiry Card

SHORT CUTS

GOOD ADVICE.....Information on turfgrass management is available to turf care professionals who enroll in the Total Turf Management Program sponsored by Nor-Am Chemical Co. Professionals eligible to enroll include golf course superintendents, turf extension specialists and university personnel with turf programs.

Managers who sign up for the Nor-Am program receive four booklets on various aspects of turf management and reports published throughout the year. Booklets include information on disease control, fertilization, insect control and a calendar guide for turf management. To enroll, contact a local Nor-Am sales representative or write to: Communications Department, Nor-Am Chemical Company, P.O. Box 7495, Wilmington, DE 19803.

ENTER SOON.....Entry deadlines are approaching for three landscaping contests. The 18th Annual ALCA Environmental Awards Program deadline is Sept. 1, 1987. A new category, "Special Event," has been added to this year's competition. For information, contact ALCA at 405 N. Washington St., Falls Church, VA 20046 or call (703) 241-4004.

Deadline for the Florida Nurserymen and Growers Association Landscape Awards Program is June 29. Information on the awards can be obtained from FNGA, 5401 Kirkman Rd., Suite 650, Orlando, FL 32819; (305) 345-8137.

Deadline for the 1987 Amateur Residential Landscaping Competition, a new program sponsored by the National Association of Brick Distributors and the American Society of Landscape Architects, is July 1. Toro will supply prizes for the contest open to homeowners. Complete information and entry forms may be obtained by writing Landscape Contest, Suite 210, 1825 K Street, N.W., Washington, DC 20006, or calling (800) 432-3247.

CRANK ADS..... A new California state bill allows for disconnecting phones of unlicensed contractors who illegally advertise in alphabetical or classified directories published by a telephone corporation. The Contractors State Licensing Board (CSLB) can issue a citation with an order of correction requiring violators to end unlawful advertising and to disconnect phone service to the number displayed in the ad. The California Landscape Contractors Association is encouraging licensed contractors to file complaints against unlawful advertisers. Complaints should be filed with CSLB at P.O. Box 26000, Sacramento, CA 95826.

STRIKE UP THE BAND...Is high school band practice putting excess stress on your football field? Paint lines on the parking lot, says Philedelphia County extension agent Andy McNitt. "They have to have the lines to march," McNitt says. "But if they practice in the parking lot, it can save compaction and wear on the field."

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Westchem Agricultural Chemicals, Inc. Billings, MT (406) 252-3834	Montana, Western North Dakota, Wyoming
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The Yamaha Terrapro work be

Along with sweating, sore limbs and painfully long days.

Introducing the Yamaha Terrapro™. The first ATV with something extra behind it. A rear-mounted PTO.

Or to be more specific, an ASAE standard, 1-inch, 2,000 rpm PTO which oper-

off your workday.

The Yamaha finish mower has three high-lift cutting blades that slice a full 48-inch swath over lawns, golf courses and grounds.

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Both mowers have an adjustable mowing

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And because the blades are forged from tough, heat-treated steel, they'll last



This is the PTO behind the ATV. It helps you get your work done ASAP.



until the cows come home.

For spraying fertilizers, insecticides, herbicides, fungicides* or other kinds of industrial liquids, there's the Terrapro System of sprayers made for Yamaha by Broyhill.

They come in 50 and 100 gallon sizes with a versatile hand-held sprayer that lets you get at those hard to



The Yamaha sprayer with boom will help eliminate insects, fungi, weeds and long days.

ates a variety of mowers and sprayers.

For example, our exclusive Terrapro System of mowers designed for Yamaha by Woods. They trim hours

With the Terrapro hand-held sprayer you can spray anything from crops to cattle.



•Warning: Use of certain chemicals may cause injury and property damage. Read sprayer owner's manual and follow chemical label directions.

180 day limited warranty includes Terrapro and Yamaha mowers and sprayers. Warranty terms are limited. See your Yamaha dealer for details. Dress properly for your ride with a helmet, eye protection, long sleeved shirt, long trousers, gloves and boots. Designed for off-road, operator use only. This product is to be used by one person only.

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The Yamaha Terrapro PTO is an ASAE standard, 1-inch, 2,000 rpm. Translated, that means it's really versatile.



A Yamaha mower trims hours off your workday.

various configurations, so you won't be.

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get places. Around trees. Through fence posts. Under bushes.

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INDUSTRY NEWS from page 8

idents at the development for the repairs if they are caught. Usually it is one of the children doing the damage. Bourne's statistics bear this out. The age group most responsible for the damage is the 17-22 year old, mostly in the lower end. And the damage takes away both time and money (about one or two percent of an annual budget) from the landscapers.

"It's a crime," said Bourne. "Criminal activity of a segment of the population that uses our facilities, and it should be treated as a crime." Bourne suggested getting offenders to do community service work in repairing the damage. "Try to get the kids to devote energy to other projects," he explains. A personal interest in the appearance of the park will make the kid less likely to vandalize again.

An attendee from a university said proper planning could reduce vandalism and general destruction. For colleges, he suggesting using large walks, and where shrubs were destroyed by traffic, using Washington Hawthorne as a sharp deterrent to traffic.

For more on park upkeep, watch for the October issue of *LANDSCAPE MANAGEMENT*.

PEOPLE

Woman super makes the books in Ohio

When *WEEDS TREES & TURF* ran an article on women golf course superintendents last December, we received a number of letters from women who had been overlooked. One woman, Jean Esposito, ran Hinkley Hills, a public course right down the road from our offices.

Now Esposito has made Ohio golf history by becoming the first woman president of the Northern Ohio GCSAA chapter. The chapter of 270 (only two members are women) elected Esposito vice president last November. She became president when the previous president took a job in California.

Esposito's parents Donald and Beatrice Krush built the course on a family farm in 1964. It is still a family-run business. Esposito's husband works as her assistant, while her sister manages the clubhouse.

CONFERENCES

Expo plans to draw 20,000 attendees

The fourth annual International

Lawn, Garden & Power Equipment Expo next month will draw more than 20,000 participants, according to the public relations agency handling the event.

Almost 260,000 square feet of exhibition space has been sold for the Expo, to be held in Louisville, Ky., July 27-29. Thirteen football fields would not fill that much space.

Howard K. Smith, one of America's most distinguished broadcasters, will be headline speaker. Singer Wayne Newton, a top Las Vegas entertainer, will also give a performance.

For more information, call (800) 558-8767. (In Kentucky or outside the continental U.S., call (502) 582-1627.)

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“I can control weeds three times longer just by adding Surflan® to my Roundup.®”



SAFETY TO THE MAX

In September 1986, WEEDS TREES & TURF exclusively reported the story of a college baseball player's death on a synthetic field. The case raised questions which apply to the natural turf industry. In this issue we examine how to accurately measure the safety of fields. This test, although technical, may help you avoid a lawsuit.

by Heide Aungst, managing editor

Editor's note: Scott Halbrook was a 19-year-old freshman on a baseball scholarship at Oregon State University in Corvallis. On March 2, 1982, Oregon's rainy weather forced the team away from the natural practice field onto the AstroTurf football field at Parker Stadium.

Scott, playing left field, collided with the shortstop while running for a short pop fly. The collision knocked Scott backwards. His head hit the AstroTurf. He never regained consciousness.

Anonymous phone calls about the poor conditions of the field prompted Scott's family to hire attorney Dan Holland of Eugene. The Halbrooks filed suit against AstroTurf manufacturer Monsanto, Sports Install Inc. a subsidiary of Monsanto and Oregon State University. The parties settled out of court in September 1985.

The story of Scott Halbrook's death on a college athletic field sent shivers down the spines of field managers throughout the country.

Some natural turf managers shrugged it off since the death occurred on a synthetic surface. Others immediately recognized the ramifications that such a report could have on the natural turf industry.

Natural turf researchers had been looking at making fields safer for several years before the Halbrook case reached the public. But by speaking out, attorney Dan Holland and Scott's father Alan Halbrook got others to recognize that field safety should be a universal concern, not one confined to the artificial turf industry.

This new-found awareness, combined with the liability crisis threatening to doom school athletic programs, has sent scientists in search of practical measurements to set guidelines for field safety.

Setting a standard

The place to start in setting a standard, say researchers, is to look at what already exists. The American Society of Testing Materials (ASTM) has set a test standard (F-355) for measuring the hardness of surfaces. ASTM defines their test method as *the measurement of certain shock-absorbing characteristics, the impact force-time relationships, and the rebound properties of playing surface systems.*

The standard further states, "*this test method is applicable to natural and artificial playing surface systems and to components thereof.*" Although three procedures exist for

GLOSSARY

The following is a glossary of terms used in the measurement of hardness:

Acceleration: The instantaneous time rate of change of velocity which may be positive or negative.

G: The ratio of the magnitude of missile acceleration of gravity, expressed in same units.

G-max: The maximum value of G encountered during impact.

Severity Index: An arbitrary parameter equal to the integral of $G^{2.5}$ times distance times time over the total duration of impact.

doing the test, the most common used on sport surfaces is Procedure A, which uses a cylindrical 20 lb. missile with a 20-inch circular flat metal face.

The problem is that most natural field managers have never heard of the test standard or the terminology used in determining hardness levels. Those natural field managers who are aware of the ASTM test may have learned the hard way.

"The only time I've tested a natural field is when there's a lawsuit," says Dick Schefsky, with Northwest Laboratories in Seattle, Wash. "We test artificial turf all the time. We can use the same equipment to test natural turf."

Dissecting the test

Before field managers can truly understand the importance of cultural practices, such as aerating and mowing, they must understand the basic principals of shock absorbcancy properties on playing surfaces, and the test which determines this. Schefsky says it's important to know this not just for football players, but for cheerleaders and other sports participants who may fall unprotected onto the surface.

DROP TEST

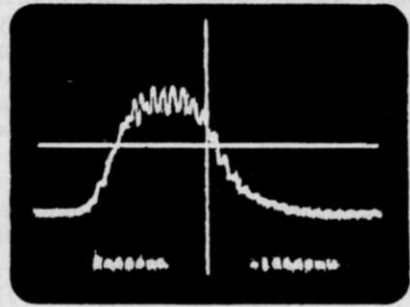
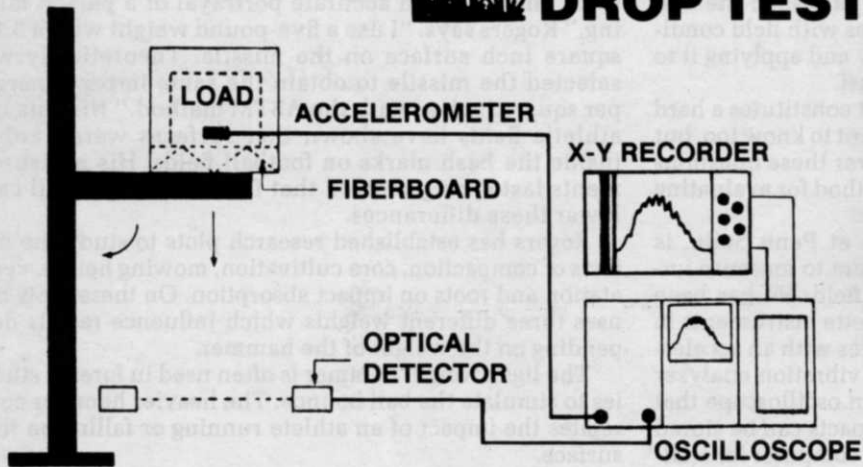


Figure 2: Impact pulse from one drop

Figure 1: An optical detector triggers the scope. The acquired signal is then fed to the floppy disk and an X-Y recorder for permanent storage.

"The deceleration of a falling body that impacts on a surface is one measure of impact absorption," says Don Waddington, Ph.D., soil scientist at Penn State University. "A hard rigid surface would stop the falling body quickly and would absorb little of the energy upon impact. A softer surface has a lower peak deceleration and absorbs more of the energy."

Perhaps a simpler way to understand the test is to imagine holding your arm out stiff and having a baseball thrown at it. If you don't move your arm as the ball hits it, it will sting. But if you move your arm and stop it back by your ear, the hit won't seem as hard because you're actually slowing down the stopping action over a longer period of time.

Not moving your arm simulates a hard surface with a high G-max. Moving your arm represents a softer surface, with a lower G-max.

The ASTM test is done by impacting the surface at a specified velocity with a missile of given mass and geometry. An accelerometer mounted in the missile monitors the acceleration. An accelerometer is a device which produces a voltage proportional to the acceleration it senses. Northwest uses an accelerometer from Vibro-meter Corp. of Billerica, Mass.

The acceleration of the impact is recorded with the aid of an instrument called an oscilloscope, that is an electronic instrument, like a television screen, which gives a visible trace of the voltage vs. time.

When Northwest Labs perform the test, they drop the missile at three different locations on the field. The drop test instrument includes the missile that has an accelerometer attached to it. An electrical signal emitted from the accelerometer is a measure of the deceleration of a missile when it impacts the surface.

The missile falls past an infra-red photoelectric eye. This optical detector and the accelerometer are hooked into an oscilloscope. A recorder attached to the oscilloscope will record the pulse of the drops (see diagram).

This pulse forms a bell-shaped curve. The points on this curve are Gs (gravities). One G equals the acceleration due to gravity. The peak of this curve is called the G-max. The

G-max is what's looked at as the hardness level.

Another example Schefsky uses to explain the test in simple terms is to drop a ball bearing on a piece of steel. The ball bearing will bounce straight up because the surface won't absorb the shock. But if you drop the ball bearing on a pillow, it won't bounce because the soft surface absorbs the shock. The first example would have a high G-max reading. The second would have a lower G-max reading.

After taking the readings in the field, Northwest Labs plugs them into a computer program which reads out the actual deceleration rate. The sophisticated digital oscilloscope (Nicolet Instrument Corp, Madison, Wisc., Model 3091) which Northwest uses, allows them to keep the field readings on a "bubble memory cassette" to be re-examined in the lab.

The price of such equipment, approximately \$5,300 for a digital oscilloscope and about \$500 for an accelerometer, puts it out of the range of most school systems. The cost of purchasing such equipment must also include the guide system, fabrication of a missile, and a recording system. A computer and software program to figure the acceleration is also necessary.

The test and lawsuits

An independent lab can do the testing much cheaper than buying the equipment. Testing fields regularly at a low cost and correcting hardness problems could help school systems avoid major lawsuits and obtain insurance more easily.

"It's desirable to get a third party to do the test," Schefsky says. "I have no stake in the outcome. Third party testing lends credibility for insurance or legal purposes."

Schefsky says Northwest Labs is the only independent lab that he knows of with a portable system. Northwest's specialists will go anywhere in the country for \$575 plus travel expenses.

"You have to put it into the budget," Schefsky says. "But if somebody does get injured, at least you will not have been remiss."

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SAFETY from page 19

Natural turf's impact

Penn State University, which in 1984 published the first solid research correlating sports injuries with field conditions, is taking such known technology and applying it to the special considerations of natural turf.

"Many people are interested in what constitutes a hard or soft field," Waddington says. "We want to know too, but at the same time we are trying to answer these questions we are also trying to develop a good method for evaluating surfaces."

Trey Rogers, a doctoral candidate at Penn State, is working on developing a portable system to measure impact absorption characteristics in the field. He has been using a Clegg impact tester from LaFayette Instruments in Lafayette, Ind. The Clegg impactor comes with an accelerometer. He attaches this to a portable vibration analyzer (Bruel & Kjaer type 2515), which has an oscilloscope that displays the impact curve. Up to 50 impacts can be stored on the analyzer before unloading into a computer for analysis.

Rogers has made some of his own modifications in the

instrument. "The Clegg uses a 10 pound weight. I don't think that gives an accurate portrayal of a person falling," Rogers says. "I use a five-pound weight with a 3.14 square inch surface on the missile. Theoretically we selected the missile to obtain the same impact energy per square inch as with the ASTM method." His data on athletic fields have shown that surfaces were harder inside the hash marks on football fields. His measurements last spring showed that frost heaving of soil can lower these differences.

Rogers has established research plots to study the effects of compaction, core cultivation, mowing height, vegetation and roots on impact absorption. On these plots he uses three different weights which influence results depending on the weight of the hammer.

The light-weight hammer is often used in foreign studies to simulate the ball bounce. The heavier hammer correlates the impact of an athlete running or falling on the surface.

Critics argue that natural turf's hardness level changes whether it's wet or dry. "You can still find out what the

continued on page 24



G-MAX TEST* (Northwest Laboratories, Seattle, Wash.)

Report to: X Stadium
Report On: Artificial Turf

Date: October 29, 1985
Lab No.: E 33859

TEST:

ASTM F355-78
"Shock-Absorbing Properties of Playing Surface Systems and Materials"

Test Site: X Stadium,
Surface: Artificial Turf cemented to resilient pad.
Test Date: September 9, 1985

Test Location Temperature Data	Drop	Time to G max (milliseconds)	Deceleration G's	Severity Index
30-yard line (N.E.)				
Relative Humidity-67%	2	6.0	113	393
Air Temp. 49°F	3	6.0	122	410
Field Temp. 52°F	4	5.5	128	421
Average (Drops 3 & 4)		5.75	125	415.5
50-yard line				
Relative Humidity-57%	2	6.5	116	389
Air Temp. 70°F	3	6.5	104	322
Field Temp. 75°F	4	6.5	108	344
Average (Drops 3 & 4)		6.5	106	333
30-yard line (S.W.)				
Relative Humidity-54%	2	6.5	108	344
Air Temp. 67°F	3	6.5	110	367
Field Temp. 71°F	4	6.0	108	322
Average (Drops 3 & 4)		6.25	109	344.5

INSTRUMENTS:

Manufacturer	Model Number	Serial Number
Oscilloscope: Nicolet	3091	84D00624
Accelerometer (Piezoelectric): Vibro-meter Corp.	501ER	453

*Although this particular test show G-max levels on a synthetic surface, Northwest Labs will perform tests on natural fields.