

New Brunswick, NJ; (732) 932-9271

**17-19: OSU Grounds Maintenance Short Course**, Holiday Inn on the Lane, Columbus, Ohio; (614) 292-7457; (614) 292-7162; www.osu.edu

**18: Connecticut Turf & Landscape Conference, for the Commercial Groundskeepers Association**, Hartford Civic Center, Hartford, CT; (203) 791-8615; (230) 699-9912; email: cgka@snet.net

**Western Canada Turfgrass Association Annual Conference & Show**, Penticton Trade and Convention Centre, Penticton, BC; (604) 467-2564; (604) 467-0500

**20-24: ALCA Executive Forum**, Weston Mission Hills, Rancho Mirage, CA; (800) 395-2522; (703) 736-9668; www.alca.org

**21-23: MFPA Winter ISA Conference**, Lansing Holiday Inn Convention Center, MI; Ann Ashby, (517) 482-5530

**22: Turf & Grounds Exposition II**, Holiday Inn, Suffern, NY; (800) 873-8873; (518) 783-1258

**22-26: Indiana-Illinois Turfgrass Short Course**, Willowbrook, IL; Bev Bratton, (765) 494-8039; (765) 496-2926; www.purdue.edu

**22-26: International Erosion Control Association Conference & Trade Expo**, Nashville Convention Center, TN; (800) 455-4322; www.ieca.org

**23-25: Athletic Field Construction & Maintenance**, Rutgers' Cook College Office of Continuing Professional Education, NY; (732) 932-9271; www.aesop.rutgers.edu~ocpe

**23-25: Western Pennsylvania Turf Conference & Trade Show**, Pittsburgh Expo Mart; Monroeville, PA; (814) 863-3475; (814) 355-7240; www.psu.edu

**24: NJ Landscape '99**, Meadowlands Center, NJ; Mark Graser, (201) 664-6310

**24-25: Southern Illinois Grounds Maintenance School**, Gateway Convention Center, Collinsville, IL; Ron Cornwell, (618) 692-9434; (618) 692-9808; www.uiuc.edu

**24-26: Landscape Contractors Association of MD/DC/VA Winter Workshop**, Univ. of Maryland Shady Grove Conference Center; Desiree Phelps, (301) 948-0810; (301) 990-9771; www.lcadcmdva.org

**24-27: OPEDA annual meeting**, Caesar's Palace, Las Vegas, NV; Julie Thane, (215) 564-3484; (215) 564-2175; www.opeda.org

**25: OSU Extension University Turf School**, Tom's Country Place, Avon, Ohio; Charles Behnke, (440) 322-0127

## MARCH

**2-3: Wood Waste Utilization National Conference**, Lied Conference Center, Nebraska City, NB; National Arbor Day Foundation, (402) 474-5655; (402) 474-0820

**2-4: New England Regional Turfgrass Conference**, Rhode Island Convention Center, Providence, RI; (401) 848-0004; (401) 846-5600; www.nertf.org

**4-7: Association of Professional Landscape Designers Winter Conference**, Ramada Plaza Hotel, San Francisco; Jack Lagershausen, (312) 201-0101; (312) 201-0214; www.apld.com

**9-12: ASCA Arboricultural Consulting Academy**, Rhode Island Hotel Viking; ASCA (301) 947-0483; (301) 990-9771

**10-11: Metropolitan Detroit Landscape Association Convention & Show**, Nova Expo Center, Nova, MI; (248) 646-4992; (248) 646-4994; www.landscape.org

**15-16: OSU Advanced Golf Course Maintenance. Short Course**, Ohio State University; (614) 292-7457; (614) 292-7162; www.osu.edu

**16: Trees, People and the**

**Law Seminar**, Los Angeles; National Arbor Day Foundation, (402) 474-5655; (402) 474-0820

**16: Ohio State University Extension Small Equipment and Safety School**, Tom's Country Place, Avon, Ohio; Charles Behnke, (440) 322-0127

**18: Trees, People and the Law Seminar**, Seattle, WA; National Arbor Day Foundation, (402) 474-5655; (402) 474-0820

**18-21: ALCA Student Career Days**, Univ. of Kentucky, Lexington, KY; Elise Lindsey, (703) 736-9666

**20-25: American Society of Golf Course Architects Annual Meeting**, Charleston, SC; Chad Ritterbusch, (312) 372-7090; (312) 372-6160; www.golfdesign.org

**22: Plant Health Care Seminar**, University of California Extension-Riverside; Jan Crump (909) 787-5804, x1621; (909) 787-2456; email: sciences@ucx.ucr.edu; www.unex.ucr/ns/ns.html

**23: Basic Turf Management Seminar**, University of California Extension-Riverside; Jan Crump (909) 787-5804, x1621; (909) 787-2456; email: sciences@ucx.ucr.edu; www.unex.ucr/ns/ns.html

**24-27: National Truck Equipment Association Annual Convention & Exhibition**, Indianapolis; Joan Christophersen, (800) 441-6832; (248) 489-8590; www.nta.com

**29-30: Building With Trees Conference**, Lied Conference Center, Nebraska City, NB; National Arbor Day Foundation, (402) 474-5655; (402) 474-0820

**31-April 1: CLCA Landscape Industry Show**, Long Beach Convention Center, Long Beach, CA; Kim Heckes, (916) 448-2522; (916) 446-7692; www.clca.org

## APRIL

**13: The Practice of Restoring Native Ecosystems Sem-**

**inar**, Milwaukee, WI; National Arbor Day Foundation, (402) 474-5655; (402) 474-0820

**15: The Practice of Restoring Native Ecosystems Seminar**, Indianapolis, IN; National Arbor Day Foundation, (402) 474-5655; (402) 474-0820

**19-22: North American Snow Conference**, Shaw Conference Centre, Edmonton, Alberta; (816) 472-6100; (816) 472-1610; www.apwa.net

**22-23: Color Magic/Elements of Color, Florida Nurserymen & Growers Association**, Epcot/Orlando, FL; Merry Mott, (407) 295-7994; (407) 295-1619; www.snga.org

**26-28: One Call Systems & Damage Prevention Symposium**, Atlanta; American Public Works Association; (816) 472-6100; (816) 472-1610; www.apwa.net

## MAY

**1-3: Turf & Ornamental Communicators Annual Meeting**, Orlando, FL, (612) 758-6340; (612) 758-5813; www.toca.org

**11: Trees, People and the Law Seminar**, Cincinnati, Ohio; National Arbor Day Foundation, (402) 474-5655; (402) 474-0820

**11: Trees and Utilities Seminar**, Charlotte, NC; National Arbor Day Foundation, (402) 474-5655; (402) 474-0820

**13: Trees, People and the Law Seminar**, Minneapolis, MN.; National Arbor Day Foundation, (402) 474-5655; (402) 474-0820

**19: North Carolina Turf & Landscape Research Field Day**, North Carolina State University, Raleigh, NC; Gene Maples, (910) 695-1333; (910) 695-1222

**25: Las Vegas Nevada Landscape Association Trade Show & Conference**, Tropicana Resort and Casino, Las Vegas, NV; Debbie Drew, (702) 673-0404; (702) 673-5828

JUNE

**15: 17th Annual Field Day,** Pure Seed Testing East Research Facility, Rolesville, NC; (919) 556-0146; (919) 556-0174

**17-19: Southeast Greenhouse Growers Conference,** Palmetto Center, Greenville, SC; (800) 453-3070; (706) 883-8215; www.sgtcs.org

JULY

**21-23: Turfgrass Producers International Summer Convention & Field Days,** East Lansing Holiday Inn, MI; Tom Ford, (847) 705-9898; (847) 705-8347; www.turfgrassod.org

**21-25: ALCA conference,** Chicago Hilton O'Hare; Joan Haller, (800) 395-2522; (703) 736-9668; www.alca.org

**24-26: International Lawn, Garden & Power Equipment Expo,** Kentucky Exposition Center, Louisville, KY; (502) 562-1962; (502) 562-1970; www.EXPO.mow.org

**26-31: Perennial Plant Association Symposium,** Lansing, MI; Dr. Steven Still, (614) 771-8431; (614) 876-5238; www.perennialplants.org

**27: Midwest Regional Turf Field Day,** West Lafayette, IN; Bev Bratton, (765) 494-8039; (765) 496-2926; www.purdue.edu

**27-29: Penn Allied Nursery Trade Show,** Fort Washington Expo Center, Fort Washington, PA; Sandy Seltzer, (717) 238-1673; (717) 238-1675; www.pantshow.com

AUGUST

**1-4: International Society of Arboriculture Conference,** Stamford, CT; Lisa Thompson, (217) 355-9411; (217) 355-9516; www.ag.uiuc.edu~isa

**4: Summer Field Day, Midwest Ground Covers, St.** Charles, IL; Illinois Landscape Con-

tractors, (630) 932-8443

**6-8: TAN-MISLARK Nursery, Garden, Landscape Supply Show, Texas Association of Nurserymen,** Dallas Convention Center, Houston; Amy Prenger (800) 880-0343; (512) 280-3012; www.grow-zone.com

**7-9: Southern Nursery Association World Showcase of Horticulture,** Georgia World Congress Center, Atlanta; Montoya Woods, (770) 973-9026; (770) 973-9097; www.sna.com

**10-13: Florida Turfgrass Association Conference & Trade Show,** O'Connell Center, Gainesville, FL; Jane Rea, (800) 882-6721

**8-11: Soil & Water Conservation Society Annual Conference,** Grand Casino, Biloxi, MS; Charlie Persinger, (515) 289-2331; (515) 289-1227; www.swcs.org

**18: Univ. of Rhode Island Turfgrass Field Day,** Kingston Campus, RI; Dr. Noel Jackson, (401) 874-2932; (401) 874-4017

SEPTEMBER

**8-11: RISE Annual Meeting,** Beaver Creek, CO; Elizabeth Lawder, (202) 872-3860; (202) 463-0474; www.acpa.org/wise

**9-10: Southwest Horticultural Trade Show, Arizona Nursery Association,** Phoenix Civic Plaza, Phoenix; Cheryl Goar, (602) 966-1610; (602)966-0923; www.azna.org

**12-16: American Society of Landscape Architects Annual Meeting,** Boston; Angela Wilson, (202) 898-2444; (202) 898-1185; www.asla.org

**16-18: Florida Nursery & Allied Trade Show,** Orange County Convention Center, Orlando, FL; Sabrina Wade, (407) 295-7994; (407) 295-1619; www.fnga.org

**19-22: International Public Works Congress & Expo,** Denver; Eastern United States and

Canada call (800) 988-9218; Western United States and Canada call (800) 525-9154

**26-28: The Fertilizer Institute, World Fertilizer Conference,** Marriott Marquis, New York, NY; Robin Hailer, (202) 675-8250; (202) 544-8123; www.tfi.org

**27-30: Hawaii Mid-Pacific Horticultural Conference & Trade Show,** Edith Kanakaole Stadium, Hilo, HI; Jo Ann Johnston, (808) 969-2088 (phone or fax); www.hena.org

OCTOBER

**8-9: Associated Landscape Contractors Association of America, Masters in Management for the Landscape Industry seminar,** Hartford, CT; Kathy Wemhoff, (800) 395-2522; (703) 736-9668; www.alca.org

**20-22: Southwest Turfgrass Annual Conference & Trade Show,** Ruidoso, NM; (505) 275-2576; (505) 292-9815

NOVEMBER

**3-5: Eastern Regional Nurserymen's Association Expo '99,** Atlantic City Convention Center, Atlantic City, NJ; Lynn, (800) 376-2463; (301) 990-9771

**4-6: National Arborist Association Tree Care Industry Expo,** Convention Center, Indianapolis; Carol Crossland, (800) 733-2622; (603) 672-2613; www.natlarb.com

**7-9: International Irrigation Expo & Technical Conference,** Orlando, FL; Denise Stone, (703) 573-3551; (703) 573-1913; www.irrigation.org

**7-9: Georgia Golf Course Superintendents Association Annual Meeting,** Jekyll Island Club Hotel, GA; Karen White, (706) 769-4076; (706) 769-8164; www.ggcsa.com

**9-11: Penn State Golf Conference,** Nittany Lion Inn, State College, PA; (814) 863-3475;

(814) 355-7240; www.psu.edu

**9-12: New York State Turfgrass Association Conference & Show,** The ONCenter, Syracuse, NY; Beth Seme, (518) 783-1229; (518) 783-1258; www.nysta.org

**13-16: Green Industry Expo (ALCA, PGMS, PLCAA),** Baltimore; Eleanor Ellison, (770) 973-2019; (770) 598-6071; www.plcaa.org

**29-Dec. 2: North Central/Illinois Turfgrass Foundation Expo,** (312) 201-0101; (312) 201-0214; www.turf.uiuc.edu

DECEMBER

**Dec. 6-9: Ohio Turfgrass Foundation Conference & Show,** Columbus Convention Center, Columbus, Ohio; Julie Weller, (614) 760-5442; (614) 760-5431

**7-9: New Jersey Turfgrass Expo,** Taj Mahal Casino/Resort, Atlantic City, NJ; Dr. Richard Caton, (732) 821-7134; (732) 821-8157; www.njturfgrass.org



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**Significantly less mole cricket damage**

**Deeper green color**

- better color with lower nitrogen input

**Better drought tolerance**

**Improved traffic tolerance**

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uniform**

- will only be grown and  
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sod/sprigs to ensure purity



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*Developed at the Coastal Plain Experiment Station, Tifton, GA By Wayne Hanna, USDA/ARS Geneticist.*

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**FEDERAL HIGHWAY ADMINISTRATION DEPARTMENTS**

*Under regulations of the U.S. Department of Transportation, Office of Motor Carrier Safety, (202) 366-4001, drivers of trucks weighing more than 26,000 lbs. must be tested for drug use by the employer. Other regulations for trucks this size and smaller—plus other commercial vehicles—vary according to state laws.*

National/state internet address:  
[cti1.volpe.dot.gov/fhwa/omchome.html](http://cti1.volpe.dot.gov/fhwa/omchome.html)

STATE	PHONE NO.	FAX NO.
Alabama	(334) 223-7244;	(334) 223-7700
Alaska	(907) 271-4068;	(907) 271-4069
Arizona	(602) 379-6851;	(602) 379-3608
Arkansas	(501) 324-5050;	(501) 324-6562
California,		
Northern	(916) 498-5050;	(916) 498-5008
California,		
Southern	(909) 653-2299;	(909) 653-6969
Colorado	(303) 969-6748;	(303) 969-6740
Connecticut	(203) 659-6700;	(203) 659-6725
Delaware	(302) 734-4216;	(302) 734-5380
Dist. of Columbia		
	(202) 523-0178;	(202) 523-0181
Florida	(941) 686-1294;	(941) 686-4431
Georgia	(404) 347-4966;	(404) 347-1723
Hawaii	(808) 541-2700;	(808) 541-2704
Idaho	(208) 334-1842;	(208) 334-1691
Illinois	(217) 492-4602;	(217) 492-4986
Indiana	(317) 226-7474;	(317) 226-5006
Iowa	(515) 233-7400;	(515) 233-7494
Kansas	(785) 267-7288;	(785) 267-7290
Kentucky	(502) 223-6779;	(502) 223-6767
Louisiana	(504) 389-0390;	(504) 382-2040
Maine	(207) 622-3858;	(207) 626-9133
Maryland	(410) 962-2889;	(410) 962-3916
Massachusetts		
	(617) 494-2770;	(617) 494-2783
Michigan	(517) 377-1866;	(517) 377-1804
Minnesota	(612) 290-3260;	(612) 290-3256
Mississippi	(601) 965-4219;	(601) 965-4674
Missouri	(314) 636-3246;	(314) 636-9283
Montana	(406) 449-5305;	(406) 449-5314
Nebraska	(402) 437-5521;	(402) 437-5146
Nevada	(702) 687-5335;	(702) 687-3803
New Hampshire		
	(603) 225-1626;	(603) 225-1602
New Jersey	(609) 637-4222;	(609) 538-4913
New Mexico	(505) 346-7858;	(505) 346-7859
New York	(518) 431-4136;	(518) 431-4140
N. Carolina	(919) 856-4378;	(919) 856-4369
North Dakota	(701) 250-4346;	(701) 250-4395
Ohio	(614) 469-5657;	(614) 469-5584
Oklahoma	(405) 945-6047;	(405) 605-6170

Oregon	(503) 399-5775;	(503) 3995838
Pennsylvania	(717) 782-4443;	(717) 782-4852
Puerto Rico	(809) 766-5985;	(809) 766-5603
Rhode Island	(401) 528-4578;	(401) 528-4542
S. Carolina	(803) 765-5414;	(803) 765-5413
S. Dakota	(605) 224-8202;	(605) 2241766
Tennessee	(615) 781-5781;	(615) 736-2649
Texas	(817) 633-6875;	(817) 633-8243
Utah	(801) 963-0096;	(801) 963-0093
Vermont	(802) 828-4480;	(802) 828-4424
Virginia	(804) 281-5120;	(804) 281-5121
Washington	(360) 753-9875;	(360) 753-9024
West Virginia	(304) 347-5935;	(304) 347-5617
Wisconsin	(608) 829-7530;	(608) 829-7540
Wyoming	(307) 772-2305;	(307) 772-2011

Iowa	(515) 281-8591;	(515) 242-6497
Kansas	(785) 296-2263;	(785) 296-0673;
	records@kda.state.ks.us	
Kentucky	(502) 564-7274;	(502) 564-3773
	llill@agr.smag.state.ky.us	
Louisiana	(504) 925-4578;	(504) 925-3760;
	carol@ldaf.gen.la.us	
Maine	(207) 287-2731;	(207) 287-7548;
Maryland	(410) 841-5710;	(410) 841-2765;
	settingme@mda.state.md.us	
Massachusetts		
	(617) 727-3000;	(617) 727-7235;
Michigan	(517) 335-6542;	(517) 335-4540;
	rosenbaum@state.mi.us	
Minnesota	(612) 297-7175;	(612) 297-2271;
	rhansen@mda_ag.mda.state.mn.us	
Mississippi	(601) 325-3390;	(601) 325-8397
Missouri	(573) 751-2462;	(573) 751-0005
Montana	(406) 444-2944;	(406) 444-5409;
	agr@mt.gov	
Nebraska	(402) 471-2341;	(402) 471-3252
Nevada	(702) 688-1180;	(702) 688-1178;
	jknight@govmail.state.nv.us	
New Hampshire		
	(603) 271-3550;	(603) 271-3550
New Jersey	(609) 984-6647;	(609) 984-6555
New Mexico	(505) 646-2143;	(505) 646-5975;
	garyc@nmsu.edu	
New York	(518) 457-7482;	(518) 485-8366
N. Carolina	(919) 733-6100;	(919) 733-0633;
	carl_falco@ncdamail.agr.state.nc.us	
N. Dakota	(701) 328-4756;	(701) 328-4567;
	ccmail.bcoleman@ranch.state.nd.us	
Ohio	(614) 728-6200;	(614) 728-4235;
	dwible@agri.state.oh.us	
Oklahoma	(405) 521-3864;	(405) 521-4912;
	agdp@icon.net	
Oregon	(503) 986-4647;	(503) 986-4735;
	acreswel@oda.state.or.us	
Pennsylvania	(717) 787-4843;	(717) 783-3275;
	tac@pda005.pda.state.pa.us	
Puerto Rico	(809) 796-1710;	(809) 796-4426
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Vermont	(802) 828-2431;	(802) 828-2361;
	drusso@agr.state.vt.us	
Virginia	(804) 786-3798;	(804) 371-8598;
	pesticid@richmond.infi.net	
Washington	(360) 902-2015;	(360) 902-2093;
	mtucker@agr.wa.gov	
West Virginia	(304) 558-2209;	(304) 558-2228
Wisconsin	(608) 224-4551;	(608) 224-4656;
	@wheel.dat.cp.state.wi.us	
Wyoming	(307) 777-6590;	(307) 777-6593

**STATE PESTICIDE CONTROL AGENCIES**

*Certification requirements and pesticide use regulations are quite complex and vary from state-to-state. The U.S. Environmental Protection Agency can be reached at (703) 305-6708. Green Industry regulations are found in The Regulation and Certification of Pesticide Applicators, 40 CFR Part 171. Phone numbers are followed by FAX and internet address if available.*

**Office in charge of applicator certification**

STATE	PHONE NO.	FAX NO.
Alabama	(334) 240-7239;	(334) 240-7168
Alaska	(907) 745-3236;	(907) 745-8125;
	<a href="http://www.state.ak.us/dcc/home.htm">http://www.state.ak.us/dcc/home.htm</a>	
Arizona	(602) 542-3579;	(602) 542-0466;
	jpeter@getnet.com	
Arkansas	(501) 225-1598;	(501) 225-3590
California	(916) 445-3838;	(916) 445-4033
	<a href="http://www.cdpr.ca.gov">http://www.cdpr.ca.gov</a>	
Colorado	(303) 239-4139;	(303) 239-4177;
	kabbott@governor.state.us	
Connecticut	(860) 424-3369;	(860) 424-4060;
Delaware	(302) 739-4811;	(302) 697-6287;
	larry@smtp.dda.state.de.us	
Dist. of Columbia		
	(202) 645-6080;	(202) 645-6622
Florida	(904) 487-0532;	(904) 488-8497
Georgia	(404) 656-4958;	(404) 657-8378
Hawaii	(808) 973-9401;	(808) 973-9418;
	kinrog@elele.peacesat.hawaii.edu	
Idaho	(208) 332-8500;	(208) 334-3547;
	mmisner@agri.state.id.us	
Illinois	(217) 785-2427;	(217) 524-4882
Indiana	(317) 494-1594;	(317) 494-4331;
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# *"Joining ALCA was the best investment I ever made."*

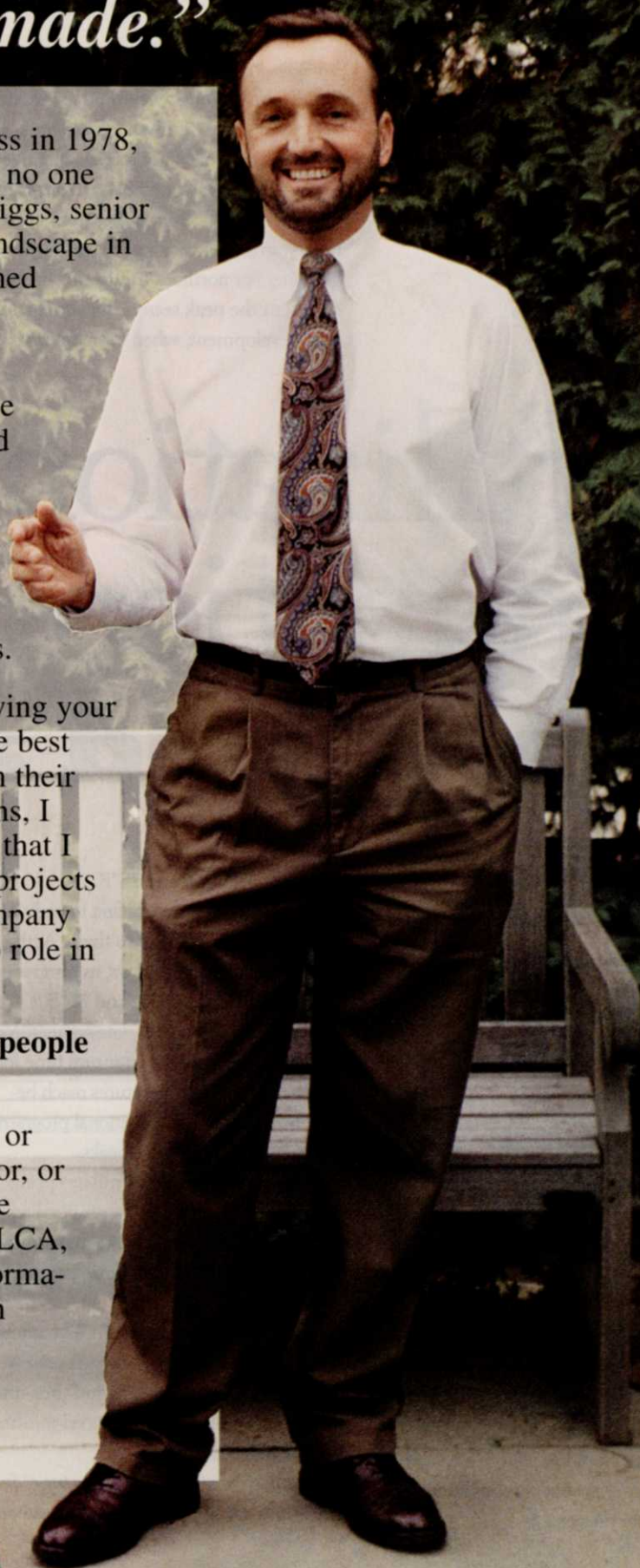
"When I started in this business in 1978, I had a lot of business questions no one was answering," says Judson Griggs, senior landscape architect at Lied's Landscape in Sussex, Wis. "That's when I joined ALCA."

"By networking with ALCA members from around the country, attending marketing and technical seminars and using the Operating Cost Study to estimate projects, I have helped my company to achieve record sales revenues of more than \$10 million dollars.

"If you are serious about growing your landscape business, ALCA is the best resource in the country. Through their meetings, videos and publications, I learned cutting-edge techniques that I applied immediately to various projects which ultimately helped the company evolve and sustain its leadership role in the marketplace."

**Join ALCA today and meet people like Judson Griggs.**

If you are an exterior, interior or landscape maintenance contractor, or simply want to see the landscape industry grow, call (800) 395-ALCA, or (703) 736-9666 for more information, or write: ALCA, 150 Elden Street, Suite 270, Herndon, VA 20170. Fax (703) 736-9668.



**ASSOCIATED LANDSCAPE CONTRACTORS OF AMERICA**



**S**pring is the time to initiate new growth for turfgrass, and the time to get some needed nutrition back to lazy turf. After winter dormancy, both warm- and cool-season turf begins growing. For northern turf, spring and fall represent the peak seasons for shoot and root development, when temperatures

ucts supply nitrogen, phosphorous and potassium in ratios which are desirable for spring shoot and root growth. Unlike high nitrogen formulations which promote mostly top growth, starter types contain higher proportions of phosphorous (i.e., a 1:2:1 ratio).

The added phosphorous helps initiate root development and early turf establishment of new seedlings.

#### Go easy on nitrogen

Nitrogen is the most important element in a turfgrass fertilization program. However, there are limits to its use.

When turfgrasses are overfertilized with spring N, excessive top growth—which requires extra mowing—and shallow rooting result.

There is also a greater threat of nitrate

# Fertilization & nutrition: a varied arsenal

*Most turfgrasses need additional fertilization to achieve maximum growth potential.*

By JOHN ROBERTS, Ph.D.  
University of New Hampshire



One of the author's key concerns is field errors that can result in misapplication, such as this fertilizer spill.

range between 50° and 75°F.

Root initiation occurs first in early spring, when soils begin to thaw. Active shoot development follows, as temperatures climb between 60° and 75°F.

For warm-season turf, late spring through summer represents the optimum time for development, as temperatures reach between 75° and 90°F. Nutritional programs often coincide with these peaks.

Nature alone helps stimulate spring green-up, but most turfgrasses need additional fertilization to achieve maximum growth potential. Spring fertilization is especially critical on recreational turf areas, such as soccer fields which receive intense traffic from increasing play each season. Without additional fertilization they often become severely worn and weed-infested.

#### To get turf started

For cool-season turf, "starter type" formulations are popular choices. These prod-

ucts supply nitrogen, phosphorous and potassium in ratios which are desirable for spring shoot and root growth. Unlike high nitrogen formulations which promote mostly top growth, starter types contain higher proportions of phosphorous (i.e., a 1:2:1 ratio).

In most situations, avoid applications of more than one pound of N/1000 sq. ft. when using "fast release" or highly water-soluble nitrogen.

When using only fast-release nitrogen sources, light applications, 1/8 to 1/4 pounds of N/1000 sq. ft., are more desirable, and should be applied more frequently.

This spoon-feeding approach has become increasingly popular on golf course putting greens.

#### Fast-release/slow-release

A widely used strategy in the spring is to fertilize with products that have a combination of fast- and slow-release nitrogen sources. Fast-release nitrogen stimulates earlier green-up and growth which is often sought in recreational and landscaped settings. Slow-release nitrogen sources,



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whether synthetic or natural organic, last eight to 15 weeks, are less likely to burn the turf and will release nitrogen more uniformly than inorganic N sources.

Turf managers often must strike a balance between which combinations to use in each situation.

Sometimes this requires supplementing small amounts of fast-release nitrogen into the spring application.

### Late/dormant application an alternative

A late fall or dormant fertilization can provide a successful alternative to an early spring application. This strategy is primarily used by athletic field managers to:

- ▶ accelerate spring green-up and growth;
- ▶ help distribute the workload more evenly over the year;
- ▶ avoid traffic damage to soft, wet turf.

One major concern with late fall fertilization is the increased potential of nitrate leaching during the winter. Using lighter rates of slow-release nitrogen will help reduce this threat. However, this strategy will generally be slower to stimulate growth in cold spring soils.

### Soil pH affects nutrient availability

The soil pH has a considerable influence on the availability of most nutrients. Phosphorous is an example of a nutrient that is most available when the soil pH is between 6.0 and 7.0. However, in highly acidic soils with pH of less than 5.0, phosphorous gets "tied up" with iron and aluminum to form complexes which are unavailable to turfgrasses.

Maintaining near neutral soil pH values also favors the activity of beneficial soil microorganisms and the release of nitrate from nitrogen fertilizers.

In highly acidic soils, toxic concentrations of aluminum, iron and manganese may develop and cause impaired rooting (roots will appear short, brown and spindly) a decrease in overall turf vigor, shoot growth, drought tolerance and recuperative potential.

## Choose the right fertilizer products for the job

**Quickly available** or water-soluble sources provide a rapid growth response under good growing conditions and include:

1. **Urea**, which is a water-soluble organic compound that contains 45% N.
2. **Inorganic salts** such as ammonium nitrate, ammonium sulfate, potassium nitrate, calcium nitrate and ammonium phosphates.
3. **Methylol ureas**, formed by reacting urea with formaldehyde have produced growth responses similar to other water-soluble sources but vary based on formulation. Examples of such products include:

▶ **Form-U-Sol**, which has 28% N, of which 67% is urea and 33% is methylol urea;

▶ **CoRon** is 28% N, has 50% urea and 50% methylol urea. It is an aqueous solution and its release is dependent upon microbial activity, but due to the relatively high urea content, it has shown to be effective in cool-seasons on turfgrasses.

▶ **Nitro-26**, which is 26% N with 30% urea and 70% methylol urea.

**Slowly-available, slow-release** or water-insoluble sources are released based on manufacturing processes. These include:

1. **Urea formaldehyde (UF)**: Also called Nitroform, Ureaform, Blue-Chip, etc.

Contains 38% N. Nitrogen release is based on activity index of various forms of water-insoluble nitrogen (WIN)

2. **FLUF** is a flowable form of UF that contains about 18% N, of which 20-25% is water insoluble and thus has less burn potential than soluble sources.

3. **Nutralene** is a methylene urea product with about 40% N.

4. **Isbutylidene diurea**, also called IBDU, contains 31% N. Its rate of N release is dependent upon the hydrolysis of the product.

**Coated N sources** are made by coating urea or complete fertilizer prills with an impermeable or semipermeable coating.

1. **Sulfur-coated urea (SCU)** is produced taking prilled urea and spraying it with molten sulfur.

2. **Polymer-coated urea (PCU)** products are coated with some type of plastic polymer coatings to reduce the rate of N release.

**Natural organic fertilizers** include sewage sludges, composted manures and tankages, hydrolyzed poultry feathers. Green-Releaf is composed of a biostimulant growth complex with minor fertilizer elements and plant extract concentrate added.

*Dr. Gil Landry, University of Georgia*

### Keep potassium levels high

Potassium plays a vital role in plant nutrition, and deserves more attention in many fertility programs.

Keep potassium levels high during the growing season. It enhances turf tolerance to various environmental and biological stresses, including cold, traffic, disease and drought tolerance.

A nitrogen to potassium ratio of 3:2 has generally been considered desirable. However, higher potassium ratios to nitrogen, such as 1:1 or 1:2 have improved stress tolerance in some cases, even when soil tests indicate potassium levels are adequate. **LM**



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# Build cool-season weed strategy on healthy turf

*Turfgrass that is established and maintained properly is turfgrass that won't provide an opportunity for weeds to muscle their way in and spread.*

By FRANK S. ROSSI, Ph.D.  
Cornell University

The coexistence of turfgrass and weeds is the basis of the age-old tip for controlling weeds in turf: maintain a healthy, dense stand of turf that prohibits weeds from establishing.

This is based on two important ecological concepts—space and competition. Therefore, the foundation of a turfgrass weed management program must be to implement management programs that favor the competitive advantage of turf, while minimizing bare areas where weeds can invade.

These ecological principles will always work in your favor as a turf manager if the proper decisions are made during turfgrass

establishment regarding site preparation, soil modification, turf selection and establishment procedure.

The primary cultural practices of mowing, watering and fertilizing should also focus on maximizing root growth. A healthy root system will always make turf more forgiving of environmental, biological and traffic stress. For example, maintaining a higher than usual height of cut (3" or greater) will promote deep rooting and shade the soil surface. Irrigating judiciously will encourage weed seed germination. Finally, fertilizing cool-season turf in the fall will maximize energy production under cooler temperatures. Still, if turf

## PREEMERGENCE HERBICIDE EFFICACY RATINGS

Herbicide	Crabgrass	Goosegrass	Annual bluegrass	Common chickweed	Henbit	Lawn burweed	Corn speedwell
atrazine (Aatrex)	F <sup>1</sup>	P	E	E	E	E	E
benefin (Balan)	G-E	F	G-E	G	G	P	E
benefin+oryzalin (XL)	E	G	E	L	L	—	—
benefin+trifluralin (Team)	E	G	E	L	L	—	—
bensulide (Betasan, PreSan)	G-E	F	F	P	P	P	P
bensulide+oxadiazon	E	G-E	—	—	—	—	—
DCPA (Dacthal)	G-E	F	G	E	F	P	G
dithiopyr (Dimension)	E	G-E	G-E	G	—	—	—
fenarimol (Rubigan)	P	P	G	P	P	P	P
isoxaben (Gallery)	F	P	F	E	L	—	—
metolachlor (Pennant)	G	F	—	—	—	—	—
napropamide (Devrinol)	G-E	G	G	E	P	E	E
oryzalin (Surflan)	E	G-E	E	L	L	—	P
oxadiazon (Ronstar)	G	E	G	P	P	P	G
pendimethalin (Pre-M)	E	G-E	G-E	E	L	—	E
prodiamine (Barricade)	E	G-E	G	G	G	G	G
pronamide (Kerb)	F	P	G-E	E	P	P	E
simazine (Princep T&O)	F	P	E	E	E	E	E

<sup>1</sup>E=Excellent, >89% control; G=Good, 80 to 89% control; F=Fair, 70 to 79% control; P=Poor, <70% control; L=Listed on the label; — = Data not available.

These are relative ratings and depend on many factors such as environmental conditions, turfgrass vigor or health, application timing, etc., and are intended only as a guide.