forms, we are especially interested in the traffic tolerance and recoverability of the new stoloniferous ryegrasses.

Synthetic Turf Research Projects: Surface temperature. In the June 2011 edition of this magazine, we published the results of our study examining the effects of various synthetic turf components and systems on surface temperature. We tested various infill types, infill colors, and fiber colors and found little evidence of significant cooling with any of the tested materials. In addition to the laboratory study that was discussed in the article, we collected surface temperature data this summer at our outdoor research facility. We found very similar results when comparing the laboratory and outdoor data. Unfortunately, we still do not have an answer to this problem, but we continue to test new methods and hope to find a solution soon.

Fiber Wear Testing. With help from field managers and owners, we have collected samples of various synthetic turf products from new field installations and tested fiber wearability under simulated field use. This is an ongoing project and the progress report on our website is updated regularly (http://cropsoil.psu.edu/ssrc/documents/lisport-report.pdf). We continue to invite field managers and owners to contact us about submitting synthetic turf samples from new field installations.

Human Performance and Safety. We recently completed a study in conjunction with Penn State's biomechanics laboratory examining human performance and safety on various playing surfaces. Data was gathered from human subjects performing various athletic maneuvers while wearing several types of footwear. We are currently combining these results with data obtained with our traction tester (Pennfoot) to further improve our understanding of how the playing surface affects performance and safety.

Surface Characteristics – Hardness, traction, and abrasion. We continue to measure and track various characteristics of synthetic turf playing surfaces such as hardness (Gmax), traction, and abrasion. Results from our multi-year study comparing these characteristics on various synthetic turf systems can be found on the research section of our website (http://cropsoil.psu.edu/ssrc).

Baseball Research Projects. We also continue to evaluate baseball infield mixes and how components of infield mixes influence playability characteristics such as ball bounce and traction.

-Compiled by Tom Serensits

PURDUE UNIVERSITY

The turfgrass science program at Purdue continues to work to provide information to turf managers in the Midwest, the US, and internationally. Seven faculty members have active turf research programs that are supported by our many industry partners and the Midwest Regional Turf Foundation. Our research efforts are complimented with an active extension program in order to maximum the benefit and value to turfgrass managers.

Pest management studies. Weed biology and control of various annual and perennial weeds using herbicides is ongoing with specific projects evaluating herbicides for the control of annual bluegrass, broadleaf plantain, crabgrass, dandelion, goosegrass, ground ivy, wild violet, and others. This research includes work with novel and existing herbicides. Work is also ongoing looking into strategies for dormant seeding athletic fields with Kentucky bluegrass safely while simultaneously removing unwanted perennial ryegrass or annual bluegrass. Additional research on how mowing practices affect weed control is being explored.

Entomology research on the biology, ecology and management of insects associated with turfgrass environments is being conducted as well. This work aims to improve the sustainability of turfgrass insect management by 1) improving integration of cultural and biological controls, 2) enhancing basic understanding of insect biology and ecology, 3) developing novel insecticide chemistries and usage strategies, and 4) providing a framework for turfgrass managers to evaluate and implement alternative management programs.

Research with fungal endophytes and entomopathogenic nematodes provides a unique platform for studying the integration of cultural and biological controls and provides a scientific approach for incorporating these tools into sustainable turfgrass management programs. Applied research focuses on improving the effectiveness of existing insecticide chemistries, evaluating new insecticide chemistries for usage in turfgrass environments, and enhancing insecticide formulations by incorporating plant-stress-mediating compounds. Because a combination of biological, aesthetic and economic factors will ultimately determine how readily alternative pest management strategies will be adopted, our research is also working to clarify how the incorporation of scouting influences the economic bottom line for turfgrass managers.

Turf diseases are among the most important and least understood constraints to maintaining healthy, high-quality turf in the eastern and Midwestern U.S. A main goal of the **turf pathology research** at Purdue is to enable turf managers to make disease management decisions from a more informed perspective thereby improving their capacity to effectively and efficiently mitigate disease-related damage utilizing a variety of control options. The general objective of program is to increase the depth of knowledge of factors that influence the establishment, spread, and management of infectious diseases on amenity turf. Specific projects are addressing the 1) deposition, depletion, and maintenance factors that influence fungicide performance against diseases affecting high quality turf and 2) environmental factors that promote outbreaks of diseases important to the lower Midwest including dollar spot, brown patch, anthracnose, *Rhizoctonia* large patch on zoysiagrass, and spring dead spot on bermudagrass.

Sustainability. As an industry we continue to strive for "sustainable turfgrass systems"; in other words, turfgrass areas that require fewer inputs, namely water, fertilizer, mowing and pesticides. In order to do this we must select and properly establish an adapted species/cultivar or species mixture/blend. Research at Purdue is evaluating various cool and warm-season turfgrass species for their adaptation to the cool-humid region. Special interest is focused on grasses that require fewer cultural inputs (water, fertilizer and mowing). Research is re-evaluating conventional wisdom related to lawn nitrogen management programs; nitrogen sources and timings, phosphorus needs and potential loss during establishment, and also soil organic matter accumulation with respect to soil carbon levels and golf green surface firmness. Additional research is being initiated on grasses that are bred for their ability to retain their green color during drought periods in cooperation with the Turfgrass Water Conservation Alliance.

A better understanding of how turfgrasses respond to stress conditions and mechanisms of stress tolerance benefits genetic improvement and management of turfgrass. Research on the **characterization of the physiological mechanisms influencing turfgrass stress tolerance and adaptation** is ongoing. This research impacts management programs by: 1) selecting adequate cultivars for growing turf on soils subjected to flooding; and 2) improving site-specific irrigation management and water conservation through mapping turfgrass water status and utilizing low-maintenance grass.

Synthetic/artificial turf. Methicillin-resistant *Staphylococcus aureus* (MRSA) is a disease-causing bacterium that is associated with approximately 19,000 deaths and 300,000 debilitating infections yearly in the US. In 2005, a survey published by a National Football League physicians group reported that MRSA infected 3.5% of professional football players. While this rate dropped to 1.9 % infection rate three years later, it still exceeded the infection rate of the general population (0.03%) by 63-fold, suggesting that despite improvement in MRSA surveillance and control, unidentified reservoirs still exist. Of the many risk factors identified for acquiring MRSA, several are of considerable relevance to athletes participating in contact sports, and professional football in specific. Since mounting evidence exists supporting the role of synthetic turf fields in harboring and potentially transmitting MRSA to humans, research at Purdue is focusing on the general microbial ecology of artificial turfgrass and the prevalence, distribution and fate of MRSA on artificial turf football fields. Completion of the current research can help categorize the role of one potential MRSA reservoir, the playing surface, as a source for the bacteria.

Carbon sequestration. Reducing the amount of atmospheric CO_2 via carbon sequestration has become one of the most researched topics in the past decade. Interestingly, one of our most intensively managed and rapidly growing agroecosystems, the urban environment, has received the least study. Understanding carbon movement in turfgrass systems will strengthen our understanding of carbon sequestration and improve our ability to adjust management practices to increase sequestration. Greater understanding of the turfgrass system's influence on atmospheric carbon will ultimately shape public policy and assist in communicating the benefits of turf.-Compiled by Aaron Patton for Cale Bigelow, Yiwei Jiang, Ron Turco, Rick Latin, Doug Richmond and Tim Gibb: Departments of Agronomy, Botany and Plant Pathology, and Entomology at Purdue.

OHIO STATE

These are challenging times for land grant institutions like Ohio State that provide research, teaching and outreach services. Reductions in funding have meant tuition fee increases for students and programs within the university having to become self-sufficient. Big changes are also afoot at Ohio State in that we are switching from quarters to semesters in summer 2012 and we are changing the major to "Sustainable Plant Systems" with a turfgrass science option. In keeping with the new major, the focus of our research at Ohio State has also been more focused on the issue of sustainability and IPM practices.

Dr. John Street and Deb Holdren were recently awarded a major Specialty Crops Grant to investigate the integration of microclover and turfgrass as an environmentally viable turfgrass ecosystem. In addition, many of the pest control products we evaluate are organic or biorational (non-toxic) in nature. We also continue to look at composts, organic fertilizers and low maintenance turfgrass varieties and species, such as tall fescue.

>> **OHIO STATE** was recently awarded a major Specialty Crops Grant to investigate the integration of microclover and turfgrass as an environmentally viable turfgrass ecosystem.

From an agronomic standpoint, we have done a lot of work with The Andersons over the past 4 years, evaluating their advanced dispersible granular technology. One of these products has been the granular version of the plant growth regulator trinexapac-ethyl, which could be a useful tool for reducing mowing frequencies while improving turf quality. For the past several years we have been working with the stoloniferous ryegrasses and this year we evaluated drought and heat tolerance of those cultivars. In what is considered to be one of the hottest and most humid summers on record, with sand rootzone temperatures well over 100 F, there were a couple of cultivars that did considerably well, even at 5/8 mowing height, so watch out for those!

New this fall we have established a Kentucky bluegrass trial that includes common types, compacts, hybrids, monostands and blends. With some pretty intense management at the onset, we were able to go from "seed to play" in about 7 weeks and we will be evaluating wear tolerance in the spring of 2012. Also new this winter is an overseeding study that we will continue as long as the ground isn't snow-covered. We are looking at germination of annual, perennial and tetraploid ryegrasses during the winter months.

Lastly, we are very fortunate to have a great relationship with the Director of Sports Medicine, Dr. Tim Hewett, who has joined forces with us on some grants and research projects. His specialty is ACL injury, so his input on traction research is invaluable. We recently acquired a pneumatic foot that can simulate athlete maneuvers like starting, stopping and cutting. The beauty about this equipment is that we do not have to have plots of turf installed at the turf facility at cost to a sponsor, as we can test small samples in the lab.

We continue to test & look at synthetic turf hardness in relation to Gmax and Head Injury Criteria (HIC) and we would like to further investigate critical fall heights in relation to sports like rugby and football, to make sure our playing surfaces do not contribute to concussions. There are many projects we'd like to do, we just need the funding! For more info on our Sports Turf Program, see our website: Buckeyeturf.osu.edu or visit us on Facebook (Buckeye Turf) and Twitter (Osuturf).-by Pam Sherratt, sports turf extension specialist

>> THIS PNEUMATIC FOOT can simulate athlete maneuvers like starting, stopping and cutting, and Ohio State researchers can test small samples in the lab rather than having to install costly plots.

Title of Research Study, Ohio State	Principle Investigator
The use of FeHEDTA herbicides as biorational broadleaf weed controls	Dr. David Gardner & Emily Horner
Timing of application of Cavalcade PQ for post/Pre emergence control of crabgrass	
Herbicide programs for seeding/overseeding	
Broadleaf weed control products	
Microclover and turfgrass ecosystems	Dr. John Street & Deb Holdren
Dispersible granular technology	All turfgrass science team
The effect of various cultural practices on putting green firmness	Arly Drake (MS) & Dr. T. Karl Danneberger
Athletic field protection systems	Matt Williams (PhD) & Dr. T. Karl Danneberger
Turfgrass physiology in shade	Aneta Studzinska (PhD) & Dr. T. Karl Danneberger (completed 2011)
Impact of dew on turf health	Dr. T. Karl Danneberger
The effect of enhanced ultraviolet light on turfgrass physiology	Ed Nangle (PhD) & Dr. David Gardner
The effects of compost topdressing on native soil health and sports turf playing quality	Marcela Munoz (MS) & Dr. John Street (completed 2011)
Models to measure carbon sequestration in the landscape	Gina Zirkle (MS) (completed 2011)
Ecologically sustainable turfgrass	Andrew Muntz (MS) & Dr. David Gardner
Drought resistant perennial ryegrass	Pam Sherratt & Dr. John Street
Natural and synthetic fertilizers	
Granular plant growth regulators	
Winter over-seeding with annual, perennial, and tetraploid ryegrasses	
Kentucky bluegrass establishment and wear tolerance	
Effects of surface characteristics on the traction and hardness of synthetic and natural turf	
Fungicide efficacy trials	Joe Rimelspach & Todd Hicks
Bacterial wilt	
Insecticide efficacy trials	Dr. Dave Shetlar & Jen Andon

RUTGERS UNIVERSITY

The following is a synopsis of ongoing and future sports turf research projects at Rutgers.

Traffic stress research concluded on the 2006 National Turfgrass Evaluation Program (NTEP) Tall Fescue Trial at Rutgers Hort. Farm II in North Brunswick, NJ in 2011. Wear and compaction were applied to the trial in Spring 2009 and 2011; Summer 2008 and 2010; and Fall 2007 and 2009. Wear stress was applied with the Rutgers Wear Simulator, a modified M24C5A Sweepster in which the steel brush on the unit was replaced with rubber paddles. The rotational movements of the paddles causes wear. The simulator allows control of both forward operating speed as well as paddle rpm. Compaction was applied with a 1.5-ton roller.

Results suggest that attention should be given to tall fescue variety selection for sports fields scheduled for fall use; entry differences were more pronounced after traffic in Fall 2009 than Spring 2009 and Summer 2010. In addition to traffic stress data, turfgrass quality and brown patch susceptibility were assessed in the absence of wear since the inception of the test. Data are currently being summarized for a Rutgers Cooperative Research and Extension Fact Sheet. Data are also available at www.ntep.org and in the Rutgers Turfgrass Proceedings (See http://turf.rutgers.edu/research/reports/index.html).

Wear tolerance research was initiated on one-hundred-four entries comprising the 2010 Cooperative Turfgrass Breeders Test (CTBT) at North Brunswick, NJ. The machine described previously was used to apply 16 wear passes during 3 weeks in July 2011. Turf quality and brown patch were assessed in the absence of wear. Wear tolerance will again be assessed in 2012. Data will be available at www.ctbt-us.info.

Seeded in September 2010, wear was applied in fall 2011 to four Kentucky bluegrass varieties and selections, four tall fescue varieties, and mixtures of the two species seeded at 90% tall fescue and 10% Kentucky bluegrass (by weight). Recovery from wear will be evaluated in Spring 2012. The performance of individual Kentucky bluegrass and tall fescue entries, as well as mixtures, during wear stress will continue to be evaluated in 2012.

The Rutgers Center for Turfgrass Science acquired a Brinkman Traffic Simulator and initiated studies comparing this machine, the Cady Traffic Simulator, and Rutgers Wear Simulator in 2011. These studies examined the effects of the three machines on tall fescue, Kentucky bluegrass, and perennial ryegrass. Additional studies comparing the three machines are slated for 2012.

In addition to research conducted at North Brunswick, the Rutgers Turfgrass Breeding Program evaluates varieties and experimental selections for wear tolerance as well as screens new turfgrass collections specifically for wear tolerance at Rutgers Plant Science Research and Extension Farm, Adelphia, NJ. A second Rutgers Wear Simulator was constructed and is used to apply wear at Adelphia. In 2011, cool-season sports turf species including Kentucky bluegrass, perennial ryegrass, and tall fescue were evaluated. The wear tolerance of fine fescues was also examined. This research will continue in 2012. Data generated from these trials is available at the CTBT website as well as in the Rutgers Turfgrass Proceedings.

Research is sponsored by the National Turfgrass Evaluation Program, Rutgers Center for Turfgrass Science, and New Jersey Agricultural Experiment Station.

Rutgers research personnel include: Brad Park, Sports Turf Research & Education Coordinator; Dr. James Murphy, Extension Specialist in Turfgrass Management; Bill Dickson, Research Farm Supervisor; Joe Clark, Research Technician; Dr. Bruce Clarke, Director, Center for Turfgrass Science; and Dr. William A. Meyer, Associate Director, Center for Turfgrass Science. ■

» APPLYING FIRST COAT of colorant to dormant bermudagrass.

Turning fields green using turf colorants

It has been called "instant overseeding"—the practice of applying a green turf colorant to dormant grass. Turf managers in the southeastern United States have traditionally overseeded dormant bermudagrass fields to have a green field during the winter and early spring months.

But the spring transition from overseeded grasses to bermudagrass is often problematic due to drought resistant cool-season grass varieties and extended cool and wet conditions in late spring. Applying colorant to semi-dormant to dormant bermudagrass fields provides an alternative to overseeding, while still providing an attractive, playable field surface. Before you start painting, it is important to research to find the pros and cons of the practice because the practice may not be a good fit for everyone.

One benefit associated with colorants rather than overseeding is affordability. A gallon of turf colorant will run from $30 to $75, with most distributors giving volume discounts. The average cost of colorant needed for a 2-acre field using the higher recommended application rates would be about $600, with a range of $400 to $1,000 an application, depending on the colorant brand and application rate. Overseeding establishment can costs can easily top $1,000 (not including season-long maintenance costs). So colorant can be a less expensive alternative. And with seeding, there are all the issues with picking your seed, ground preparation, seeding, watering, fertilizing, mowing, pest control, spring transitioning, etc.

The painting process can be boiled down to pick/purchase a colorant, add water plus colorant to your sprayer, and begin spraying. If the color is not even or dark enough, you can go over the area again. There is some clean-up, but no season-long care like with overseeding.

Of course with anything good, there are also some downsides. The biggest issue is that it does not provide a wearable playing surface like an overseeded grass. Once the dormant bermudagrass tissue is worn away, there is no regeneration until spring. So, the "wear factor" must be considered. And while the unknowing observer may be fooled looking at a painted field, to a field manager it will be easy to notice the duller finish from painting versus the nicely stripped, shiny surface of a freshly mown, overseeded field.

Over the last few years, we have conducted numerous studies at North Carolina State University to evaluate various colorant products. Our first detailed studies were applied to putting greens in fall 2008 and 2009. Subsequent trials have included evaluations on bermudagrass mowed at heights similar to those commonly used on athletic fields.

Colorant brands that were used in the original trails included: Green Lawnger (Becker Underwood), LESCO Green (John Deere Landscapes), Mtp Turfgreen (Missouri Turf Colorant,), Titan

If the color is not even or dark enough, you can go over the area again. There is some clean-up, but no season-long care like with overseeding.

JOHN MASCARO'S PHOTO QUIZ

John Mascaro is President of Turf-Tec International

Can you identify this sports turf problem?

Problem: Green and brown turf
Turfgrass area: Football field
Location: Miami, Florida
Grass Variety: 419 bermudagrass

Answer to John Mascaro's Photo Quiz on Page 33

Background illustration courtesy of istockphoto.com

>> **NUMEROUS STUDIES** at North Carolina State University have evaluated various colorant products, including use on bermudagrass mowed at heights similar to those commonly used on athletic fields.

>> **SMALL SPRAYER COLORANT APPLICATION** on semi-dormant bermudagrass athletic field.

Table 1. The progression of colorant color using Pantone® Color chips following colorant treatment.

Treatment/rate	Bermudagrass	
	Day 0	Day 56
Green Lawnger 80 gpa	PMS 354	PMS 358
LESCO Green 80 gpa	PMS 347	PMS 351
Mtp Turfgreen 80 gpa	PMS 7481	PMS 7464
Titan Green Turf 80 gpa	PMS 7482	PMS 636
Turf in a Bottle 80 gpa	PMS 346	PMS 344
Regreen 80 gpa	PMS 347	PMS 311
Wintergreen Plus 80 gpa	PMS 340	PMS 344
Ryegrass 80 gpa	PMS 374	PMS 372
Ultradwarf Super 80 gpa	PMS 363	PMS 577
Ultradwarf Plus 80 gpa	PMS 362	PMS 577
Bermudagrass 80 gpa	PMS 7481	PMS 344
Bermuda Green 80 gpa	PMS 340	PMS 290
Green Lawnger 160 gpa	PMS 355	PMS 360
Turf in a Bottle 160 gpa	PMS 354	PMS 358
Ultradwarf Super 160 gpa	PMS 364	PMS 362

Green Turf (Burnett Athletics), Turf in a Bottle (US Specialty Coatings), Regreen (Precision Laboratories), Wintergreen Plus (Precision Laboratories), Ryegrass (Pioneer Athletics), Ultradwarf Super (Pioneer Athletics), Ultradwarf Plus (Pioneer Athletics), Bermudagrass (Pioneer Athletics), and Bermuda Green (J.C. Whitlam Manufacturing).

It is worth noting that by the time this article is in print, we will have initiated new trials that will include most of these colorants plus at least thirteen others. Manufacturers/Distributors that have provided products (to date) for these trials include the companies listed above, plus products from D. Ervasti Sales, Enviroseal, Geoponics, Harrell's, Milliken, Poulenger USA, Solarfast, and World Class Athletic Surfaces. Some of the colorants we will be testing were from existing product lines but many are newly introduced colorants. The rapid increase in new products is in response to the growing interest in using colorants.

In the earlier studies we applied colorant treatments to completely dormant turfgrass in late October to early November using a boom sprayer calibrated at 40 gallons per acre (gpa). Each plot was sprayed in two directions to provide uniform coverage, resulting in application rates of 80 gpa for each colorant. A few of the colorants were applied at alternative rates due to their label recommendations and to verify the influence of rate and longevity. Applied to bermudagrass, colorant increased turf color from 38 to 67 percent relative to the control at the time of painting. Of course there was some variation in how the color was judged over time. But remember the saying, "beauty is in the eye of the beholder."

We felt that at 56 days after treatment the colorants Ryegrass, Ultradwarf Plus, Bermudagrass, and Bermuda Green failed to provide acceptable colorant color when applied to dormant bermudagrass. Only Turf in a Bottle had acceptable color 56 days after treatment on bermudagrass. This illustrates that most of these products will have a date in which they will need to be re-applied to get season-long green color.

In another study applied to semi-dormant turfgrass, the

Some of the colorants we will be testing were from existing product lines but many are newly introduced colorants. The rapid increase in new products is in response to the growing interest in using colorants.

products performed much better due to the greater background color at the time of application. This is a very important point. Subsequent tests have proven that some background color goes a long way. Applied to semi-dormant turfgrass, the color will look better and may last longer. For optimum results, do not wait until the turfgrass is straw brown.

Some of the colorant-treated turf took a bluish tint over time (56 days after treatment). Regardless of application volume, Regreen had the greatest propensity to turn a bluish tint. Titan Green Turf also turned bluish when applied to dormant turf. Furthermore, Bermuda Green turned a bluish gray to blue on both grasses. These products may not be as color-stable over time compared to others but if the product is reapplied, even at a lighter rate, this may not be a significant issue. So, it may be important to think about how you want to use these products before selecting the product. Some field managers like to put lighter rates on their field more frequently. If that is the case, then color stability is less an issue.

Applying the colorants at 160 gpa provided turf color increases up to 44 percent greater than the 80 gpa treatments. Applying colorants at rates above 80 gpa also resulted in increased color longevity over the winter season. We did not expect to see such a significant rate response in longevity of the products. More research is needed in this area to fully understand how to best use this information.

I often get asked, what is the best colorant? But in fairness, no one turf colorant was clearly superior on both grasses in terms of natural green color at the time of application and 56 days after application. Results from our earlier studies generally indicated that the colorants with the best natural green color did not generally last as long as some of the others. And with almost double the number of products available to field managers today versus just a few years ago, I can hardly wait to see how some of the newer products compare to some of the industry standards. There is no doubt, some turf colorant products can provide an attractive green putting surface at a reduced cost compared to overseeding. ■

Dr. Grady Miller is a professor with the Crop Science Department of North Carolina State in Raleigh.

How colder weather affects synthetic turf installs and repairs

Editor's note: *We asked some experts these questions: Is there a temperature threshold below which it is considered "too cold" to install or repair synthetic turf? How can cold weather affect installation time lines? What exactly is affected—building the base, for example, or using the adhesive? Is sewing seams recommended in cold weather vs. using adhesives? Is sewing that much of a slower process?*

Steve Smetana, a former professional baseball player and current high school baseball coach in northern Ohio, is a partner with former STMA president David Frey in a venture called Pro Turf Clean.

He has been installing artificial turf surfaces since 2004 and now is maintaining synthetic fields as well as installing them. "For installation purposes I have always gone by trying to install turf in above-50 degree temperatures," he says. "I guess it might be possible to install when its colder but you run the risk when the temperatures go back up into the 80's and 90's that the material will expand and create issues for you.

"The cold weather definitely will affect timelines with installations. Up here in the northern states the most hectic months are end of May until the end of August. The schedules of the colleges and high schools greatly dictate the installation timeline," Smetana says.

"There are pros and cons to each sewing and using adhesives when bonding seams. Sewing is less expensive but a lot more labor intensive than gluing," he says. "For example, sewing will require 10-12 laborers and multiple days; sewing is a good way to seam turf but to glue the belly of a field can take as few as four laborers and one day to complete.

"Another reason why some people do not sew is because a turf with a real thick backing would be difficult to sew. Secondly, when you sew a seam it has a prominent lump on that edge that can be buried in the aggregate underlayment. If you use a drainage mat for your drainage then you can't sew," Smetana says.

I have seen needles get brittle and break in cold temperatures. . .There is nothing that slows a job down like a broken sewing machine.
— *Patrick Maguire*

Patrick Maguire is principal for the sports division of Stantec Consulting, which specializes in civil engineering services for outdoor athletic facilities. "We typically recommend that no work take place unless the temperature is 40 and rising," he says. "Clearly that is a luxury in some climates and at certain times of the year. When it is colder we ask that the installers make provisions to deal with the temperatures. For example it is never a good idea to roll out a frozen carpet. The secondary backing can crack, which can be a big problem.

"Cold weather—like any inclement weather—can affect installation timelines because it can cause delays in getting started in the morning due to frost or ice and in waiting for materials to reach workable temperatures," says Maguire. "Additionally human beings generally are not as efficient in cold weather, particularly for things like

Wisdom from The Guru of Glue

THE SYNTHETIC TURF BUSINESS has expanded to a point where there is not enough time to limit installations to just warm-mild weather. More time is needed which translates into installations and repairs in the cool and/or cold weather of early spring, late fall and throughout the winter. However, there is some cold weather factors that should be kept in mind regardless of the methods and/or products used.

Almost everything slows down when it gets cold. Rain water evaporates slower in Winter than in the Summer; automobile batteries get weaker, their oil gets thicker and they perform better after they "warm up"; chemical reactions, such as adhesive curing, either slows down or stops, depending on the adhesive; turf get stiffer and harder to handle; sewing get tougher, etc.

While the laws of physics regarding cold vs. hot can't be changed there are some products and methods that can not be used when cold; others that are extremely slow and difficult; and others which although slower are useful for cold weather installations and/or repairs.

REGARDING ADHESIVES: There are some that freeze, crystallize or otherwise solidify in their container when cold. Hot melts adhesives are designed to go from solid to liquid when heated but they often prematurely re-solidify when applied to a cold sub-surface; paste adhesive become almost impossible to spread when cold; others do not cure when the temperature falls below otherwise workable temperatures. However, there also is a group of one-part urethane adhesives in which the manufacturer says can be used at any low temperature in which the installer can work.

REGARDING SEWING: Sewing machines become sluggish, plus the turf and sewing thread gets stiffer, which makes sewing much more difficult.

REGARDING INSTALLATION AND REPAIR: They proceed slower when cold than when hot because, installers can not work as efficiently; cold is also often accompanied by wind; the turf gets stiffer and harder to handle plus the options for sewing and/or adhesives selection are greatly reduced.

Cold weather installations and repairs are slower than when warm, but in cold weather it's much better and more profitable to work than the alternative of not starting or stopping an installation while waiting until it gets warm. However, investigate first and then be selective on the products and methods to use in cold weather. ■

Norris Legue, aka The Guru of Glue®, is president of Synthetic Surfaces Inc.

Below: Adhesive being sprayed to bond number inserts during a cold weather turf installation. **Right:** Adhesive coated seaming tape for bonding a loose-laid seam.