Update on university turf-related research projects, Part II

Editor’s note: Following are more reports from some leading turfgrass researchers in the US on their current studies. Part I appeared in our December 2009 issue.

RUTGERS UNIVERSITY

Traffic stress research conducted on National Turfgrass Evaluation Program (NTEP) trials will continue at Rutgers University Horticultural Research Farm II, North Brunswick, NJ in 2010. Previously, the 2005 NTEP Kentucky bluegrass test received seasonal wear applications in fall 2006, summer 2007, spring and fall 2008, and summer 2009. This test is scheduled to receive wear in spring 2010.

Wear stress is applied with a modified M24C5A Sweepster in which the steel brush on the unit was replaced with rubber paddles. The simulator allows control of both forward operating speed as well as paddle rpm. In addition to wear data, turfgrass quality has been assessed in the absence of wear since the inception of the test and 2009 data include entry susceptibility to dollar spot.

The 2006 NTEP tall fescue test has received season-specific applications of traffic (wear plus compaction) in fall 2007, summer 2008, and spring and fall 2009. Wear is applied with the modified Sweepster and compaction is applied with an approximately 1.0-ton vibratory roller. The test is scheduled to receive traffic in summer 2009. Other data include non-trafficked turfgrass quality (2007-09) and brown patch susceptibility ratings taken on multiple dates in both 2008 and 2009. Similarly, research results can be found at the aforementioned websites.

Wear was applied to entries comprising the 2004 NTEP Perennial Ryegrass trial in the fall of 2009.

In late 2009, the Rutgers Center for Turfgrass Science constructed a Cady Traffic Simulator to compliment its current wear simulator. The new traffic simulator will be integrated into future turfgrass traffic stress tolerance projects at Rutgers. Comparison of the Cady traffic simulator with the modified Sweepster (wear) simulator will be made.

Rutgers research personnel include:
• Brad Park, Sports Turf Research &

AUBURN UNIVERSITY

Weed management update: Indaziflam (Bayer CropScience), a new herbicide for preemergence and postemergence Poa annua control in warm-season turfgrass. Scott McElroy, Assistant Professor, and Jack Rose, Research Assistant.

Indaziflam is a new herbicide currently being evaluated for preemergence weed control in primarily warm-season turfgrass that was introduced at the 2009

Indaziflam is a new herbicide currently being evaluated for preemergence weed control in primarily warm-season turfgrass

www.sportsturfonline.com
Annual Meeting of the Weed Science Society of America (WSSA). Information about indaziflam presented in this research update was derived primarily from this WSSA abstract (Myers et al., 2009) and personal experience working with the product.

Indaziflam is classified as an alkylazine herbicide that inhibits cell wall biosynthesis. It possesses soil residual/preemergence activity, as well as postemergence activity on annual bluegrass. However, its preemergence control is the most promising aspect.

Numerous research trials have been conducted at Auburn evaluating indaziflam weed control efficacy. One trial evaluated the effect of application timing on indaziflam efficacy on *Poa annua* in non-overseeded bermudagrass turf. Herbicide, rates, and timing is presented in Table 1.

Table 1. Herbicide, rate, and timing of treatments applied for *Poa annua* control in dormant bermudagrass turf. Indaziflam is presented in metric units, rather than English units.

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Rate</th>
<th>Timing</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indaziflam</td>
<td>80 g ai/ha</td>
<td>August 28</td>
<td>Indaz-Aug</td>
</tr>
<tr>
<td>Indaziflam</td>
<td>80 g ai/ha</td>
<td>September 30</td>
<td>Indaz-Sept</td>
</tr>
<tr>
<td>Indaziflam</td>
<td>80 g ai/ha</td>
<td>October 30</td>
<td>Indaz-Oct</td>
</tr>
<tr>
<td>Indaziflam</td>
<td>80 g ai/ha</td>
<td>January 9</td>
<td>Indaz-Jan</td>
</tr>
<tr>
<td>Indaziflam +</td>
<td>80 g ai/ha</td>
<td>January 9</td>
<td>Indaz+Rev-Jan</td>
</tr>
<tr>
<td>Revolver</td>
<td>+ 17.4 fl oz/a</td>
<td>January 9</td>
<td>Rev-Jan</td>
</tr>
<tr>
<td>Revolver</td>
<td>17.4 fl oz/a</td>
<td>January 9</td>
<td>Rev-Jan</td>
</tr>
<tr>
<td>Barricade</td>
<td>1 lb ai/a</td>
<td>August 28</td>
<td>Barr-August</td>
</tr>
</tbody>
</table>

Only a single rate of indaziflam was evaluated over four timings from August to January (Figure 1). Indaziflam applied at August to October controlled *Poa annua* >98% when rated 173 days after initial treatment on 17 February 2009. Barricade at 1 lb ai/a applied 28 August controlled *Poa annua* 88%, equivalent to indaziflam treatments applied August to October.

Indaziflam alone, Indaziflam plus Revolver, and Revolver alone applied in January controlled *Poa annua* unacceptably (<80%). There are two reasons for decreased control with indaziflam applied in January. First, decreased temperatures can decrease effectiveness. This is known to occur with Revolver and is thought to be the cause of the decrease in control with Revolver alone at this timing. Second, *Poa annua* plants were >3

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Figure 1

Traffic, wear & compaction studies by J. Scott Ebdon, PhD: Effects of Nitrogen and Potassium on Wear Stress Mechanisms in Perennial Ryegrass. Fertility trials were established to investigate the effects of five N rates in combination with three K rates on wear tolerance and associated mechanisms. Wear was applied using wear simulators fitted with metal soccer cleats. Optimum fertility for maximum wear tolerance and recovery was found to be 3 to 5 lbs N/1000ft²/yr. N rates exceeding 5 lbs caused excessive shoot growth rates, higher shoot water content and loss in cell wall components. Shoot density played a secondary role to shoot water content and leaf growth rates in accounting for turf and ornamentals.  Proc., Weed Sci. Soc. Am.  No. 386.

Purdue University

The turf science research program continues to reap the benefits of the extremely generous support of the Mid-West Regional Turf Foundation and many industry partners. Pest management studies: Weed management studies have continued to evaluate the use of various novel herbicides like Tenacity for creeping bentgrass removal in Kentucky bluegrass athletic fields. This herbicide is being increasingly adopted by several regional cool-season athletic field managers and is being applied using an autumn application regimen. In addition, several continuing projects have identified various herbicide and management techniques to minimize roughstalk bluegrass encroachment in golf turf.

Insect studies have been evaluating the use of novel endophytes and entomopathogenic nematodes, as well as the role of fertilizer nutrient ratios on turfgrass health and the ability for turfgrasses to resist surface and sub-surface dwelling insects without the use of synthetic pesticides. Additionally, our entomology team has been closely monitoring a newly documented pest problem throughout the Ohio River valley, the occurrence of significant billbug damage in zoysiagrass. A similar phenomenon could be occurring with indaziflam.

By April 10 rating, Revolver containing treatments control of Poa annua was >90% and equivalent to indaziflam alone treatments. Revolver is known for its “slowness” when applied during colder temperatures, especially in removing overseeded perennial ryegrass; however, Revolver is much more active on Poa annua than perennial ryegrass. As demonstrated in this study, Revolver control of Poa annua is just a matter of time.

Conclusion: Initial results with indaziflam are promising. There are currently no herbicides on the market that control Poa annua both pre and postemergence. Such a product would be well received and highly beneficial to the turfgrass industry.

Literature Cited


University of Massachusetts

Species and cultivar evaluations: Bermudagrass cultivars—Being located at the northern edge of the upper transition zone, we continue to be an excellent location for the evaluation of bermudagrass cultivars for cold hardiness. In the third week of January, 2009, the air temperatures in West Lafayette plummeted to -22F without snow cover. These environmental conditions negatively affected the winter survival of several standard cultivars like Tifway and TifSport. By contrast, several cultivars with superior performance like the old “stand-bys” Midlawn, VaMont and Quickstand, and the more recent generation, Patriot, Riviera, Yukon, and GN-1, continue to perform well in successive years. In addition, there are some promising new experimental cultivars under development which show promise for the future. These have been developed by the Oklahoma State breeding program and include: OKC-7018, OKC-1119, OKC-1134 and OKS-2004.

Ryegrass—For the cool-season species several studies have focused on the perennial ryegrass. Field and laboratory studies have been conducted to determine the ploidy level of the collection of USDA ryegrass accessions and are evaluating the drought tolerance of these at three contrasting locations throughout Indiana. Using molecular techniques it was determined that in general the plants in the USDA collection as well as many of our commercially available cultivars are very much genetically similar. This information may be of use to our plant breeders as they expand their selection for plant material with improved traits for superior turf performance.

Bermudagrass overseeding: A field study was conducted over two years to determine optimum perennial ryegrass seeding rates for overseeding Patriot bermudagrass football fields and determine if multiple seeding events were superior to a single event for PRG establishment and persistence. This study was arranged in a 3 x 5 factorial with five seeding rates (12.5, 25, 50, 75, and 100 lbs/A/yr) and three application strategies (applying 100% of the seed in one application (100), 70% of total seed in the initial application plus 10% of total seed in each of three successive applications ten days apart (70/10/10/10), or four equal applications of 25% of the total seed applied ten days apart (25/25/25/25). Seed was initially planted the third week of August. The results of this study showed that ryegrass coverage rarely increased at seeding rates > 50 lbs/A/yr regardless of seeding strategy. The 25/25/25/25 seeding strategy consistently resulted in the most coverage, 55-77%, when rated in mid-August. The relatively low ryegrass coverage values could be due to seedling competition with actively growing Patriot bermudagrass. These data indicate that when overseeding Patriot bermudagrass in the upper transition zone multiple seeding events appear to be superior to a single event and there is little benefit for exceeding seeding rates > 50 lbs/A/yr.

Cale Bigelow, Tim Gibb, Yiwei Jiang, Rick Latin, Zac Reicher and Doug Richmond: Departments of Agronomy, Botany and Plant Pathology and Entomology, respectively.
for wear tolerance in perennial ryegrass. N rates in excess of 5 lbs N/1000ft2/yr promoted rapid recovery but greater wear injury while N rates less than 3 lbs were too slow to recover. Potassium rates in excess of 5 lbs caused a significant loss in wear tolerance and leaf cell wall content. Sponsor: Massachusetts Turf and Lawngrass Association.

Wear Tolerance and Associated Morphological Characteristics in Kentucky Bluegrass.

One hundred and ten cultivars of Kentucky bluegrass are being compared for wear tolerance and various morphological characteristics in field trials. Visual ratings for wear injury, growth habit (horizontal versus upright), shoot density, leaf texture (width) and disease were evaluated in the spring of 2009. Wear tolerance in the field increased with higher shoot density, greater resistance to leaf spot and a more upright leaf and shoot orientation. Leaf texture (fine or coarse leaf appearance) was not important in Kentucky bluegrass wear tolerance. Greater leaf spot resistance was associated with better spring wear tolerance by providing less thinning from disease and greater shoot density. Sponsor: National Turfgrass Evaluation Program.

Differentiating Between the Influence of Wear and Soil Compaction and Their Interaction on Turfgrass (with William Dest, PhD, University of Connecticut). This recently completed study differentiated between the effects of wear and compaction on turfgrass performance and soil physical and surface properties. Kentucky bluegrass and perennial ryegrass were planted in mixture on both sand and silt loam soils. Both soils were compacted to a uniform hardness before planting. Treatments included a compaction and non-compaction treatment with a wear and non-wear treatment. Wear was applied with a steel brush set into a frame so no compaction was imposed. Compaction significantly inhibited establishment compared to non-compaction. Compaction treatments increased perennial ryegrass content in the stand over non-compaction. The sand promoted greater Kentucky bluegrass and thatch tendency. Rooting in response to compaction increased in the 0 to 3 inch zone and decreased in the 3-6 inch soil depth when compared to non-compaction. Wear accounted for 90% of the total variation in traffic injury with soil compaction effects accounting for the balance. Soil and wear effects were the principal factors affecting turfgrass quality. Wear treatment did not affect soil physical properties while compaction altered aeration porosity, percent of maximum dry density, and internal drainage (saturated hydraulic conductivity).

Wear Stress Mechanisms in Cultivars of Creeping and Velvet Bentgrass. Seven cultivars of velvet bentgrass were compared with seven cultivars of creeping bentgrass in wear tolerance and anatomical, morphological and physiological characteristics. Bentgrass species and cultivars were maintained at greens height of cut and wear injury was imposed using walk behind mowers fitted with grooming brush. Cultivars of velvet bentgrass were found to exhibit significantly better wear tolerance than creeping bentgrass. The greater wear tolerance with velvet bentgrass entries was due to their greater leaf cell wall content, upright tiller and leaf orientation, and greater shoot density. Sponsors: New England Regional Turfgrass Foundation and National Turfgrass Evaluation Program.

Wear Trials in Bentgrass Maintained as Fairway and Putting Green Turf. Nineteen cultivars of creeping and velvet bentgrass maintained as putting green turf are being compared for overall performance under wear stress. This 5-year evaluation was established in the fall of 2008. In 2009 Villa velvet bentgrass and Alpha creeping bentgrass exhibited the best wear tolerance. In fairway trials, creeping bentgrass entries exhibited significantly better wear tolerance than colonial bentgrass. Authority, Benchmark DSR, Declaration, L-93, T-1 and 007 creeping bentgrass provided the best wear tolerance under fairway height of cut. Sponsor: National Turfgrass Evaluation Program.

Increasing Water Use Efficiency by J. Scott Ebdon, PhD: Efficient Irrigation for Recreational Turf in New England: Evapotranspiration and Crop Coefficients. This new study planted in the fall of 2009 will measure evapotranspiration (ET) losses from pure stands of Kentucky bluegrass (Touchdown), perennial ryegrass (Exacta) and creeping bentgrass (Memorial). Different mowing heights and N fertility will be compared. Monthly crop coefficients along with reference ET val-
ues from weather stations will be
determined for low- and high-maintenance
turf. These values can be used to assist turf
managers in applying irrigation water more
efficiently to sports and golf turf in the cool-
humid New England region. Sponsor: New
England Regional Turfgrass Foundation.

Increasing Water Use Efficiency by Michelle
DaCosta, PhD:

Evaluation of Wetting Agents on Drought
Resistance and Irrigation Requirements of
Bentgrass Species. The objective of this field
study slated to begin in the summer of 2010 is
to quantify the influence of wetting agents on
improving turf performance of three bentgrass
species that vary in drought sensitivity and irri-
gation requirements under golf course fairway
conditions.

Environmental Protection and Applicator
Safety by J. Marshall Clark, PhD:

Optimization of Vegetative Filter Strips for
Mitigation of Runoff from Golf Course Turf.
The loss of pesticides and nutrients into sur-
rounding bodies of water and the resulting
decreases in water quality have led to the use of
best management practices such as the use of
vegetative filter strips (VFS) to intercept runoff
water and thus prevent its loss and the loss of
any associated pesticides and nutrients to sur-
rounding water bodies. This three year project,
begun in 2008, will evaluate selected plants for
their effectiveness in removing pesticides and
nutrients from turfgrass runoff waters.

Preliminary data indicates that the vegetative
filter strips have the potential to intercept pesti-
cides.

Utilizing Reduced Risk Pesticides and IPM
Strategies to Mitigate Golfer Exposure and
Hazard

This 3-year project, initiated in 2007, seeks
to determine actual levels of exposure to
“reduced risk” pesticides following application
to turfgrass. The fate of pesticides after applica-
tion largely determines how much of it is avail-
able for potential human exposure.

Pesticide residues in the air and on turfgrass
(dislodgeable foliar residues, DFR) using either
chlorpyrifos, carbaryl, cyfluthrin, chlorothalonil, 2, 4-D, MCPP-p, dicamba, imi-
dacloprid, carfentrazone or azoxystrobin have
been analyzed. In 2009 two applications of the
“reduced risk” insecticide halofenozide were
made. Analyses of these samples are in progress.

This study is also evaluating best manage-
ment practices for reducing exposure to
“reduced risk” turfgrass pesticides.

To determine precisely how much of the
environmental residues are actually trans-
ferred to people, we measure exposure to
volunteer golfers using dosimetry (measur-
ing pesticide residues on full body cotton
suits and personal air samplers) and bio-
monitoring (measuring urinary metabo-
lites). Dosimetry and biomonitoring,
together with concurrently collected dis-
lodgeable foliar and airborne residue data,
provide a unique database on exposure and
have allowed us to develop an exposure
model. We will compare the biomonitoring
and dosimetry results for these “reduced risk” compounds, such as halofenozide,
with those previously determined for chlor-
pyrifos, carbaryl, cyfluthrin, 2,4-D, MCPP,
dicamba, chlorothalonil and imidacloprid.

To date, Hazard Quotients (HQs),
using the EPA Hazard Quotient criteria,
determined for chlorpyrifos, carbaryl,
cyfluthrin, 2, 4-D, dicamba, MCPP,
chlorothalonil, imidacloprid and carfentra-
zone have been 20- to 1.25 million- fold
below 1.0, indicating safe exposure levels.
HQs less than or equal to 1.0 indicate that
the exposure resulted in a pesticide dose at
which adverse effects are unlikely. Sponsor:
New England Regional Turfgrass
Foundation.

Integrated Pest Management by J. Scott
Ebdon, PhD:

Resistance of Perennial Ryegrass
Cultivars to the Ingress of Annual
Bluegrass. This recently completed study
assessed perennial ryegrass resistance to the
ingress of annual bluegrass over a 4-year
period. Visual percent Poa in 120 cultivars
of perennial ryegrass was assessed annually
beginning in the 2nd year after establish-
ment. Percent Poa increased with age of
the stand from 12.6% in 2006 to 17.6%
in the last year of the test in 2009.

Significant genetic variability was observed
between cultivars with % Poa ranging
from 6.7% to 70% in the last year of the
test. Cultivars with the lowest Poa (6.7%)
in 2009 included Accent II, Exacta II
GLSR, Manhattan 5, Pianist, Secretariat
II, and SR-4600. Only one entry, an
experimental (SRX 4682), was found to
have no Poa by the last year of the
test. Sponsor: National Turfgrass
Evaluation Program.

Tolerance of Kentucky Bluegrass Cultivars to the Herbicide Certainty (with Prasanta
Reduced field efficacy using propiconazole was observed at sites with preexisting DMI resistance, whereas complete control was observed at sites with total DMI sensitivity. A repetition of this study will take place in 2010 and 2011 to confirm the existence of the site-specific population structures and to study how the structures have changed after two years of DMI application at different rates and intervals.

This research has directly contributed to the formation of a Fungicide Sensitivity Assay diagnostic service for turf managers who have difficulty controlling dollar spot. The assay is conducted at the UMASS Turf Pathology lab using all commonly used fungicide classes to test levels of fungicide resistance to each. Results of the assay give clients a holistic understanding of their dollar spot populations along with effective cultural and chemical control options saving some thousands of dollars in misapplications of chemicals to dollar spot populations with fungicide resistance.

Reverting DMI-Resistant Dollar Spot Populations with the Use of Non-DMI Fungicides (boscalid, Emerald®, chlorothalonil, Daconil Ultrex®, iprodione, Chipco 26GT®, and Ipro SE®, vinclozolin, Curalan®, and more) at a Golf Course on Cape Cod.

This experiment began in 2007 and is intended to identify non-DMI fungicides capable of reverting DMI-resistant populations back to sensitive populations so that the DMI fungicides can be used again. This experiment is also examining the length of reversion time while maintaining acceptable turf quality. Based on 3 years’ careful monitoring of the populations using laboratory assays and evaluating field control, we did not observe any significant shift of the resistant populations.

QTL Mapping of Resistance to Gray Leaf Spot (GLS) in Perennial Ryegrass. This project aims to research the interactions between the GLS pathogen variability and host resistance. The ultimate goal is to produce perennial ryegrass plants having a broad spectrum of gray leaf spot resistance by pyramiding various resistant genes originated from different Lolium species and cultivars. The gray leaf spot resistant cultivars being studied showed only moderate resistance to the 13 geographically diverse isolates of the disease causing organism. This result may indicate non-race specific resistance in perennial ryegrass. Sponsor: United States Golf Association.

Disease Management Trials: Trials investigating the effectiveness of specific fungicides are being conducted at the UMass Joseph Troll Turf Research Center as well as at field sites. These include evaluation of: 1. twenty-nine different fungicide treatments for preventative control of dollar spot (caused by Sclerotinia homoeocarpa) on a mixed stand of creeping bentgrass and annual bluegrass; 2. 34 different fungicide treatments with variable timing for preventative control of Typhula blight (caused by Typhula ishikariensis and T. incarnata) and pink snow mold (caused by Microdochium nivale); and 3. fungicides for preventative control of foliar Pythium blight (caused by Pythium aphanidermatum) on a seedling stand of perennial ryegrass (Lolium perenne).

Disease Management Trials by Robert Wick, PhD:

Alternatives to Fenamiphos for Controlling Plant Parasitic Nematodes in Golf Greens

Biological controls, botanicals, conventional and unconventional chemistry are being tested as alternatives to fenamiphos for controlling plant parasitic nematodes in golf greens. Sponsors: New England Regional Turfgrass Foundation and the United States Department of Agriculture.

Disease Management Trials by Patricia Vittum, PhD:

Management of Turfgrass Damaging Insects

Various studies concentrating on the management of turfgrass damaging insects are underway at field sites in the northeast. These include: seasonal control of white grubs with neonicotinoids; efficacy of biological control agents (Bacillus thuringiensis bv. bachi, another strain of BT, and entomopathogenic nematodes) against white grubs; identification of distribution and behavioral differences of white grubs in New England (Japanese beetle, oriental beetle, European chafer, Asiatic garden beetle); and mating disruption as a means to reduce oriental beetle grub populations.

Disease Management Trials by Michelle DaCosta, PhD:

Winter Injury of Cool-Season Turfgrasses

Several studies are underway to determine the physiological basis for differences in freezing tolerance among cool-season grasses, with an emphasis on understanding mechanisms of cold acclimation and deacclimation. Sponsors: New England Regional Turfgrass Foundation, United States Golf Association, and Adirondack Golf Course Superintendents Association.

Compiled by Mary Owen, Extension Turf Specialist
Prepare for using pre-emergent products

Celsius herbicide
Celsius, the newest generation post-emergent herbicide from Bayer Environmental Science, delivers the highest degree of weed control on warm-season turf, allowing turf managers to maintain the highest quality fields for their players. It is safe for use year round on the most important warm-season turf types to keep turf in play all the time, and the reduced risk of significant phototoxicity at high temperatures allows fields to always look ready for action. Celsius provides exceptional control of more than 150 troublesome broadleaf and grassy weeds, as well as application convenience, flexibility and long residual. Available in wettable granular formulation, Celsius gives turf managers the freedom to make post-emergent applications on their own schedule.

www.bayerprocentral.com

Oxadiazon professional herbicides
Get the long-lasting grass and broadleaf weed control you demand and the dependable results you expect with pre-emergent herbicides from Quali-Pro. Products are university tested and offer formulation quality. Oxadiazon SC (Ronstar Flo equivalent) controls annual grasses and broadleaf weeds and comes in a case pack (2 x 2.5 gal). Oxadiazon 2G (Ronstar G equivalent) is a selective pre-emergent herbicide in 50-lb. case pack; and Oxadiazon 50 WSB (Ronstar Flo equivalent) controls annual grasses and offers formulation quality. Oxadiazon SC results you expect with pre-emergent herbicides weed control you demand and the dependable resolutions on their own schedule.

www.quali-pro.com

Acelepryn insecticide
More than 550 independent university trials prove that one application of DuPont’s Acelepryn insecticide delivers excellent control of the 10 toughest grubs at the lowest application rate ever used for white grub control. Plus, Acelepryn offers more than just grub control. One early application also provides excellent control of key surface-feeding pests, including cutworms, webworms, and billbugs. In addition, research and field use show that Acelepryn is an effective option for use in an annual bluegrass weevil control program. Acelepryn has been classified as reduced-risk for turf applications by the US EPA.

www.proproducts.dupont.com

Barricade herbicide
Barricade herbicide from Syngenta has excellent residual and performance to last throughout the season. A single fall application of Barricade will control next season’s crabgrass, as well as many other broadleaf and grassy weeds. A spring application will last until fall of the same year. Barricade is one of the featured products in The Syngenta GreenTrust 365 Purchase Program, a new simplified year-long program that is designed to provide maximum flexibility to sports turf managers. It went into effective Oct. 1, 2009 and will provide incentives through September of 2010, with additional bonuses for purchases made through Feb. 26, 2010. As with all products, it is important to read and follow label instructions when using Barricade.

www.syngenta.com

Systemic grub control
Imidacloprid 0.5G and 75 WSB from Quali-Pro provides systemic control of soil inhabiting pests in turfgrass and landscape plantings. This great value product features low use rates, application flexibility, broad spectrum control, and long-term control of white grubs, European cranefly, Japanese beetles and more. Low use rates, designed specifically for soil application. Available in convenient granular formulation for broadcast application to turf and ornamentals or convenient pre-measured water soluble bags.

www.quali-pro.com

Specialty herbicides from Dow AgroScience
For effective control of crabgrass, Dimension specialty herbicide offers a wider application window because it provides both preemergence and early postemergence control. In addition, Dimension provides season-long control of more than 40 grassy and broadleaf weeds, including goosegrass, spurge and [START ITAL]Poa annua[END ITAL]. With multiple formulations, including the water-based Dimension 2EW, Dimension in non-staining, has a low odor and is labeled for use on sports turf.

LockUp specialty herbicide is now available through distributors as a formulated product for superior postemergence control of dollarweed in the South and white clover dandelion in the North. LockUp provides activity at extremely low use rates and can be applied to wet or dry cool or warm-season turf.

www.dowagro.com

Echelon and Dismiss
Echelon herbicide from FMC Professional Solutions provides preemergence and early postemergence control of sedges, crabgrass, and goosegrass in sports turf, golf courses, as well as other multi-use turf environments. Used in typical spring preemergence applications, Echelon offers control beyond that of traditional preemergence herbicides, saving the applicator time and money on weed control later in the season. Echelon is also used as a preemergence in the fall for control of poa annua, as well as sedges present at that time of year.

Dismiss turf herbicide and Dismiss South herbicide provides fast visible sedge control through contact activity and long residual sedge control by penetrating the tubers and destroying the reproductive structures. Both products provide visible control of sedges and green kyllinga in 24-48 hours, and Dismiss South offers enhanced control of purple nutsedge in warm season turf types (excluding St. Augustine grass). Dismiss is available in 6-oz bottle (lower price in 2010) and a new, ½ gallon container. Dismiss South is available in pints.

www.fmcprosolutions.com