Preemergence crabgrass control on athletic fields

By **Greg Breeden & James T. Brosnan, Ph.D.**

» **Left: Figure 1.** LARGE CRABGRASS (Digitaria sanguinalis).
» **Inset: Figure 2.** SMOOTH CRABGRASS (Digitaria ischaemum).

CRABGRASS SPECIES are annual grassy weeds that are problematic on most every athletic field. If left uncontrolled, crabgrass infestations will decrease the aesthetic and functional quality of any athletic field.

The forthcoming loss of an effective, economical postemergence herbicide like MSMA renders the use of preemergence herbicides for crabgrass control increasingly more important. While registrants of MSMA for use on sports turf can no longer sell the product, distributors will be able to sell products purchased before December 31, 2009 until December 31, 2010. After December 31, 2010 existing stocks of MSMA can legally be used for weed control on sports field turf until they are exhausted provided that these uses comply with the EPA-approved label and labeling of the affected product1. Once supplies have been exhausted, preemergence herbicide applications will be one of the main tactics used to control crabgrass infestations on athletic fields.

CRABGRASS CHARACTERISTICS

There are two primary crabgrass species that infest athletic fields: large crabgrass (Figure 1) and smooth crabgrass (Figure 2). Large and smooth crabgrass can be differentiated by examining the leaves and stems of each species. Large crabgrass has pubescence (hairs) on its leaves and stems, while the leaves and stems of smooth crabgrass have very little pubescence except on the collar region (the intersection of the leaf and stem of the plant). Both large and smooth crabgrass are summer annuals that germinate primarily in the spring, grow through the summer, produce seeds in the fall, and die following the first killing frost.

GERMINATION AND PREEMERGENCE HERBICIDES

Correct application timing is an integral part of controlling crabgrass with preemergence

The blooming of the forsythia plant, also known as golden bells (Figure 3), is a visual indicator that soil temperatures are increasing to a level conducive for crabgrass seed germination. Using this visual indicator, the first preemergence herbicide application of the season should be made before the last forsythia bloom falls from the tree.

Forsythia branch image courtesy of istockphoto.com

» **Figure 3.** FORSYTHIA in bloom.

herbicides. A common misconception is that preemergence herbicides act by preventing weed seeds from germinating. These herbicides actually prevent germinating seedlings from developing into mature plants. For preemergence herbicides to work properly, they must be applied before seed germination and need approximately 0.5 inch of rainfall or overhead irrigation within 24-48 hours after application in order to be activated.

Large and smooth crabgrass seed germinates in the spring when soil temperatures exceed 55 F for 4 consecutive days and nights. Initial applications of preemergence herbicides for crabgrass control should be made before these temperatures occur in your region. In the transition zone applications are normally made in late February through early April.

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Preemergence herbicides will generally provide crabgrass control for 12-16 weeks after application depending on application rate. However, the level of control provided will dissipate over time. Using a split application strategy where an herbicide is applied twice at a lower rate can extend the length of residual control provided by that application. Additionally, a split application strategy will offer improved preemergence goosegrass control.

Preemergence crabgrass herbicides

THERE ARE SEVERAL PREEMERGENCE HERBICIDES marketed for crabgrass control on athletic fields. The following information is provided as a guide for herbicide selection. Always refer to the product label for specific information on proper product use, tank-mix compatibility, and turfgrass tolerance.

Trade Name: Dimension
Chemical Name: dithiopyr
Family: Pyridine
Use Areas: Golf course (except putting greens), athletic fields, sod farms, residential and non-residential areas.
Turf Safety: All major established turfgrass species.
Rate: Dimension EC - 2 qt/a (0.5 lb ai/a)
Application Type: Sprayable and Granular

Trade Name: Echelon
Chemical Name: prodiamine + sulfentrazone
Family: Dinitroaniline + protox-inhibitor
Use Areas: Golf course (except putting greens), athletic fields, sod farms, residential and non-residential areas.
Turf Safety: All major established turfgrass species
Rate: Echelon 4SC – 18-36 oz/a (0.57-1.125 lb ai/a)
Application Type: Sprayable

Trade Name: Ronstar
Chemical Name: oxadiazon
Family: Oxadiazole
Use Areas: Golf course (Except tees and putting greens), athletic fields, sod farms, and non-residential areas [Not labeled for residential lawn use].
Turf Safety: All major established turfgrass species.
Rate: Ronstar G - 100 to 200 lb/a (2 to 4 lb ai/a)
Application Type: Granular or Sprayable to Dormant Turf Only

Trade Name: Pendulum Aquacap
Chemical Name: pendimethalin
Family: Dinitroaniline
Use Areas: Golf course (except tees and greens), athletic fields, sod farms, residential and non-residential areas.
Turf Safety: All major established turfgrass species.
Rate: Pendulum Aquacap - 1.5-3 qt/a (1.5 to 3 lb ai/a)
Application Type: Sprayable and Granular

Trade Name: Barricade 4FL and 65 WG
Chemical Name: prodiamine
Family: Dinitroaniline
Use Areas: Golf course, athletic fields, sod farms, residential and non-residential areas.
Turf Safety: All major established turfgrass species.
Rate: Barricade 4 FL- 10 to 48 oz/a (0.5 to 1 lb ai/a)
Application Type: Sprayable and Granular

Preemergence herbicides must be applied before seed germination and need approximately 0.5-inch of rainfall or overhead irrigation within 24-48 hours

RESEARCH

Each year the University of Tennessee evaluates numerous preemergence crabgrass herbicides in different locations and environmental conditions. In most years, labeled rates of prodiamine (Barricade), dithiopyr (Dimension), pendimethalin (Pendulum Aquacap), oxadiazon (Ronstar), and prodiamine + sulfentrazone (Echelon) all provide effective crabgrass control (> 90%) throughout the season when applied properly.

Some preemergence herbicides do provide activity against crabgrass plants that have emerged from the soil seedbank. Early postemergence applications of Dimension (1 tiller or less) and Echelon (1-3 leaf) have been found to provide a level of smooth crabgrass control similar to applications of the same herbicides at recommended preemergence timings. While these are the only two preemergence crabgrass herbicides that exhibit postemergence activity, control from these applications has been reported to be inconsistent in other locations. In general, preemergence herbicides should be applied before crabgrass seed germination. Any postemergence activity should be considered an added bonus when these herbicides are made at later than optimal timings

DEVELOPING A PREEMERGENCE PROGRAM

Step 1. Choosing a preemergence herbicide. While many athletic field managers hold strong opinions as to which preemergence herbicides work better than others, research data collected at the University of Tennessee has found all of these products to perform similarly when applied properly. Therefore, be sure to select a product that is available in a formulation that is compatible with your application equipment. In many cases granular products may be better suited than sprayable formulations for some turf managers.

Step 2. Apply in a timely manner. After choosing a preemergence herbicide make sure it is applied in a timely manner. Keep in mind

Establishment of grassy weeds, like crabgrass, can often be prevented with a timely preemergence herbicide application in the spring of the year.

that all preemergence herbicides need rainfall or irrigation to be activated. The optimal time to apply preemergence herbicides for crabgrass control varies greatly from region to region. Contact your local Extension office for more information regarding crabgrass seed germination timing in your area. For extended residual activity make a second application 6-8 weeks after the initial application.

Establishment of grassy weeds, like crabgrass, can often be prevented with a timely preemergence herbicide application in the spring of the year. Research has found that these herbicides perform similarly when applied correctly at the proper timing. Using a split application strategy can extend the length of residual control provided by a single preemergence herbicide. With the forthcoming loss of an effective, economical postemergence herbicide like MSMA, preemergence control of crabgrass will become increasingly important.

Always refer to the product label for specific information on proper product use, tank-mix compatibility, and turfgrass tolerance. For more information on turfgrass weed control, visit the University of Tennessee's turfgrass weed science website, http://tennesseeturfgrassweeds.org. ■

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Sprayer calibration in a pinch

» THE GOAL was to calibrate an existing 30-year-old sprayer (with minimal equipment modification) to properly apply a systemic broadleaf herbicide.

(All photos by Brad Park, Rutgers University).

SPORTS FIELD MANAGERS, particularly those working in a K-12 setting, do not always have access to state-of-the-art spray application equipment. In these settings, the application of liquid materials is frequently contracted out or the sports field manager must often work with available equipment.

The sports fields and grounds at Overbrook High School (Pine Hill Public Schools, Pine Hill, NJ) are overseen by Rich Watson, grounds supervisor and sports turf manager, and Bill Loftus, sports turf manager. The school owned a simple, functional, 30 year-old sprayer that could be used for the application of liquid materials. The sprayer consisted of a 100-gallon tank mounted on a tractor three-point hitch and a pump powered by the PTO. The boom was equipped with nine flat flan nozzles commonly used in turfgrass applications.

Rich Watson's goal was to properly calibrate this sprayer, with little or no modification to its existing set-up, to correctly apply a selective, systemic broadleaf weed herbicide.

What we knew about the sprayer and what we needed to determine. While there are various methods and techniques that can be used to calibrate a sprayer, we used the following formula to sort-out which variables we knew and which variable(s) needed to be determined to accurately deliver the broadleaf herbicide: GPM = [GPA x MPH x W] / 5940, where GPM = gallons per minute (per nozzle); GPA = gallons per acre (spray volume); MPH = miles per hour (tractor operating speed); and W = width (inches) between nozzles. The value of 5940 is a constant needed to convert units and is not derived in this article.

The sprayer was equipped with nine (9) XR TeeJet 8004VS nozzles positioned on 20-inch spacings across the boom. Per manufacturer specifications (TeeJet Technologies, Spraying Systems Co., Wheaton, IL), the nozzle output is designed to be 0.4 GPM and each nozzle will produce an 80-degree spray angle at an operating pressure of 40 pounds per square inch (psi).

Note that this calibration formula, nozzle nomenclature, and other technical information can be accessed at the TeeJet Technologies website (www.teejet.com).

The label of the broadleaf herbicide chosen for this application states that the product should be applied in 20 to 220 gallons of water per acre. While this is obviously a wide range, the product being used was a systemic broadleaf herbicide. The goal of applying a systemic herbicide is to simply deliver the product onto the leaf of the plant (as opposed to uniformly covering turfgrass leaves in the case of a contact pesticide). Thus, a target application rate of 40 GPA (approximately 1.0 gallon per 1000 sq ft) was appropriate for the systemic herbicide. Also, applying the product at this spray volume (as opposed to 80 GPA or greater) would require fewer tank refills to spray large acreages.

Figure 1. Using a calibration formula

The formula:	Variables:
$GPM = \frac{GPA \times MPH \times W}{5940}$	GPM = 0.4 GPA = 40 W = 20 MPH = ?
GPM = gallons per minute (per nozzle)	**Our calculations:**
GPA = gallons per acre (from label)	$MPH = \frac{5940 \times GPM}{W \times GPA}$
MPH = miles per hour	$MPH = \frac{5940 \times 0.4}{20 \times 40}$
W = nozzle spacing (inches)	MPH = 3.0

Thus, with the existing sprayer components in mind (XR 8004 nozzles positioned on 20-inch spacings), it becomes clear upon examining the calibration formula that operating speed is the variable that needed to be determined to calibrate the sprayer to deliver 40 GPA of spray solution. Inputting our known variables into the equation, we determined that the sprayer required an operating speed of 3.0 mph (Figure 1).

CALIBRATING THE SPRAYER

A 100-foot course was measured, the spray tank was filled halfway with clean water, and the tractor was operated numerous times over the course at varying ranges and forward gears at an engine rpm of 2100 (rpm necessary to maximize PTO performance) until the course was completed in 23 seconds. A speed chart was used to determine that 23 seconds were required to complete the 100-foot course at 3.0 mph; however, a calculation and unit conversions could have been performed to obtain the same information. Through trial and error, we determined that the tractor had to be operated in 3rd range and 2nd gear at 2100 rpm to complete the course in 23 seconds.

All nozzles, screens, and seat gaskets were removed from the boom the day before and soaked in an ammonia solution for 24 hours. Once cleaned, nozzle assembly components were then reassembled on the boom. This was an important step because clogged nozzles and screens will often produce an uneven appearance of the spray, which will affect spray volume and the uniformity of the application.

With the tractor engine rpm set to 2100 in an idle position and the PTO engaged, the sprayer was operated with clean water with the pressure regulator set to 40 psi. This allowed us to observe the operating appearance of the “fan” pattern produced by each nozzle, which we determined to be satisfactory.

Next, a graduated cylinder was used to confirm that each nozzle

» **Left:** A 100-FT COURSE was set-up to determine the tractor’s range and forward gear necessary to achieve an operating speed of 3.0 mph.
» **Right:** EXISTING nozzles and components were allowed to soak in an ammonia solution for 24 hours before being reassembled on the sprayer boom.

A graduated cylinder (ml) was used to check each nozzle for a calculated spray volume equivalent to 0.4 GPM (i.e. 380 ml in 15 seconds).

was delivering 0.4 GPM (Figure 2). At 0.4 GPM, each nozzle delivers 380 ml (~13 fluid oz) of water over 15 seconds. An acceptable margin of error is + 5%; hence, the acceptable amount of water to be collected ranged from 361 to 399 ml. Actual quantities collected ranged from 340 to 360 ml. The spray pressure was adjusted to 50 psi to increase spray output. An upward adjustment in pressure was not unexpected since the pressure gauge was mounted to the pressure regulator and the operating pressure at the nozzles was likely less due to friction associated with the spray solution moving though the hose lines. Spray output was increased to the acceptable range after the pressure adjustment.

Figure 2. Calculating how much water to collect per nozzle

Steps we took:

Our goal was to collect a quantity of clean water equal to 0.4 GPM per nozzle.
We had a graduated cylinder (ml).
We recognized that 15 sec is an appropriate amount of time to perform a spray volume check.

Calculations

$$\frac{0.4 \text{ gallons}}{1.0 \text{ minute}} \times \frac{3785 \text{ ml}}{1.0 \text{ gallon}} \times \frac{1.0 \text{ minute}}{60 \text{ seconds}} \times 15 \text{ seconds} = 380 \text{ ml } (\sim 13.0 \text{ oz})$$

2) We needed to collect 380 ml (±5%) per nozzle in a 15 second period.
3) The pressure regulator was set to 40 psi (per manufacturer specifications).
4) Our collected volume ranged between 340 and 360 ml (outside 5%).
5) We increased the pressure regulator to 50 psi to reach desired input.

FINAL STEPS

Per manufacturer specifications, the XR TeeJet 8004VS nozzles positioned on 20-inch spacings should be set at 17 to 19 inches above the intended target. Thus, the boom height was adjusted to set the nozzles at 20 inches above the paved surface; this height is approximately 18 inches above the 2-inch high turfgrass canopy (the intended target).

We then operated the sprayer (filled with clean water) across a dry, paved surface at the calibrated speed and pump pressure to

Within 2 weeks, white clover control was judged to be "excellent."

observe the drying pattern of the spray solution. The spray dried in a uniform pattern (i.e. there were no visible streaks resulting from improper overlap); hence, the nozzle spacing and height were set properly.

The following day, the broadleaf herbicide was applied using the sprayer set to the calibrated speed and pressure. A minimal amount of spray solution remained in the tank after the application was made—an indication that our calibration efforts were successful. The remaining solution was diluted and "sprayed-out" multiple times in out-of-play border areas at the far-end of the facility. Within 2 weeks, white clover control was judged to be "excellent."

Laws pertaining to fertilizer and pesticide applications are becoming increasingly restrictive, particularly on school properties. Heighted parent and environmental interest-group awareness of chemical tools used on public grounds drives much of this regulatory policy. It is important that chemical applications are made thoughtfully and in accordance with their product labels. A thorough understanding of the sprayer calibration process allowed the application of a broadleaf herbicide at Overbrook High School to be successful. ■

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» Water was sprayed on a paved surface using the calibrated sprayer to observe the drying pattern. A uniform drying patter, absent of skips and streaking, indicates proper nozzle performance and positioning.

THE PERILS of growing bermudagrass on the California coast

BERMUDAGRASS is a tropical/subtropical warm season perennial grass native to southeastern Africa. It is believed to have entered the United States around 1751, probably through coastal Georgia and/or the Carolinas. There are approximately 10 species that include the common seeded wild types as well as many interspecific hybrids. The most commonly used for turfgrass are the sterile hybrids of the *C. dactylon x C transvaalensis* types.

Originally used in this country for pasture and hay production, it has become one of the best performing turfgrass species available. In my mind, Tifway (Tifton 419) bermudagrass is still the standard in the industry for golf fairways and athletic fields where it can be grown. It has a rich green color and produces aggressive rhizomes and stolons making it very tolerant to wear with rapid recovery from turfgrass stand loss.

Some specific cultivars of bermudagrass can be grown as far as 53 degrees north latitude, however, most are best suited for growth below 37 degrees north—the limiting factor being winter kill. For instance Patriot bermudagrass, released by the Oklahoma Agricultural Experiment Station (Oklahoma State University), is being used as far north as Purdue University in Indiana.

Most bermudagrasses are quite well adapted to hot (85-95 F, day) dry climates and can perform well under moderate drought. However, bermudagrass does not perform well under even the slightest of shade. For example, bermudagrass requires between 800-970 langleys (a unit of radiation = one gram calorie per square centimeter of irradiated surface) per day solar radiation (390-470 watts per square meter per day). This equates to at least 6 hours of full sun per day. Compare this to many cool season grasses that can thrive with only 245-490 langleys per day. This represents a very significant difference in shade tolerance.

Growing bermudagrass in shade is especially difficult when managed at low mowing heights under any traffic stress like athletic fields.

Growing bermudagrass in shade is especially difficult when managed at low mowing heights under any traffic stress like athletic fields. Fortunately, most athletic field designs provide for minimal structural shade throughout the day. This is not always true with golf course designs, as planting or leaving a "strategic" tree(s) can be an important part of golf hole design yet can pose hours of shade per day.

This brings me to the subject at hand—growing bermudagrass in the coastal regions of California which includes San Diego in the southern most part north to the central coastal region of San Luis Obispo—approximately 300 miles north of the Mexican border. This area is characterized as having a mild Mediterranean climate with average summer temperatures ranging from 75-90 F (day) with winter temperature ranging from 40-60 F. This is perfect weather for humans but not very ideal for growing many warm season grasses. This is especially true when you consider the rapid drop in night time temperatures in the summer.

Add to this the "coastal" influence which includes fog and clouds, you can see that this region may not always be conducive to growing bermudagrass. Not only do you not have temperatures suited for bermudagrass growth but cloud induced limitations in radiant energy adequate for photosynthesis may be lacking as well.

COMPARE WITH PHOENIX

Comparing the percent growth potential (GP) for bermudagrass in Phoenix, AZ (where bermudagrass is highly preferred) with that of San Diego, CA there is a significant difference in potential for growth. Growth potential reaches 100% in Phoenix for approximately 6 months of the year (late May to mid-October). The highest GP in San Diego, however, only reaches a high of 40% and for only about 3 months (July to mid-September). In Sacramento (further inland but also further north of San Luis Obispo) the GP still only reaches a high of 60% for July to mid-September.

Gelernter and Stowell state that bermudagrass still performs adequately at and above 50% growth potential, but does poorly below that mark. So you can see why turfgrass managers struggle along California's coast to grow quality bermudagrass.

What this means is that even though it appears these coastal regions should be ideal for bermudagrass growth, low average temperatures (especially at night) and cloudy/foggy days prevent adequate carbohydrate production and therefore limited growth in bermudagrass.

FESCUES

This is not the case for most cool season grasses, however. I have found that both tall fescue and the fine fescues do very well in these coastal regions as they have moderate heat and drought tolerance and do well under cloudy/foggy (slight shade) conditions. The potential problem with growing these cool season types, however, whether here in San Luis Obispo or in San Diego, are the dry summer conditions and the poor quality water resulting in salt and carbonate accumulations (Bowman, et.al., 2006). As an aside, Kentucky bluegrass does not perform well in southern California because of the occasional high summer temperatures and the water requirements for its survival.

MANAGEMENT STRATEGIES

Managing bermudagrass on the California Coast involves treating the stand as if it were growing in shaded condition, because ultimately it is. Shaded bermudagrass develops thin, etiolated leaves, increases internode length, and a poorly developed root system.

Over time, shade results in a thin canopy intolerant to traffic. Under traffic stress, the stand will rapidly thin to the point of stand failure, weed intrusion, and finally, poor surface performance.

Therefore managing bermudagrass under these conditions require maximizing photosynthetic efficiency and traffic control. Managers should be aware that "normal" management strategies need adjustment.

One of the most important considerations is how much and what kind of nutrition to employ. The principle being to avoid excessive succulent growth by using high rates of soluble nitrogen sources which leads to plants ill equipped to handle stress.

As the plant will use any and all carbohydrate reserves for leaf growth and not for stolon and rhizome growth, re-growth potential from heavy stress will be reduced. Potassium should be used judiciously to promote carbohydrate synthesis and leaf hardening as well as increased water conservation and winter hardiness.

Mowing height should be maintained at the higher limit allowed for the intended use. For instance, using bermudagrass for fairways vs. athletic fields vs. home lawns require different mowing practices and, therefore, different tolerances.

Managers may have to cultivate more often yet less aggressively. Compaction relief and aeration are important but recovery from these activities, especially if they are intensive, may be slow and therefore, may promote poor recovery, quality, and weed envision.

Overseeding is a very popular and important practice to those that manage athletic fields during the winter months. Overseeding involves planting (seeding) a cool season (CS) grass into an existing canopy of a warm season (WS) grass (usually bermudagrass). This process starts in the fall as the bermudagrass is going dormant and results in good color and playing conditions during the winter from the CS grass.

On the California coast, those that overseed have very interesting concerns as it relates "spring transition." This is when management switches away from the CS grass and shifts to promoting the annual recovery (green-up) of the WS grass.

Trade Name	Slow Activity (3-6 Wk), Applied late April - May	Fast activity (1-2 Wk) Applied mid-May - late May
Kerb 50WP	1 lb / A	- - -
Manor or Blade 60DF	0.5 - 0.75 oz / A	- - -
Revolver 0.19SC	9 oz / A	17-26 oz / A
TranXit 25DG	0.5 oz / A	1-2 oz / A
Monument 75WG	0.1 oz / A	0.3 oz / A

Figure 1. Chemical products used to remove cool season grasses from overseeded bermudagrass during spring transition.

In the coastal regions of California, it is critical that the spring recovery (transition) of the bermudagrass not be delayed. Bermudagrass relies on stored carbohydrates, accumulated the previous summer and early fall, for re-growth of new shoots in the spring. As we may assume that bermudagrass grown on the California coast may not have stored a great deal of sugar, we can also assume that there may be times when there may not be enough sugar to overcome a highly competitive CS grass during transition, especially if the perennial ryegrass is growing at its best.

Therefore, managers on the California coast should considered a well timed chemical approach to removing the CS grass. Something like Revolver, Manner, or Kerb can provide quick reliable removal of the CS grass during the spring (Figure 1).

Using Figure 1 you can see that timing is the critical factor. I would recommend applying the product when the bermudagrass has reached approximately 50% green-up of any un-overseeded areas (create a test area). It is important to consult the label and your service professionals as there are several considerations for use, specifically grass species tolerances, movement of the material along the soil, and soil temperature at application.

Using bermudagrass cultivars tolerant to either cold, shade, or both may provide another possibility. Although not everyone can or will renovate to new species of one grass or another, there are some new bermudagrasses available that may provide choices for quality turfgrass in these difficult costal conditions.

For instance, the University of Georgia's Wayne Hanna recently released a new "Tifton" bermudagrass called TifGrand which has been developed as a shade tolerant bermudagrass. This hybrid will be available sometime in 2010.

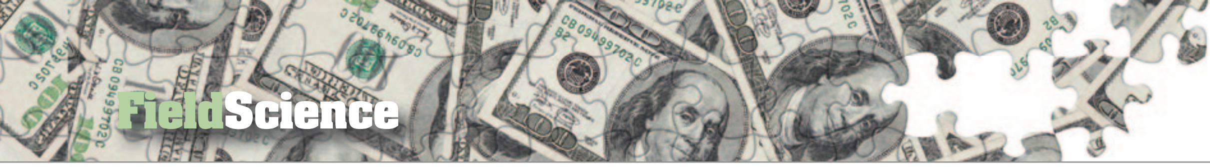
Another shade tolerant bermudagrass already available is Bull's Eye (West Coast Turf). It was recently installed on the baseball field at PETCO Park, home of the San Diego Padres. It was chosen for its color, durability, and tolerance for shade. This grass is also found on the Bank One Ballpark, home of the Arizona Diamondbacks.

Lastly, in a 2-year study conducted by Baldwin and Lui, they were able to rank several different bermudagrasses for response to shade. They found, using 64% continuous shade that the best cultivars for shade tolerance were Celebration, TifNo.4 (TifGrand), TifNo.1 and Transcontinental based on turfgrass quality, chlorophyll content, root biomass, and root length.

I think that it is easy to see that growing bermudagrass on the California coast can be difficult at times. Cloudy conditions with periods of less than ideal high summer temperature make growing bermudagrass a challenge. With good management, though, and the right cultivar choices whenever possible can make management easier.

Actually, whether growing a warm season or a cool season grass on the beautiful California coast practitioners will experience problems. Whether it is the climate, the soil, or the water turfgrass managers in California must stay on top of their management strategies to ensure the best turfgrass quality possible. ■

Dr. Terry L. Vassey is an assistant professor at California Polytechnic State University, San Luis Obispo, CA. For references, see www.sportstur fonline.com.



"AMENDING" INFIELDS ON A BUDGET

Editor's note: *This article was written by former MLB groundskeeper Clayton Hubbs, now with Stabilizer Solutions, Inc., Phoenix, AZ.*

WHY SHOULD THE EAST ANAHEIM LITTLE LEAGUE MATTER TO YOU? The league's field, once a treacherous battle-ground where bad hops usually led to bloody mouths, has now become a proving ground for professional baseball.

When the East Anaheim Little League came to Barney Lopas, head groundskeeper for the LA Angels of Anaheim for help on their field, it was a challenge to adapt a major league maintenance schedule to a field that lacked tools, budget and had a fluctuating base of volunteer manpower. Lopas, a concerned parent and coach, asked himself, "what can I focus on right now to make the biggest impact on this field within the league's budget and volunteer help?"

Being that 70% of a baseball or softball game is played on the infield skin, Lopas decided to focus his efforts there. If a ground ball made it over the infield lip, player's had to expect the unexpected with the unpredictable infield. The loose infield mix not only created dangerous hops, it made it difficult for the players to find stable footing. While the addition of moisture provided a somewhat better surface, too much moisture compromised the immediate game and the field's usability for days.

Replacing the infield mix was definitely not within the league's budget. Lopas realized that the one thing he could carry over from his major league field, and still stay within budget, was an infield amendment.

PARTICLE SIZE ANALYSIS IS A MUST

The first step in amending an infield is knowing where you stand right now. We have all heard the numbers, an infield mix should be 70% sand, and 30% evenly split between silt and clay. Without a true particle size analysis you may think you have plenty of clay content, but you may actually be playing on silt. Too much sand can usually be improved by adding more clay (depending on the parent material of the mix).

On the flip side, too much clay can generally be remedied by adding more sand. Too much silt to begin with, and you are better off starting with a new infield mix altogether. While silt is a necessary component of making a good infield work, too much of it can put you in a 'no man's land' of poor drainage and no cohesion, similar to what Lopas had to deal with. Only extreme cases warrant adding silt.

This brings us back to the particle size analysis; if you don't know the composition of your infield, you may be adding unnecessary silt, sand, or clay.

Of course a quality infield mix is the best starting point. Infield mixes vary by use and region; a major league mix is going to be closer to 60% sand and 40% silt and clay, with more of a focus on the clay. This type of infield will be difficult for a little league or heavy use municipality to maintain properly. These fields should be closer to the 70/30 range.

Many high school, municipality, and even college fields use soils that may be classified as "clay loam" and fit within the recommended particle size, but contain too much organic matter (broken down plant material like mulch). While organic matter is great for plants, it is bad for players.

Too much organic matter can loosen soil, impede lateral surface drainage, and disrupt the structure that hard soil particles provide to support the player. The biggest problem with organic matter is that it breaks down and turns into silt. Many laboratories provide a separate organic matter content test, sometimes included with the particle size analysis. This test can provide you with valuable information that can help you plan ahead for future silt from organic matter breakdown.

Find an infield mix that derived from a good parent material, processed mechanically and produced specifically for baseball and softball to avoid high organic matter content. If you don't have the luxury of purchasing a new infield mix, proceed with an infield amendment.

SELECTING AN AMENDMENT

The next step is to know your goal. The East Anaheim Little League's main objective was player safety. A municipal field's goal may be Return On Investment—maximize field use while reducing maintenance. A college may want to enhance home field advantage and get more practice time despite the elements.

While most desire all of these goals, really focusing on one or two motives will help in matching the right amendment with your existing soil conditions. Infield amendments should be used cautiously and for a specific reason, not just thrown onto an infield and expected to "do something." If not used properly, they could end up doing more harm than good.

Infield amendments come in all shapes and sizes, but mainly fall under two categories: mineral and organic-based. If your goal is to increase drainage, beyond adding sand and risking a loose infield, mineral amendments such as gypsum and calcium carbonate can help you improve your infield's natural drainage properties. Take care in applying these mineral amendments as over application can be a problem. Especially note that calcium carbonate should only be applied to high clay soils. Further soil tests, such as pH studies, should be done to determine the exact amount needed.

While vertical drainage is crucial for playability on an infield, most water should exit the infield via lateral drainage. The best way to improve lateral drainage is building a 1/2% slope into your field at the onset and maintaining a level field over time. Keeping a field level during a game is difficult, as low areas are bound to form and collect puddles.

Conditioners can be a good way to absorb puddles and continue play in rainy weather. The most popular conditioners are calcined or vitrified clay, mineral amendments made from fired clay particles that maintain a loose consistency and absorb water. Conditioners also work well as topdressings on higher clay infields. They provide the loose "cushion" needed to drag and slide on.

Conditioners work great for what they are designed to do, but Mark Razum of the Colorado Rockies warns, "infield conditioners are not a cure-all. Before adding them, you need to make sure your infield is level and your holes filled in with a good infield mix. I see it time and again, groundskeepers think they can just level their field with a topdressing, but the end result is like playing in a sand pit. When infield conditioners are substituted for good groundskeeping, they can turn against you."

Organic infield amendments are used to increase safety and field usage. They are incorporated into the soil to help stabilize the infield

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and improve cohesion and absorption. Good organic amendments will effectively bind soil particles to help turn loose, even unplayable infields into cohesive and stable footings. These products make silt particles act more like clay particles, which is a great defense against weather extremes.

The East Anaheim Little League actually approached Barney Lopas several years ago. Now Lopas has crafted a yearly maintenance program, which builds upon the progress from previous years. "Small incremental changes each year can lead up to equal the big immediate renovation," says Lopas. While the maintenance program focuses on new areas of development, like turf health and mound renovation, the importance of the infield amendment, Stabilizer®, is never forgotten. You don't need to add the same amount as the initial installation, but adding the recommended amount each year can ensure that you don't undermine the progress you've already made."

A recommended infield amendment program should include ripping and tilling your fields once a year. Fines do sink to the bottom, which in a small amount can be a good thing. When fines sink, larger particles remain on top, providing the loose cushion or sliding surface. Too much sinking and your surface becomes too loose and drainage layers may form. The surface soil particles themselves can also become crushed from overuse, depending on the parent material of the infield mix. Also, soil particles weather and break down the same way that the Grand Canyon was formed: exposure to rain, snow, and sun. Ripping and tilling once a year evenly blends soil particles, brings fresh soil particles to the surface, and provides a good opportunity to level the infield by adding additional infield mix.

Adding infield mix once a year is a good idea, as the mix is washed into the grass, players pick up the mix on their cleats and groundskeepers throw infield mix away when picking up debris. Before tilling, amendments that are incorporated into the soil such as mineral and organic amendments, should be spread at the recommended rates via drop spreader or topdresser. Tilling incorporates infield amendments evenly throughout the profile. Always beware of getting into your base material when you are tilling. After tilling, the infield should be leveled, preferably by a laser grader to achieve the 1/2% slope, watered, and rolled if necessary. This program should be performed more than once a year for fields that receive extremely heavy use. ■

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