Comprehensive Management Programs for Turf

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Ornamental turf is often expected to be uniform and relatively weed free around commercial establishments. It is part of a look that says this property is well cared for and that people are paying attention to quality and details. This may be expressed as a desire for good “curb appeal” – a good first impression of the business or property. It may be part of a message that says “this company seems to care about the place where their employees work”, or “this development seems to care about the place where the tenants live”. Corporations in particular may want uniformity, security, control and hierarchy to be expressed in the landscape. They may want the landscape to tie the buildings together into a corporate presence. They may want the spaces that people walk through and look into to seem controlled. Perhaps they want some entrances to be “presented” as more important or differently than others.

When people are paying for a landscape service they expect the results of the service to match or exceed their expectations. Concepts such as sustainability, reducing green waste, using well adapted plants, and integrated pest management may not be important to the customer. However incorporating these concepts is important for the landscape management company because they reduce costs and make the management of the landscape more predictable and labor efficient.

Many companies want to have a “good story” to tell visitors and employees. Help the customer make sound landscape management practices part of their story/identity. Try to explain the fertility program, e.g. what you are testing for, why fertilizing is done at certain times of the year, how you are trying to make efficient use of nitrogen fertilizer by grasscycling and why irrigation system upgrades save water and help reduce greenhouse gasses. Perhaps edging in the spring is a bad idea if crabgrass keeps growing in the edges. If the turf has had a history of getting weedy and then being dug up and replaced, point out to the customer that it does not have to be this way.

Weed Control Process

Do some Internet research about the weed or herbicide. I always check out http://axp.ipm.ucdavis.edu/, http://www.pace-ptri.com/ and http://gcsaa.expoventure.com/user-
I also use Google and enter the weed and/or herbicide name and Elmore OR Cudney.

- Understand what the customer wants, their expectations about the service provider and their budget.
- Analyze the turf.
- Make a 90-day and yearly plan. Execute it. Be sure the money, labor and equipment resources are available for the key crabgrass/spurge preemergent window in late January/early February and, if *Poa annua* is a concern, in late August/early September. Be sure cool season turf receives fall and late fall (late November/early December) nitrogen fertility. Thoroughly check irrigation systems in February.

**Identify the weeds.**

One of the best ways to identify weeds is to use the Internet. A very good site is the UC IPM site: [http://axp.ipm.ucdavis.edu/PMG/weeds_common.html](http://axp.ipm.ucdavis.edu/PMG/weeds_common.html). This site also lists books and other written references that can be used in the field.

The weeds that seem to cause the most customer concerns are crabgrass, kikuyugrass and bermudagrass in tall fescue - probably because they often don’t get controlled. However any weed that disrupts turf uniformity may be a concern, especially if the weeds don’t go away once pointed out. Also one weed near an entrance may cause more concern than a hundred weeds in turf behind a parking lot.

The weeds must be susceptible to herbicides you plan to use. Some broadleaf weeds are often difficult to control, e.g. *Oxalis*, spurge, knotweed, Canada thistle, yarrow, English daisy, black medic, and many other clover family weeds. Speedwells (*Veronica*) and pineapple weed are almost impossible to control unless the turf is vigorous. Annuals are usually difficult to control once they start to set seed.

- *Oxalis* can only be systemically controlled with Turflon (triclopyr).
- Nutsedge can only be systemically controlled with Manage. MSMA can be used to burn off the tops.
- Grassy weeds are difficult or impossible to control, although crabgrass can be controlled preemergently.
- Do not let new turf get infested by bermudagrass or kikuyugrass. Crew must be trained to pick out invading plants as soon as they appear.
Many weeds that may be actively growing e.g. black medic or bur clover, false dandelions, and many thistles have small hairs that repel herbicides, and form thick cuticles during dry summer weather. Herbicides do not penetrate a thick cuticle well. Weeds that undergo frequent water stress are particularly hard to control for this reason.

Evaluate the need for preemergent herbicide

Crabgrass and spurge are major targets. Identify areas prone to crabgrass and spurge:

- crabgrass skeletons visible on lawn.
- thin, full sun areas.
- heat sinks (sidewalk, curb).

Target these areas for preemergent application.

Postemergence Crabgrass control

The most important part of crabgrass control is a good turf canopy. Crabgrass requires direct sunlight to grow. It will not grow well in the shade of a turfgrass canopy.

If crabgrass has emerged it must be controlled with postemergent applications (Acclaim or MSMA plus Dimension). The best time to control crabgrass is while it is still small in April or May. During this time the crabgrass is easy to control and the turf is still growing fast and will fill in. Customers usually don’t notice the crabgrass until July. At this time the crabgrass is large and hard to control and the turf is growing slow and may not fill in. Dimension will keep crabgrass from coming back in these areas.

MSMA can be applied at high volume (2 to 4 gallons per 1000 SF) with a power sprayer. It is slightly more effective than Acclaim.

Prodiamine (Barricade) and pendimethalin have some postemergent control on very young crabgrass that has not tillered. This postemergent control is inconsistent.

Bermudagrass control in Tall Fescue turf

Repeat application of Turflon every four to six weeks will suppress bermudagrass.

Chemical programs must be combined with good cultural practices and often aeration/overseeding in the early fall. Remember that the bermudagrass is only suppressed not killed. If bermudagrass invasion is extensive, renovation is required.
Bermudagrass invasion of tall fescue is a common problem in California and Nevada. The extent of invasion is increased by:

- watering practices that allow the cool season grass to become stressed.
- mowing shorter than 2½ inches.
- other factors which slow down the growth of the desirable cool season turf, such as poor rooting, disease, or insect damage.

Bermudagrass will usually invade unless management practices are optimized for the cool season turfgrasses — tall fescue, bluegrass and ryegrass. Bermudagrass is much more drought tolerant than cool season grasses. If a lawn does not receive adequate water, bermudagrass will be favored. Bermudagrass is also more tolerant of short mowing heights. If mowing height is relatively low Bermudagrass again will be favored.

To judge adequate watering, look for areas of the turf that are thin and clumpy. This is a sign of poorly watered turf. As water becomes less available only the most vigorous and deeply rooted grass plants survive. During the fall and winter, when water is available, and vigorous growth resumes, the surviving grass plants become large clumps because there is little competition from surrounding plants.

Warm season grasses such as Bermudagrass grow well during the hot summer weather while cool season grass grows better during the spring and fall. One effect of poor water availability is an increase in temperature of the turf. When turfgrasses have plenty of water there is an evaporative cooling effect.

Kikuyugrass control in Tall Fescue turf

Control programs are similar to those for bermudagrass, since both are warm season invaders into cool season turf. There are three basic choices to make

1. Implement a kikuyugrass control program – Apply a mix of Turflon and MSMA herbicides 3 times at 6 week intervals starting in early May to stunt the kikuyugrass. Overseed with tall fescue after each herbicide treatment and again in the fall. Tall Fescue seed can be raked into Kikuyugrass without vertical mowing. Do not use preemergent herbicide if you are going to overseed.
2. Manage the kikuyugrass as the desirable turf – this requires verticutting 3 times per year in May, June and August. Kikuyugrass forms a yellowish-green, medium to coarse textured, aggressive, low growing turf that is difficult to mow and very prone
to thatching. Fertility must be low. After edging apply Primo growth regulator to slow the regrowth. Primo will also improve kikuyugrass appearance by making a tighter somewhat darker turf.

3. Renovate the turf – Kill all existing grass and weeds and sod or seed with tall fescue. Aggressive fall fescue varieties compete best with Kikuyugrass. If you do renovate you will have keep invading kikuyugrass out. If it was there before it will come back.

**Poa annua control in Tall Fescue turf**

Poa annua invasion is usually from irrigation problems. Poa annua is a prolific seed producer and will successfully invade any gaps in the turf. Herbicide programs have not been very successful. Do not use phosphate fertilizers unless soil tests show a need.

**The turf should be receiving a proper turf fertility program.**

- Good weed control requires competition from the turf. Turf competitiveness is increased with nitrogen fertilizer.

- Clovers and black medic can be difficult to control weeds. Clovers are legumes and are encouraged by phosphate, potash, and sulfur fertilizers. They can be controlled somewhat with fertilizers high in nitrogen and low in phosphate. Established turf, especially cool season turf, usually does not require much phosphate and potash.

Turf fertility is improved by recycling the clippings produced by mowing. Clippings should be left on the lawn whenever possible. The clippings contain significant amounts of turf nutrients. If these nutrients are removed by removing the clippings, more nutrients will have to be added by fertilization. Nitrogen fertility requirements are reduced by about ¼ to ½ by returning clippings. Analyze mowing practices to ensure that clipping return is maximized.

Keeping turf constantly wet during warm weather can result in loss of nitrogen fertilizer to the air (denitrification). This is wasteful of fertilizer and contributes to “greenhouse” gas accumulation. The soil surface should be allowed to dry between irrigations. The following series of microbe mediated reactions change plant available nitrogen to unavailable atmospheric nitrogen. Nitrous oxide is a greenhouse gas.

\[
\text{NO}_3^- \rightarrow \text{NO}_2^- \rightarrow \text{NO} \rightarrow \text{N}_2\text{O} \rightarrow \text{N}_2
\]

Nitrate→Nitrite→Nitric Oxide→Nitrous Oxide→Dinitrogen
The following conditions are conducive to nitrogen fertilizer loss through microbial denitrification.

- Absence of oxygen from wet soil and thatch
- Warm temperature
- Easily metabolized organic matter from clippings, senesced turf and root exudates
- Presence of nitrate or nitrite

**General Turf Fertility Guidelines**

We can make accurate measurements of nitrogen, molybdenum, sulfur, copper and iron and other elements, but these measurements usually fail to provide usable information. Iron for example can be plentiful both in the soil and inside the plant; but iron can still be unavailable to the new tissues and therefore deficient to the plants needs.

- Test the soil for proper calcium, magnesium, and potassium balance and for the presence of adequate phosphorous. When clippings are removed test the soil once a year.
- Nitrogen fertility needs are assessed by turf density, growth rate, color and knowledge of seasonal needs.
- Color judgments alone tend to lead to overuse of nitrogen fertilizer.

There is no accurate soil test to determine nitrogen fertilizer need for turfgrasses.

Grass will rapidly take up available nitrogen. Also, the nitrogen status of a turf can vary rapidly. Today it can have excess, next week a lack. A soil analysis showing abundant soil nitrogen under turf would tend to indicate one of three things:

- Fertilizer has just been applied.
- The turf is sick.
- The turf is experiencing climatic adversity such as drought or heavy overcast.

A healthy well-irrigated turf growing with adequate sunshine will generally take up nitrogen fertilizer so rapidly that nitrogen fertilizer will drop to low levels in the rootzone within a few days of its application.
An analysis of clippings for nitrogen may show a good level of nitrogen however that may have no use. During a time of vigorous growth the same turf may be under-supplied with nitrogen a few days after collecting the sample.

A low value of nitrogen in clippings has excellent predictive value of a deficiency. However, we could already see the paler color of the grass when we took the sample so the analysis tells us nothing new.

**Indicators of need for increased nitrogen fertility**

- Weeds germinating and becoming established. Clover family weeds are a particularly good indicator.
- Worn spots showing up or failing to heal.
- Clipping production low - not enough growth for replacement of wear.
- Bare soil visible from above.

Different turf types (species) have different yearly nitrogen requirements; also turf will need less nitrogen if it is growing in shade or poor soil.

Turf that has not received much fertility in the past may need extra fertilizer to have good color. This is especially true when iron is used for color enhancement. Iron is only effective on turf that has active growth from regular fertilizer applications.

Athletic fields have a much higher nitrogen requirement. Wear tolerance comes from quantity of top growth and top growth is stimulated by nitrogen.

- Sometimes the soil can “tie up” nitrogen fertilizer. This usually occurs in new areas where the topsoil has been removed or the soil has been mixed up so the topsoil is not on top or has been diluted. Over a period of several years the turf will make new topsoil. Aeration often helps speed up this process.
- A dull mower will make large brown wounds on the cut ends. This makes the turf look less green.

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1 One theory is that Bacteria dominate the microflora of these soils ([http://www.soilfoodweb.com/lo1.html](http://www.soilfoodweb.com/lo1.html)). Turf roots exude simple sugars to support microbes in the root zone and bacteria are more competitive than fungi when the dominant energy source (food) in simple sugars. Bacteria have a C:N ratio of about 5:1 compared to the C:N ratio of 30:1. Over time fungi become established. Fungi consume bacteria and release nitrogen that becomes available to the turf.
Comprehensive Weed Management Program for Landscapes

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Objective: Review the Decision Making Process and Variables Involved in Selecting the Appropriate Weed Management Options

Decision Tree for Landscape Weed Management

Historical Thought Process

- Identify the weed/weeds
- Develop strategy based on plant species, time of year, irrigation, selectivity
  - Pre vs. Post vs. Manual
- Soil type
  - adsorption / potential for leaching / movement
- Application Equipment

Today’s Landscapes are Far More Diverse and Complex: Many More Site-Specific Variables than in the Past

Consider Some of the Variables from Landscape Perspective

- New vs. Renovated Landscape
- Slope vs. Flat Grade
- With Turf vs. Only Trees, Shrubs, Ground Cover
- Irrigated vs. Non Irrigated Landscape
- Mulched vs. Non Mulched Landscape
- Chemical vs. Non Chemical Options
- Potential for Staining

New vs. Old or Renovated Landscapes

- Wide Variation in Weed Species
  - Grass vs. Broadleaf species
  - Annuals vs. Perennials
**Slope vs. Flat Grade**
- Potential Difficulties with Application
- Possible Offsite Movement
- Creation of Special Problems

**With Turf vs. Only Trees, Shrubs, Ground Cover**
- Major Impact on Product Selection Control
- May also Affect Control Strategy

**Irrigated vs. Non Irrigated Landscape**
- Affects pattern of Weed Growth
- Can affect activation/degradation herbicide
- Potential impact on timing of application

**Mulched vs. Non Mulched Landscape**
- Mulch can help prevent weed outbreaks
- Mulch can impact herbicide activity
- Weeds do grow on Mulch

**Chemical vs. Non Chemical Options**
- Environmentally sensitive sites
- Regulatory exclusion

**Potential for Staining**
- Affects product selection
- Affects application technique

**Bottom Line = Weed Management in Today’s Landscapes Demands:**
- More Customized Approach to Individual Sites
- More Frequent Evaluation of Variables

**Comprehensive Weed Management in Landscapes is a Continuing Process**
- Most Products Work Provided:
- Correct Weed Spectrum
- Proper Application Rate
- Optimum Activation
- Matching Highest Level of Herbicide Activity with Peak Germination of Target Weeds