

# Establishing thresholds for turfgrass management

**T**HRESHOLD. We heard the term when we prepared to take the test for a pesticide license. We refer to it when we discuss Integrated Pest Management (IPM). Thresholds are benchmarks for determining when to take an action

involves the use of chemical or nonchemical methods, good stewardship begins with an established threshold. As managers of our sites, we initiate an action when a threshold is crossed.

correct a problem. Like pain thresholds or risk thresholds, it is different for everybody. But whether the problem is pests, the grass is the wrong shade or the soil is too wet or dry, the question is: how do you arrive at that limit and set the threshold?

There are different kinds of thresholds. When IPM was originally developed, control measures were based on *economic* thresholds. Pest population and the resulting damage had to exceed a threshold where the costs to apply a pest management treatment was worth the benefit of reduced yield loss. There had to be an economic gain for treatment to be worthwhile. If the pest population (and the resulting damage) was low enough, it would not pay to take control measures.

In the green industry, we consider two additional types of thresholds: *injury* and *aesthetic*. Injury threshold refers to the level of damage a plant can tolerate. Injury thresholds tend to be more precise because the level of damage associated with a specific pest density is known. For example, how many white grubs per square foot of turf are acceptable? A few might not be a concern on low maintenance turf grass. Sites that use a biological control such as milky spore disease for Japanese beetle control would desire a small Japanese beetle population to help sustain the milky spore culture in the soil. But, on a sports field where footing is critical, the turf manager may be concerned that the strength of the turf could be compromised by even a small number of grubs per square foot.

Aesthetics are subjective, so what “looks good enough” at one site might not be acceptable elsewhere. The amount of aesthetic quality decline that a field can tolerate is referred to as the aesthetic threshold. Because aesthetic

*Continued on page 40*



to make a change. Subjective and arbitrary, thresholds are lines in the sand.

Site specific sports field and landscape management is built around thresholds. Whether our decision to use a control

A threshold is a valuable tool for a grounds manager because it sets a parameter. A threshold becomes a component of policy and quantifies when a corrective action must be made using resources (time and money) to

Continued from page 22

value is often of primary concern in turfgrass sites, individual tolerance levels are variable. For example, on a high profile sports field, dandelions probably would not be tolerated. On a public use community sports field, dandelions might be completely tolerated. At the high school stadium field, a few dandelions might be tolerated, but when the weed population reaches a certain level, a decision is made to employ some type of control.

Some pests present health, safety or legal concerns, so thresholds are more clearly defined. Stinging insects that inhabit the soil or outdoor structures are not tolerated because of health, safety and liability issues. Poison ivy growing on fences or near places where children play is undesirable. Certain thistles are considered noxious weeds in some states and are prohibited by law.

Typically, most people think of biotic pest problems (weeds, insects and diseases) in relation to thresholds, but abiotic causes such as traffic wear, soil compaction, drought or excess rainfall can all have their own unique thresholds when a decision must be made whether or not to do something. This action threshold is an arbitrary limit that is established to determine that a response (or a treatment) is warranted to arrest a problem.

Consider the action threshold based on money (economic threshold). How much of the problem (pests or abiotic causes) can be tolerated before it begins to cost something either in repair costs or a quality devaluation?

Turfgrass managers may be willing to tolerate different levels of pests or environmental conditions in different situations and make site-specific management decisions. If a baseball game is cancelled because of wet field conditions at the community use level, people are inconvenienced and, at best, disappointed. But, when the problem becomes chronic, and people are unhappy and disgruntled enough, they might reach an action threshold and raise funds to correct the problem.

The first step in establishing a threshold is to develop quality standards for your site. Identify those areas that receive different priority levels of service. For each area make a list of the expectations of quality levels. Then, make a list of pests, conditions or environmental problems. For each item on that list, quantify the density of pests or the percentage of area that exhibits damage. Determine action thresholds for when a response will be made to address the problem. Finally, list all control responses that will be made starting at the gentlest and ending with the strongest response.

Many landscape and sports field managers base their threshold decisions on these factors:

- The problem in terms the pest or conditions, severity, and the type of damage.

## Sports Field Quality Levels

Level 1 Sports Turf	The field is a showplace. The field was constructed properly, is highly managed, use is limited; blemishes are few and are corrected immediately.
Level 2 Sports Turf	Very high quality sports field. The field was constructed properly, is properly managed, use is controlled, occasionally develops noticeable blemishes that are corrected promptly.
Level 3 Sports Turf	Good quality sports field. The field is safe, playable and has an attractive appearance. May have chronic problems due to design and construction problems, but the field is properly managed, and well maintained. The field has some blemishes from use.
Level 4 Sports Turf	Common sports field. The field receives basic maintenance. Might have overuse and drainage issues
Level 5 Sports Turf	Poorly maintained, unkempt field receives maintenance sporadically. Has overuse and drainage issues

## Examples of Threshold Differences Between Level 2 & 4 Sports Fields

Here are some examples of threshold differences for 2 different field quality levels. The examples shown are only suggestions, and are not meant to be all inclusive. Sports Field Managers are advised to customize their own lists for their respective sites.

### Level 2 Turfgrass Sports Field (Sample)

Pest or Condition	Count or % per sq. ft. or Area	Action Level	Control Treatment	(optional) Proactive Treatment Next Season
Weeds	< 1 weed per 100 sq. ft.	>1 weed per 100 sq. ft.	Hand pull, Resod, Herbicide treatment	Improve cultural practices, Resod, Change soil, Preemergent herbicides
Harmful Insects	< 1 body per sq. ft.	>1 body per sq. ft.	Insecticide treatment	Use insect resistant grass seed, or sod' Biorational controls
Disease	2-3 patches/1000 sq. ft.	Detection	Improved cultural practice Fungicide	Use disease resistant grass seed or sod Improve cultural practices
Drought	50% Management Allowable Depletion	Detection	Irrigation	
Soil pH	6.2-6.8	When pH levels move to the range limits	Soil amendments	
Mowing Height	¾ to 1 inch turf height	When grass height grows by ½	Mowing with sharp mower blade, Plant Growth Regulators	
Turf Density	100%	Detection	Resod or seed as appropriate	Resod or seed as appropriate
Litter	Zero tolerance	Detection	Immediate cleanup	

### Level 4 Sports Field (Sample)

Pest	Threshold Count or % per sq. ft. or Area	Action Level	Control Treatment	(optional) Proactive Treatment Next Season
Weeds	<10% of area	>10% of area	Improve cultural practices Herbicide treatment	Improve cultural practices, Preemergent herbicides
Harmful Insects	< 5 bodies per sq. ft.	If damage is noticeable	Insecticide treatment	Use insect resistant grass seed, Biorational controls
Disease	Moderate amount of disease is expected	If damage is noticeable	Improve cultural practices	Use disease resistant grass seed Improve cultural practices
Drought	Field is not irrigated	Turf allowed to go dormant	Reduce activities, traffic and inputs	
Soil pH	6.2-7.5	When pH levels move to the range limits	Soil amendments	
Mowing Height	3 inches	When grass height grows by ½	Mowing with sharp mower blade,	
Turf Density	75%	< 75%	Resod or seed as appropriate	Resod or seed as appropriate
Litter	Light to moderate amounts	Police litter before mowing	Cleanup	



- The correction options available such as different cultural practices, planting resistant varieties, nonchemical or chemical pesticides, and the resources available.

- The perception of the problem (from a public relations standpoint) and who it concerns.

- The objectives of the property owner in relation to financial risks, liability, safety, health hazards and community values.

A number of tools are available to assist the sports field manager in determining thresholds for their fields. The "STMA Field Safety Checklist" is helpful for establishing safety thresholds. Just recently, the STMA has made available the "STMA PCI Pilot" as a tool for STMA member sports turf managers to use in assessing the current playing conditions of an athletic field at a given point in time. Both of these tools are available free to STMA members and can be found on [www.stma.org](http://www.stma.org). The "Field Wear Index," developed by David Schlotthauer and featured in the February 2008 issue of this magazine, is another useful guide for establishing thresholds based on traffic and wear, and suggests when to perform aeration, renovation and other tasks.

Once the standards, thresholds and treatment options have been set, continue to regularly monitor all of the problems and conditions on the site. After a treatment, schedule a follow up inspection. Develop a checklist and keep records so that the effectiveness of the program can be measured. Use this information to assess the effectiveness of the turf program and find ways to improve it for next year. After several seasons of recording and evaluating, a long-term trend toward better turf quality and low pest populations should be noticeable. Remember that these standards become a living document, which means that it can be amended regularly for maximum effectiveness. ■

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