Managing Sports Fields without Pesticides: Assessing the cost and success of alternative management practices and fundamental concepts in Integrated Pest Management

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Purpose

The New York State Integrated Pest Management Program funded this report to evaluate strategies for sports field management without the use of pesticides. The purpose of this report is to provide practical guidance for schools to maintain their fields in the best possible condition while fully complying the with Child Safe Playing Field Act.

ACKNOWLEDGMENT

Special thanks is made to the Tully Central Schools for providing the opportunity to shape new ideas at their facility; and, specifically to Ron Birdsall for all his time and patience. The author also wishes to thank the New York State Integrated Pest Management Program for funding this program and providing the opportunity to demonstrate alternative management practices on active sports fields.

This program was started during one of the toughest growing seasons in New York State history. The success of the program is largely due to the participation of several key vendors. A special thanks goes to each of the following companies:

Aerway http://www.aerway.com	Jon Schoenmaker Millstone Golf & Turf Products 209 Cheese Factory Rd, Honeoye Falls, NY 14472 Phone: 585-624-3878 Email: millstonegolfturf@frontiernet.net
Bauer www.bauer-at.com	Jim Dewitt 6838 Swamp Road, Auburn, NY 13021 Mobile: 607-750-3482 Email: j.dewitt@bauer-at.com
Hummel & Co http://www.turfdoctor.com	Norm Hummel 35 King Street, P.O. Box 606, Trumansburg, NY 14886 Phone: 607-387-5694 Email: norm@hummelandco.com
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Introduction:

Amendments to the New York State Education Law (Section 409-k) and the Social Services Law (Section 390-g), referred to as the Child Safe Playing Fields Act, restrict schools from applying pesticides on turfgrass playing fields. The restrictions became effective on May 18, 2011. Schools are challenged to maintain adequate turf quality to support scheduled field activities without disrupting play or endangering the safety of the participants.

The Department of Environmental Conservation has provided guidance under Chapter 85, Laws of 2010, to outline a summary of the prohibition and approved alternatives to pesticide use. These guidelines suggest a number of general concepts and references to foster healthy turf that lack specific detail to the manner and frequency of recommended practices.

The new restrictions emphasize the need for grounds superintendents to consistently monitor their field conditions and scout for pest problems. While the threat from plant disease or insect infestations can be very real and the damage can be severe, the most prevalent problems are weeds and the overall condition of the fields. Irregular patches of weeds are crowding out the playing fields. Of course, the weeds are unattractive. But the real problems are that natural turf fields are becoming heavily compacted and hard. The irregular surface of thinning turf and bare soil also create problems for traction. These conditions are increasing the risk of sports field injuries. Therefore, the objective becomes more challenging. Superintendents need to adopt a series of alternative practices that not only promote excellent soil and turf conditions as both a preventative and remedial pest management program, they need to implement steps that provide safe playing conditions without the use of pesticides.

If sports fields are not maintained properly, an injury could result in litigation. Schools need to insure that their management programs fulfill their responsibility or duty of care to provide safe playing fields. The ASTM International (formerly known as the American Society for Testing and Materials) has a standard, F2060, for maintaining cool season turfgrass on athletic fields.

A project was initiated in July of 2012 to assess the playing field conditions, essentially, one year after pesticide restrictions were imposed, and to demonstrate a set of alternative management practices for sports fields at the Tully School District (TSD) in Tully, New York. The practices were established to correct underlying conditions in soil compaction and poor infiltration. Irrigation, fertilization and seeding practices were adapted to restore a dense stand of healthy turfgrass. Reference material was made available to help staff recognize common pest problems and their associated conditions or risk periods. The project presents the costs of the recommended practices compared to historical practices.

Sports Injury and Field Conditions:

The Sports Turf Managers Association (STMA) reports that "fields with good quality turfgrass cover have higher traction, cushioning, and resiliency, and lower surface hardness, reducing the probability of injury in contact sports". There is a growing body of work that gives insight into the frequency, severity and causes associated with sports injuries. Some studies have isolated data by sport, men and women, at a scholastic level separate from college or professional sports.

One study looked at 90 high school football games and 125 injuries incurred while playing on natural grass. They reported an overall Injury Incidence Rate (IRR) of 13.9 injuries per ten team games or 1.4 injuries per team game. This study found that 76.8% of these injuries, classified as minor, resulted in 0-6 days of lost time; 9.6% of the injuries, classified as substantial, resulted in 7-21 days of lost time; and the remaining 13.6% of the injuries were classified as severe, causing more than 22 days of lost time. A clear majority of the injuries (55.2%) were attributed to player-to-player collisions. There were 16 concussions, 12.8 % of the total reported injuries, resulting from player-to-player or player-to-turf collisions. Another 32.8% of the injuries were related to the players shoe contact with the surface resulting in muscle and ligament sprains or tears, dislocations, and fractures. The IRR for knee injuries was 1.0 (torn ACL's per ten games) on natural grass. Rain or wet field conditions were noted in 19 (15.2%) of the reported injuries.

Another study looked at injuries among adolescent soccer players. While the definitions for incidence rates and severity varied from the study reported above, they reported 152 injuries on natural grass at an incidence rate of 3.8 injuries per 1000 player hours. There were 44 injuries reported for fractures, knee injuries and concussions, 22 of which were defined as severe.

Noting a growing concern over concussions and multiple concussion trauma, a group of schools in Baltimore conducted an 11-year study and recorded an incident rate of 0.24 concussions per 1000 athlete exposures (practice, scrimmage, or game). The study looked at six boys sports and six girls sports. Boy's football had the highest incidence rate. Girl's soccer had the second highest incidence rate.

The Penn State Center for Sports Surface Research reports field standards for the hardness of artificial turf systems using the American Society of Testing and Materials (ASTM) F355 and F1936 standards. The ASTM standard F1702 is used for natural grass. F355 uses a 20 lb missile that is dropped from 2 ft. F1702 uses a Clegg hammer dropping a 5 lb missile 18 inches. The sports industry has focused on artificial turf to establish standards, but as the data reported above indicates, the risk of concussions is a real threat on natural grass as well. F355 establishes a Gmax of 200g, a value associated with life threatening head injuries. Penn State has shown that the equivalent Clegg Impact Value (CIV) is 135g. Given the increasing concern about repetitive concussions, Penn State indicated that there are discussions to lower the F355 maximum level to 165g or a CIV equivalent of 100g.

One Australian study has found there is a statistically significant increase in risk of injury of natural grass when CIVs are greater than 120g. Hardness in excess of these values increased the risk of contact and non-contact injuries by 82%. Australia grounds managers are now striving to establish standards with their sports associations and insurance companies suggesting that CIVs of 60-95g are acceptable. A maximum of 125g was proposed. Some areas have established guidance noting that measurements of 150g are cause for concern. Play is being suspended for any reading over 200g.

Australia is also looking at Anterior Cruciate Ligament (ACL) knee injuries and relating increased risk with high rotational traction at the boot to surface interface. The measurement is made using a cleated plate and a torque wrench to measure the force and degree of rotation at which the turf fractures or shears. The work shows that turf density is a significant factor. Inconsistent field conditions exacerbate the problem. Long cleats worn for bare and thin turf will increase the risk of injury in longer grass. The study also demonstrates that improper cleat sizes contribute to injuries as well. The study suggests that players should change cleats depending on turf conditions.

Hardness and traction were also under study in the United Kingdom at the University of Exeter. Three different soils were tested: a clay soil, a medium soil and a sandy soil. Confirming the findings in Australia, sand had the lowest hardness and shear strength. Clay compacted to the hardest. A great amount of data was collected on the biomechanical responses and the test apparatus used to measure traction. References were made to the shear strength decreasing when clay soils were wet. Sand was little affected by soil moisture. For most fields, playing under wet conditions can lower the shear strength and increase the risk of injury. These Australian studies put emphasis on improving ground cover, soil moisture and surface roughness to reduce field conditions contributing to injury.

The University of Massachusetts conducted a study in New England looking at field injuries during football, lacrosse and soccer. They found that 39% of the sports injuries related to the condition of the field. Fields with higher turf density was the single most important factor in reducing injuries. They also reiterated that increased hours of use reduces turf density and increases hardness.

Penn State ran a similar study looking at football injuries at 10 different fields. They found 20.9 % of the injuries were field related. They found a wide disparity in the maintenance steps used to manage game fields separate from practice fields. They reported a total of 210 injuries, but 110 of these injuries occurred on practice fields with reduced levels of maintenance. Operations like fertilization, overseeding and aeration were often not applied to practice fields.

Whether field conditions contribute 20 or 30 % to field injuries; whatever incident rate convention is used; the risk for severe injuries, particularly concussions and knee injuries is very real. Grounds managers, coaches, and school administrators, perhaps even the community at large, should take the steps necessary to assess their fields and maintain them to provide the safest venue possible.

Assessment:

TSD currently maintains three game fields; four practice fields, one baseball field and one modified softball field. The game fields are designated as playing field #1, #2 and #4. Game Field #1 is the varsity and special events field with lighting and bleachers. Field #3 is a practice field that was also a staging area for the construction of a new gymnasium. Restoration of the field was contested. The field is still heavily compacted, more than other fields, and the soil includes a lot of gravel. Field #5 is another practice area that is sometimes alternated with Field #4.

The Natural Resources Conservation Department (NRCS) Web Soil Survey (WSS) identifies the underlying soil in the general area as a *Palmyra gravelly loam*. The soil was characterized as "well-drained" and classified in the Hydrologic Group A, soils with high infiltration rates. The depth to a restrictive layer is, generally, greater than 80 inches. The available water content is listed between 12-16%.

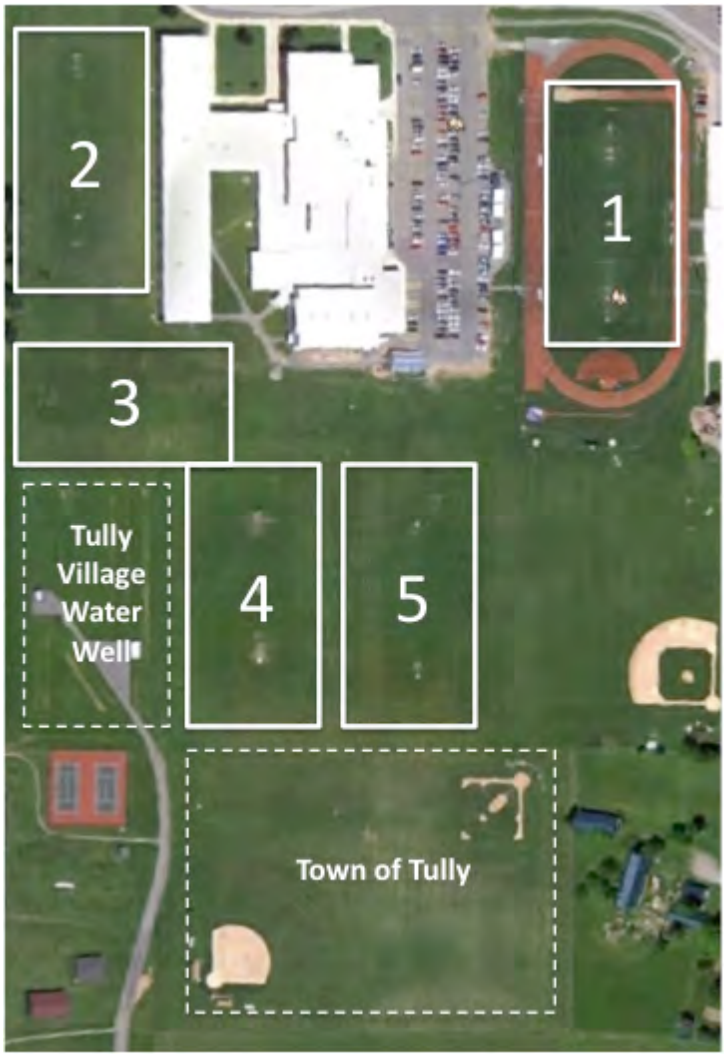
Lab samples were taken to Hummel & Co for analysis. The analysis was in line with the WSS soil survey for the percentages of sand, silt and clay. Note the distinctly higher percentage of gravel on field 3.

Sample	% Gravel	% Sand	% Silt	% Clay	% Organic Matter	USDA Textural Class
Field 1	7.1	32.2	47.9	20.0	7.42	Loam
Field 2	6.5	28.2	52.0	19.8	7.88	Silt Loam
Field 3	12.8	34.5	46.9	18.6	7.51	Loam
Field 4	9.0	27.3	53.9	18.8	8.34	Loam

A nutrient analysis was run by CLC Labs (Westerville, Ohio). The soil pH was 6.9. The nutrients phosphorus, potassium, calcium and magnesium were measured at 160 (Bray 1), 419, 3231 and 389 lbs per acre, respectively. There are no soil deficiencies.

The fields have assigned uses. The girls use Field #2 for lacrosse and soccer. The boys use teams Field #4 for lacrosse and soccer. The JV also use the fields for practices and games. Field #1, the stadium field, is considered the varsity football game field. However, every team wants to play on Field #1 under the lights. The fields are not rested, nor are activities rotated.

The Town of Tully also hosts a series of recreational leagues that use many of the game fields. Compounding this concentration of play, the school will host special events such as two weekend tournaments put on by the Lacrosse Federation. There can be as many as 110 games played in two days, no matter the weather conditions. The men's event takes place in November. This late in the season, there is no opportunity for the turf to recover. The women's lacrosse tournament is held in June.



Each sport has it's own field dimensions and particular areas of concentrated play. Regardless of the sport, there is an area from goal line to goal line, down the center of the field that shows the worst wear. The areas in front of goals were typically worn to bare soil, as are the centerfield/face-off areas. The girl's lacrosse fields have unique 8 and 12-meter arc's governing play. The turf around these arcs was also bare.

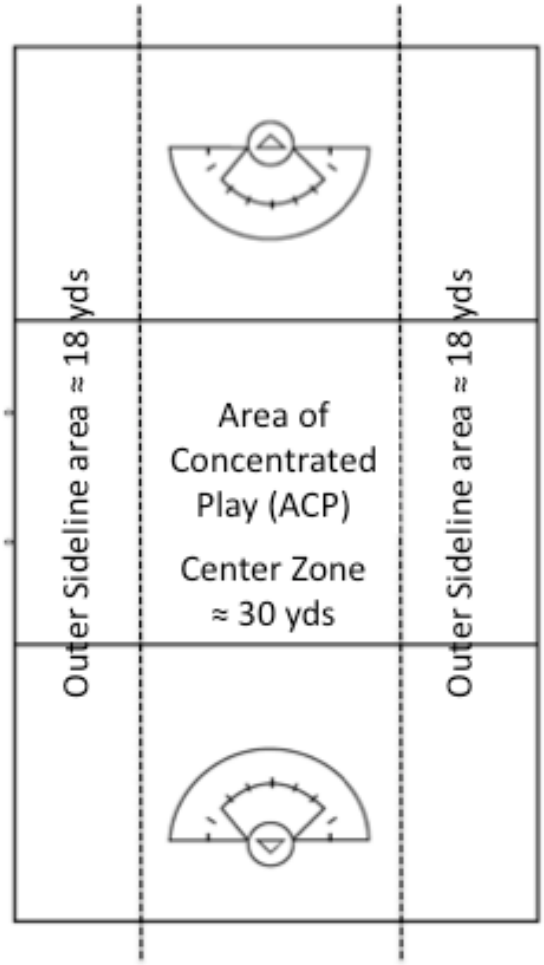
Sports Field Dimensions

	Width (yds)	Length (yds)	Special Notations
Men's & Women's Soccer	70-75	115-120	20 ft sideline offsets
Football	53.3	120	12-18 ft sideline buffers
Men's Lacrosse	60	110	6 &10 yd side+5 yd end buffer
Women's Lacrosse	60-70	110-140	26.3 and 39.3 ft Arcs

(TruMark http://www.athleticfieldmarker.com)

While the varying field dimensions challenge the grounds crew, the area of management at Tully is typically 75 yds wide and 120 yds long. This study identified an Area of Concentrated Play (ACP) as the center 30 yds running from endline to endline. The ACP

on each field showed varying degrees of wear, from thinning turf to wide areas of bare soil. The ACP was heavily populated with prostrate knotweed and broadleaf plantain; both species generally associated with compacted soil conditions. The outer sideline areas of the fields showed decent turf density. These outer areas generally included large areas of white clover; a weed generally associated with deficient soil fertility.



Plant Population - July 5, 2012										
Percent Cover	**Field #1**		**Field #2**		**Field #3**		**Field #4**		**Field #5**	
	Side	**ACP**	**Side**	**ACP**	**Side**	**ACP**	**Side**	**ACP**	**Side**	**ACP**
Perennial Rye	25.0	62.5	37.5	62.5	12.4	43.8	100	56.4	100	87.5
Kentucky bluegrass	25.0	---	37.5	12.5	31.3	18.7	---	18.7	---	---
Other Grass	25.0	---	12.5	---	---	---	---	---	---	---
Total Grass	**75.0**	**62.5**	**87.5**	**75.0**	**43.7**	**62.5**	**100**	**75.1**	**100**	**87.5**
Broadleaf Weed	25.0	25.0	12.5	12.5	25.0	---	---	6.2	---	6.2
Bare Soil	---	12.5	---	12.5	31.3	37.5	---	18.7	---	6.2

Typical condition in Areas of Concentrated Play (ACP) with heavily compacted soil conditions, bare or thinned turf areas, and intrusion of prostrate knotweed and broadleaf plantain.

A soil probe was used to gather soil samples. The probe also provided some measure of the workability of the soil. The sideline areas on all fields except Field #3, could easily probe 4-6 inches deep. Center zones were typically 2-3 inches deep. The northeast corner of Field #3 and all along the northern sideline was 1-2" depth. A double ring infiltrometer was used to measure saturated infiltration rates in the outer sideline and within the Areas of Concentrated Play (ACP).

	Infiltration Rates (inches per hour)			
	July 5, 2012		**October 17, 2012**	
	Outer Sideline	**ACP**	**Outer Sideline**	**ACP**
Field 1	13.5	1.5	3.0	1.5
Field 2	9.8	5.6	1.5	1.0
Field 3	0.5(N)/5.25(S)	3.0	1.5(N)/10.5(S)	3.8
Field 4	21.8	6.8	210	1.0
Field 5	21.8	6.8	210	30.0

The Cornell Sports Turf Rating chart is another useful assessment tool. A member of the school board and the athletic director were invited to walk the fields with the grounds superintendent to complete a numerical assessment of the conditions on the filed. From a distance, the fields appear to be in good shape. But as the group walked across the playing areas, the problems become clear. The survey provides an excellent opportunity for school administrators to view and assess the conditions. The survey score helps identify when action is required. Completing the survey with school officials will help to create a consensus.

Tully Central School	Sports Turf Rating								Date: 11-Jul-12			
	Light	Water	Food	Color	Bare Soil	Weeds	Mowing	Feel of Ground	Terrain	Intensity	Expected Quality	
	% Shade	Irrigated or Not	Fert. Apps/Yr.	Nutrient or Pest Issue	% Exposed Soil	% Non-Turfgrass	Mow Ht. (inches)	Surface Firmness	Surface Drainage	Events per day	How close to perfect?	
	1= Full Sun	1= Yes	1= 2 or more	1= Green	1=0-25	1=0-25	1=2 to 4.5	1=Firm	1=Adequate	1= 2 or less	1= No concern	
	2= Part shade	2=No	2= 1	2= Evenly yellow	2= 25-50	2= 25-50	2= 1.5 to 2	3= Spongy	3=Some Puddling	3=2 to 4	3=Somewhat	
	3= Deep Shade		3= none	3= Patchy Yellow	3= >50	3= >50	3= >4.5"	5= Hard	5= Large Pools	5= More than 4	5= Perfect	
					5= No Turf	5= No Turf	5=<1.5"					Total
Stadium Field 1: Goal Area	1	2	1	3	2	1	1	5	3	1	4	24
Stadium Field 1: Center Field	1	2	1	3	1	3	1	5	3	1	4	25
Stadium Field 1: Side Areas	1	2	1	1	1	1	1	3	1	1	4	17
Field 2: Goal Area	1	2	1	3	1	1	1	5	3	1	3	22
Field 2: Center Field	1	2	1	1	1	1	1	3	1	1	3	16
Field 2: Side Areas	1	2	1	1	1	2	1	3	3	1	3	19
Field 3: Goal Area	1	2	1	3	3	1	1	5	5	1	3	26
Field 3: Center Field	1	2	1	3	2	1	1	5	5	1	3	25
Field 3: Side Areas	1	2	1	1	1	2	1	3	3	1	3	19
Field 4: Goal Area	1	2	1	3	2	1	1	5	3	1	3	23
Field 4: Center Field	1	2	1	1	1	1	1	3	3	1	3	18
Field 4: Side Areas	1	2	1	1	1	1	1	3	3	1	3	18
Field 5: Goal Area	1	2	1	1	1	2	1	3	1	1	3	17
Field 5: Center Field	1	2	1	1	1	1	1	3	1	1	3	16
Field 5: Side Areas	1	2	1	1	1	1	1	3	1	1	3	16

Score Interpretation:

11 to 20	Continue current management, except if color rating 3 or bare soil rating >2
21 to 35	Reassess management program, unless quality expected is < 3
> 35	Consider renovation, change in use intensity of quality expectations

CORNELL Turfgrass

Field conditions were measured using a Clegg hammer to determine the hardness (Clegg Impact Value or CIV) of the fields in accordance with the American Society of Testing and Materials (ASTM) standard F1702 . The CIV reading was taken after four, 18 inch, drops of a 5 lb weight. These ratings can be compared to other scientific studies relating a fields hardness to the risk of injury or concussion. This study showed there was an empirical difference between the sideline areas and the center zone.

	Clegg Impact Value (g-gravities)			
	July 5, 2012		**October 17, 2012**	
	Outer Sideline	**ACP**	**Outer Sideline**	**ACP**
Field 1	123	191	64	82
Field 2	146	162	88	91
Field 3	241(N)/162(S)	160	108(N)/71(S)	106
Field 4	139	167	71	79
Field 5	131	160	71	74

Hardness is dependent of the soil moisture content, the soil type and the density of the cover. Dry fields are harder and partly explain how the July measurements are substantially higher than the October reading in any treatment. Hardness also increases with an increasing percentage of fines or amount of clay. Fieldwork indicates an approximate 40% reduction in hardness with good turf density. The measurements suggest that the fields either exceeded or were very close to exceeding maximum safe playing conditions. Then as the hot and dry conditions of summer changed to cooler, wetter fall conditions, along with the alternative practices taken on Fields 1, 2 and 4, the hardness readings receded to generally accepted readings of 60-95g.. Field 3 still has areas of concern.

Plant population measurements and infiltration measurements taken on October 30th, show improvements on the alternative management fields, especially in the areas of concentrated play. There are still inconsistencies in the surface conditions with irregular turf density, some weedy areas and patches of bare soil. Infiltration rates show less improvement and emphasis the need to be diligent at maintaining the frequent aeration schedule.

Plant Population - October 17, 2012										
Percent Cover	**Field #1**		**Field #2**		**Field #3**		**Field #4**		**Field #5**	
	Side	**ACP**	**Side**	**ACP**	**Side**	**ACP**	**Side**	**ACP**	**Side**	**ACP**
Perennial Rye	37.5	93.8	56.3	62.5	68.8	62.5	31.3	68.8	31.3	37.5
Kentucky bluegrass	62.5		43.7			6.2	37.5	25.0	37.5	37.5
Other Grass										
Total Grass	**100**	**93.8**	**100**	**62.5**	**68.8**	**68.7**	**68.8**	**93.8**	**68.8**	**75.0**
Broadleaf Weed					18.7		25.0		25.0	25.0
Bare Soil		6.2		37.5	12.5	31.3	6.2	6.2	6.2	

Renovation:

On the initial walk around the property, the damage around the goal areas was extensive on all fields clearly posing a threat to players and a disruption in the quality of play. The determination was made to renovate and reseed the damaged areas within the 12 m arc on all fields.

The following procedure was used:

1. Scalp damaged center sections around midfield and goal areas.
2. Complete multiple passes with Aerway Shattertine until soil profile is loosened.
3. Remove vegetative matter..ie weed clippings.
4. Break and level surface with power rake on sandpro.
5. Spread and rake 90% topsoil / 10% compost to fill voids and contour.
6. Starter fertilizer at 2 lbs nitrogen per 1000 sq. ft. rate, reseed with Perennial ryegrass blend at 12 lbs per 1000 sq ft rate, roll to create good soil contact.
7. Irrigate daily (Approx. 0.1 inch of water) until seed establishment
8. After 2 weeks, fertilize again at 0.5 lbs nitrogen per 1000 sq.ft.

Wear within the 12 meter arc's around the goals

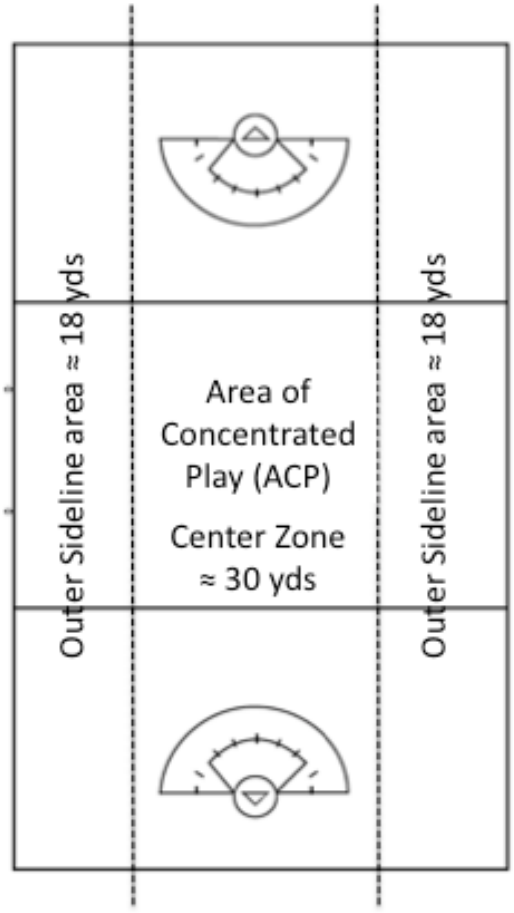
Alternative Management Program:

The five playing fields were divided in method of treatment to demonstrate the benefits of an alternative management program designed to foster turf growth and density.

	Play	**Treatment**
Field 1:	Football & Special Events	Alternative Mgmt
Field 2:	Girls Soccer and Lacrosse	Standard Mgmt
Field 3:	Practice Field	Alternative Mgmt*****
Field 4:	Boys Soccer and Lacrosse	Alternative Mgmt
Field 5:	Alternative Game Field	Standard Mgmt

***** This field will receive an additional treatment of ≈ 3/8 " of WeCare Organics "E" Compost worked into profile with a minimum of three passes using Aerway shattertine aerifier.

Each field should be seen as three sections: the Area of Concentrated Play (ACP) designated by the center section approximately 30 yds wide from end line to endline and two outer sideline zones, approximately 18 yds wide each.



The cultural management steps and frequencies of operation for each treatment are listed in the following table. The salient costs of these operations are also provided along with a summary of the equipment requirements and their associated capital costs.

Activity	Standard Mgmt (Fields 2 & 5)	Alternative Mgmt (Fields 1, 3 & 4)
Aerify	Toro 667 2-3 times per year with ¾" hollow tines. Drag and distribute cores	Aerway Shattertine: Intitially two passes across entire field then 2-3 times per year. Center zones receive 2 passes each month.
Fertilize	MESA® Slow Release 32-0-6 2X per year @ 1.5 lbs per 1000 sq.ft.	Fertilize at 0.5 lbs N / mo. Using 32-0-0 UAN, 46-0-0 Urea or 90/10 MU/Urea
Irrigate	Precipitation Only & Irrigate after over-seeding when possible	Irrigate whenever there is a P-ET deficit to maintain soil moisture in the top 4 inch profile & Irrigate after over-seeding until germination.
Reseed	Maintenance: 100 lbs Perennial Rye Blend per field (≈ 80,000 sq ft or 1.25 lbs / 1000 sq ft) 3X per year.	Maintenance: 24 lbs per 1000 sq ft of Perennial rye blend in two 12 Lb splits per playing season: Spring and Fall. ACP Only (Center Zone) Annual: Late Fall dormant feed with Kentucky bluegrass blend at 5 lbs per 1000 sq ft. ACP Only (Center Zone)
Topdress	Drag cores after aeration	Fields 1 & 4: None Field 3: Compost at 1/4-1/2 inch even layer and incorporate with multiple aerification passes.
Mowing	All Season: Mow at 2.5 inch	All Season: Mow at 2.5 inch height Sharpen blades at least 1x/month

Economics	Standard Mgmt ($$$ per Field per Year)	Alternative Mgmt ($$$ per Field per Year)
Fertilize	80,000 sq ft / field	80,000 sq ft / field
	2 x 1.5 lbs N / 1000	3 x 1 lbs N / 1000
	240 lbs or 15 bags 32-0-6	240 lbs or 15 bags 46-0-0
	$405.00	**$403.20**
Irrigate		**Villiage Water**
		406,114 gals / field (80% ET)
		$0.0061/gal ($0.046/cu ft)
		$2,477.30
Reseed	**Perennial Rye Blend**	**Perennial Rye Blend**
	300 lbs on 80,000 sq ft field	778 lbs on 32,400 sq ft ACP
	3.75 lbs per 1000 sq ft	12 lbs per 1000 sq ft : 2X year
	$420.00	**$1,089.20**
		Kentucky Bluegrass
		162 lbs on 32,400 sq ft ACP
		5 lbs per 1000 sq ft
		$259.20
Annual Cost per Field	**$825.00**	**$4,228.90**
Optional Topdressing		**Compost**
		3/8 in.thk or 1.2 yds/1000 sq ft
		38.9 yds on 32,400 sq ft ACP
		$1,322.60
		Sand
		1/4 - 1/2 inch 2X year
		up to 160 tons per year
		$3,520.00

Equipment			
Operation	**Mfg Description**	**Model**	**Price**
Aerify	Aerway – Shattertine 3 pt Hitch	AWGH#-60-1T7-BG	$ 7,864
	Aerway – Shattertine Tow Behind	AWGHP-60-2T7-DGB	$ 10,574
Fertilize & Reseed	Lely- 3 pt hitch Broadcast spreaders with hydraulic gate control	L1250 (18.9 cu ft/1323 lbs)	$ 3,995
	Redexim	Speed Seed 1600	$ 8,500
Irrigate	Bauer Water Reel	A2 58-115 Rainstar	$ 7,800
		SR101 Sprinkler	$ 950
		5HP Booster pump	$ 2,670
Topdress	Turfco	Mete-R-Matic Belt Topdresser	$ 16,200
		CR-7 Large Area Topdresser	$ 15,500

Conclusions:

School athletics pose unique problems for field managers. There are differences in the wear on turf depending on whether the players are children, teenagers or adults. Different sports create their own patterns of wear. The spring sports teams are anxious to get a jump on the season when the grass may still be in dormancy. The wear in spring can be repaired whereas late season play in the fall has no period for regrowth. Just as summer break starts and scholastic events are finished, the field manager is challenged to reseed and grow new grass during peak summer temperatures. If the school continuously schedules activities across all fields throughout the season, the manager has no window of time to reseed and repair damaged fields. There is no time allowed for the fields to fill out and thicken for the ensuing season of play.

The worst problems facing Tully, and probably many other school districts, is not the ban on pesticides, but rather the assumption that we can all do anything, anytime, without any consequence to the playing quality of the fields and the safety of the athletes on the fields. It is not some government agency or school administrative policy that dictates the terms. Natural playing fields require good soil conditions, sunlight, nutrients and water. Schools must plan to sustain these requirements. To provide fields suitable for play and minimize injury, schools should adapt the following elements in their operating plans:

1) Practice due diligence to measure and manage field conditions on game and practice fields including but not limited to the following:
    i) Insure management practices meet or exceed ASTM STD 2060
    ii) Hardness measurements in accordance with ASTM STD. F1702
    iii) Periodic Infiltration Tests
    iv) Cornell University Sports Field Rating System
2) Maximize turf density with adequate reseeding, fertilizer and irrigation management.
3) Manage compaction by frequent aeration particularly in the areas of concentrated play.
4) Topdress to adjust soil texture, and overall soil health that promotes turf growth
5) Maintain adequate soil moisture levels
6) Rotate play, shift field positions and schedule rest periods for fields to grow in.
7) Schedule and plan special events in the interest of maintaining field conditions.
8) Practice IPM by periodically scouting the property for pest problems.

There are going to be budget problems and challenges to the costs of field maintenance or equipment required to sustain the fields. Hopefully, the community will step in to help with special fundraisers or tax levies. Hopefully, every coach and player can better appreciate the time, effort and expenditure that is made to provide a save playing field. They might ask what they can do to help. Rotating practice areas, moving game fields, and rescheduling events will be necessary compromises. Imagine the varsity football team out pulling perennial weeds, now that's a place to start.

Addendum

Field Day:

A field day was scheduled to be held at Tully Central Schools on October 30th. Ninety one people had signed up to attend representing school districts from Rochester to Utica and Oswego to Binghamton. Unfortunately, Hurricane Sandy forced the rescheduling of the event to November 27th. There were still 48 attendees not including 9 vendors or staff. Presentations were given reviewing the Child Safe Playing Fields Act, sports injury statistics as they relate to field conditions, and a summary of the project. The presentation also had a segment that reviewed IPM criteria for identifying and managing pest problems without pesticides. The cost comparisons between the alternative methods used and standard management were presented as handouts along with a printed guideline for irrigation management. An evaluation form was provided to attendees. Sixteen people responded. Their comments are summarized below:

Most valuable things learned:

+ Aspects of the Law
+ Keep the school board informed
+ Safety considerations
+ Developing a program
+ New recommendations for mgmt
+ Costing of alternative program
+ IPM issues
+ Relationship between compaction and injuries

Can you name a practice that you intend to change because of today's program?

+ Measuring how much water is applied
+ Over-seed more often
+ Aerify more often
+ Topdress

What additional information would you like to learn?

+ Best timing for mgmt practices
+ More research on allowable selective herbicides
+ Weed controls

How would you like to get more information?

12	field days
6	newsletters
9	indoor winter meetings
12	Cornell turfgrass website
7	webinars

Have you ever requested an emergency application of pesticides?

0	Yes
14	No
2	Did not respond

If yes, what was the pest problem?

Did not respond

Cornell Website:
A webpage dedicated to Scholastic Sports Turf is under construction and will soon be accessible at the Cornell Turfgrass website at www.**hort**.**cornell**.edu/**turf**/. The website will have guidance on the CSPFA, summaries of our study, and access to pdf factsheets created for managing pest problems.

Future Considerations:

1) This years growing season was exceptionally difficult. The heat and drought made it difficult to rejuvenate dormant turf and reseed in time for fall sports. Nonetheless, the program was successful in creating denser stands of turf even in the highly compacted, weedy areas in front of goalmouths and the center of the fields. It would be beneficial to continue this project through the next growing season to further demonstrate the success of the alternative management program.

2) Many members of the School Building and Grounds Association (SBGA) have asked for the program to be presented to their chapters. There is a need for our presentation to be carried to regions throughout the state. NYSIPM and the Cornell turfgrass department should be proactive in establishing contact with SBGA chapters throughout the state, not only to present this study, but also to open different modes of communication with schools. Creating a website is just one concept.

3) There was no disagreement from grounds superintendents about what needs to be done to improve their fields. Our study and report will help them present the need to adapt the equipment and practices. The equipment cost can be daunting. Some county BOCES offices have already purchased equipment and are providing support services to schools in their districts. It's a concept that should be explored further. But there is still a need for schools to have water wheels and the budgets for seed and fertilizer. It is difficult to justify such expenditures on the premise that it's "integrated pest/weed management". The sports injury risks and the duty of care present new impetus for schools to act now. This concept will be tested at Tully Central Schools where follow-up meetings are being scheduled with some school board members who have been tracking the program.