

A Cost Comparison of  
Conventional (Chemical) Turf Management  
and Natural (Organic) Turf Management  
for School Athletic Fields

A report prepared by  
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*A non-profit organization*

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**March, 2010**

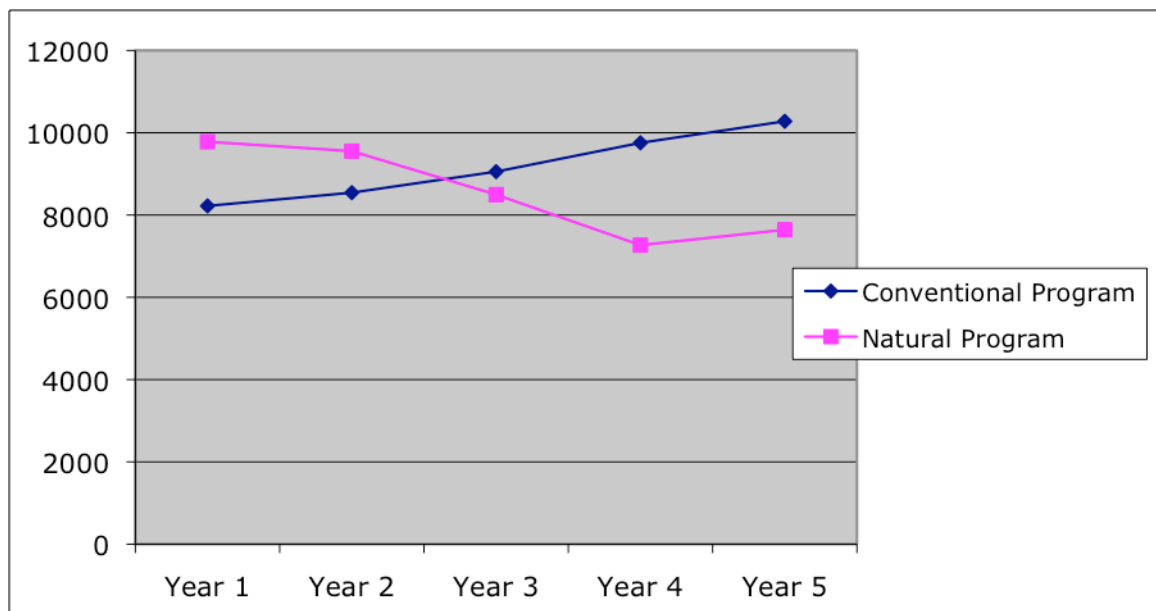
# A Cost Comparison of Conventional (Chemical) Turf Management and Natural (Organic) Turf Management for School Athletic Fields

## Introduction

The mounting scientific evidence linking exposure to pesticides with human health problems, especially in developing children, has increased the demand for non-chemical turf management solutions for schools. One obstacle commonly cited by chemical management proponents is the purported higher cost of a natural turf program.

This report compares the annual maintenance costs for a typical 65,000 square foot high school football field using both conventional and natural management techniques. Both programs are mid-level turf management programs, typical of those currently being used at many schools across New York State.<sup>1</sup>

The analysis of data demonstrates that once established, a natural turf management program can result in savings of greater than 25% compared to a conventional turf management program. (Fig. 1)



**Figure 1:** A Comparison of Costs for Conventional and Natural Turf Programs Over A Five-Year Period

<sup>1</sup> We recognize that some schools will spend considerably less for field maintenance than our example, and some will spend much more. The turf management programs chosen for this comparison are designed to yield similar aesthetic results.

## Background

Prior to 1950, all school playing fields were maintained organically. The widespread use of chemical pesticides to control weeds, insects and turf diseases on school playing fields began in the post-World War II era, when chemical companies sought to establish markets for their products in the agricultural, consumer and municipal sectors. By the mid-1990s, former New York State Attorney General Robert Abrams estimated that 87% of public schools in the state were using chemical pesticides on their fields.<sup>2</sup>

As awareness of the risks associated with pesticides has grown and demand for non-toxic solutions has increased, manufacturers and soil scientists have responded with a new generation of products and technologies that have changed the economics for natural turf management. Product innovation has resulted in more effective products, and advances in soil science have increased understanding of soil enhancement techniques. Virtually all major turf chemical manufacturers now offer an organic product line. Professional training and education have also increased, with most state extension services and professional organizations now offering training courses in natural turf maintenance.

## Sources of Data

The products, costs, application rates and other data for our analysis have been obtained from various sources, including the Sport Turf Managers Association<sup>3</sup>, Iowa State University<sup>4</sup>, bid specifications from a coalition of public schools on Long Island,<sup>5</sup> bids and proposals from conventional turf management companies, and documented costs for existing natural programs.

## Economic Assumptions

This analysis is based on the cost of operating in-house turf programs. Sub-contracted programs typically cost 30-35% more. Both programs include fertilization, seeding and aeration. All product costs are based on quantity institutional purchases, with a calculated 7% annual cost increase. Labor costs have been calculated based on a municipal employee @ \$40,000 including

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<sup>2</sup> *Pesticides in Schools: Reducing the Risks*, Robert Abrams, Attorney General of New York State, March 1993.

<sup>3</sup> "2009 Field Maintenance Costing Spreadsheet" published by the STMA. Available online at [www.stma.org/\\_files/\\_items/stma-mr-tab6-2946/docs/field%20maintenance%20costing%20spreadsheet.pdf](http://www.stma.org/_files/_items/stma-mr-tab6-2946/docs/field%20maintenance%20costing%20spreadsheet.pdf)

<sup>4</sup> "Generic Football Field Maintenance Program" by Dr. Dave Minner. Department of Horticulture, Iowa State University.

<sup>5</sup> "Invitation to Bid, Organic Lawn Care Field Maintenance and Supplies," Jericho Union Free School District, Jericho, NY on behalf of 31 school districts.

benefits, calculated at \$20 per hour. Indirect costs for pesticide applicator licenses, training, storage/security and DEC compliance costs have been estimated at \$500 per year. Fertilization for both programs has been calculated at the rate of 5 lbs of nitrogen (N) per 1000 SF. Grub and/or insect controls may or may not be necessary. Compost has been calculated at a cost of \$40 per yard. Seeding rate is calculated at 5 lbs/1000 SF. Cost of water is estimated at \$0.003212/gal.<sup>6 7</sup>

## **Irrigation**

Irrigation costs for turf maintenance are considerable, but are generally less for naturally maintained fields due to deep root growth and moisture retention by organic matter. Estimates of irrigation reduction for natural turf programs range from 33% to more than 50%. This analysis uses a conservative diminishing factor for irrigation reduction for the natural management program, starting with 100% in the first year as the field gets established down to 60% in the third year and beyond. Some school districts may experience greater savings.

## **Soil Biology**

One of the most critical factors in the analysis – and the one most difficult to assess - is the availability and viability of microbiology on fields that have been maintained using conventional chemical programs. The microbiology that is essential for a successful natural turf management program can be destroyed or severely compromised by years of chemical applications. In this analysis, we have assumed a moderate level of soil biology as a starting point; the compost topdressing in years 1-3 is part of the rehabilitation process required to restore the soil to its natural, biologically active state.

## **Reducing Fertilization Costs**

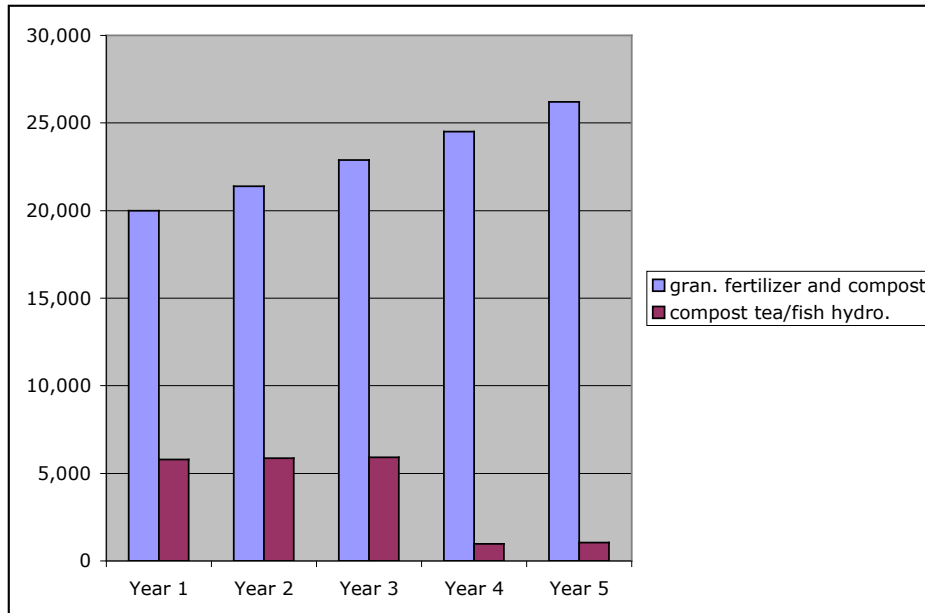
Once playing fields have been converted to a natural program and the percentage of organic matter (%OM) has reached the desired level (5.0-7.0), additional significant reductions in fertilization costs can be realized using compost tea and other nutrients (humic acid, fish hydrolysates) applied as topical spray, rather than using granular fertilizers.

The following chart shows the product cost benefits of switching to an organic nutrient spray program, and amortizing the \$10-12,000 capital cost for equipment over three years. (Fig. 2)

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<sup>6</sup> Water usage computed using STMA recommended irrigation rate of one inch/week for Junior High football field. Iowa State University recommends 1.75 inches per week for football fields.

<sup>7</sup> Price computed using NUS Consulting International Water Report for 2008 average US water cost per m<sup>3</sup> adjusted for inflation.



**Figure 2:** Cost comparison of granular fertilizer and compost compared to spraying compost tea and fish hydrolysates in Marblehead, MA.<sup>8</sup>

## Conclusion

This analysis demonstrates that the cost of a natural turf management program is incrementally higher in the first two years, but then decreases significantly as soil biology improves and water requirements diminish. Total expenditures over five years show a cost savings of more than 7% using natural turf management, and once established, annual cost savings of greater than 25% can be realized.

## About the authors:

**Charles Osborne** is a professional turf consultant, working with municipalities and school districts in the Northeast to help them develop effective natural turf management programs. A professional grower with more than thirty years of experience in greenhouse and turf management, Mr. Osborne is the Chairman of the Town of Marblehead Recreation, Parks, and Forestry Commission where he oversees the management of the Town's school and municipal fields.

**Doug Wood** is the Associate Director of Grassroots Environmental Education, an environmental health non-profit organization which developed the EPA award-winning program, "The Grassroots Healthy Lawn Program." He is also the director and producer of the professional video training series "Natural Turf Pro."

<sup>8</sup> To address concerns over the potential phosphorus content of compost tea (contained in the bodies of microbes) only high-quality vermicompost should be used for tea production. Animal manure teas, popular with farmers for generations, are not suitable for use on lawns or playing fields.

COMPARISON OF CONVENTIONAL (CHEMICAL) AND NATURAL (ORGANIC)  
TURF MANAGEMENT PROGRAMS: YEAR ONE

<b>CONVENTIONAL PROGRAM</b>		Year 1	Year 1	Year 1
		cost	cost	total
		prod	labor	
April	fert/pre-emergent	\$250	\$95	\$345
May	fertilizer	\$225	\$95	\$320
June	grub or insect	\$325	\$95	\$420
June	post-emergent	\$90	\$150	\$240
July	fertilizer	\$225	\$95	\$320
Sep	fertilizer	\$225	\$95	\$320
Nov	fertilizer	\$225	\$95	\$320
June	seed	\$700	\$150	\$850
Sep	seed	\$700	\$150	\$850
aerate	3 times	\$0	\$375	\$375
	irrigation	\$3,212	\$150	\$3,362
	indirect costs			\$500
	<b>Total Cost</b>			<b>\$8,222</b>
<b>NATURAL PROGRAM</b>				
		Year 1	Year 1	Year 1
		cost	cost	total
		prod	labor	
April	fertilizer	\$610	\$115	\$725
June	fertilizer	\$610	\$115	\$725
June	liquid humate	\$120	\$100	\$270
July	fish/compost tea	\$100	\$100	\$250
Sep	fertilizer	\$610	\$115	\$725
Jun	seed	\$700	\$150	\$850
Sep	seed	\$700	\$150	\$850
	aerate 3x	\$0	\$375	\$375
Jun	topdress	\$1,300	\$350	\$1,650
	irrigation	\$3,212	\$150	\$3,362
	<b>Total Cost</b>			<b>\$9,782</b>

COMPARISON OF CONVENTIONAL (CHEMICAL) AND NATURAL (ORGANIC)  
TURF MANAGEMENT PROGRAMS: YEAR TWO

<b>CONVENTIONAL PROGRAM</b>		Year 2	Year 2	Year 2
		cost	cost	total
		prod +7%	labor	
April	fert/pre-emergent	\$267	\$95	\$362
May	fertilizer	\$240	\$95	\$335
June	grub or insect	\$347	\$95	\$335
June	post-emergent	\$96	\$150	\$246
July	fertilizer	\$240	\$95	\$335
Sep	fertilizer	\$240	\$95	\$335
Nov	fertilizer	\$240	\$95	\$335
June	seed	\$750	\$150	\$900
Sep	seed	\$750	\$150	\$900
aerate	3 times	\$0	\$375	\$375
	irrigation	\$3,436	\$150	\$3,586
	indirect costs			\$500
	<b>Total Cost</b>			<b>\$8,544</b>
<b>NATURAL PROGRAM</b>				
		Year 2	Year 2	year 2
		cost	cost	total
		prod+7%	labor	
April	fertilizer	\$653	\$115	\$768
June	fertilizer	\$653	\$115	\$768
June	liquid humate	\$128	\$100	\$228
July	fish/compost tea	\$107	\$100	\$207
Sep	fertilizer	\$653	\$115	\$768
Jun	seed	\$750	\$150	\$900
Sep	seed	\$750	\$150	\$900
	aerate 3x	\$0	\$375	\$375
Jun	topdress	\$1,390	\$350	\$1,740
	irrigation	\$2,749	\$150	\$2,899
	<b>Total Cost</b>			<b>\$9,553</b>

COMPARISON OF CONVENTIONAL (CHEMICAL) AND NATURAL (ORGANIC)  
TURF MANAGEMENT PROGRAMS: YEAR THREE

CONVENTIONAL PROGRAM		Year 3	Year 3	Year 3
		cost	cost	total
		prod +7%	labor	
April	fert/pre-emergent	\$285	\$95	\$380
May	fertilizer	\$256	\$95	\$351
June	grub or insect	\$371	\$95	\$467
June	post-emergent	\$103	\$150	\$253
July	fertilizer	\$256	\$95	\$351
Sep	fertilizer	\$256	\$95	\$351
Nov	fertilizer	\$256	\$95	\$351
June	seed	\$775	\$150	\$925
Sep	seed	\$775	\$150	\$925
aerate	3 times	\$0	\$375	\$375
	irrigation	\$3,676	\$150	\$3,826
	indirect costs			\$500
	<b>Total Cost</b>			<b>\$9,055</b>
<b>NATURAL PROGRAM</b>				
		Year 3	Year 3	Year 3
		cost	cost	total
		prod +7%	labor	
April	fertilizer	\$699	\$115	\$814
June	fertilizer	\$0	\$0	\$0
June	liquid humate	\$137	\$100	\$237
July	fish/compost tea	\$114	\$100	\$214
Sep	fertilizer	\$699	\$115	\$814
Jun	seed	\$775	\$150	\$925
Sep	seed	\$775	\$150	\$925
	aerate 3x	\$0	\$375	\$375
Jun	topdress	\$1,487	\$350	\$1,837
	irrigation	\$2,206	\$150	\$2,356
	<b>Total Cost</b>			<b>\$8,497</b>



COMPARISON OF CONVENTIONAL (CHEMICAL) AND NATURAL (ORGANIC)  
TURF MANAGEMENT PROGRAMS: YEAR FOUR

CONVENTIONAL PROGRAM		Year 4	Year 4	Year 4
		cost	cost	total
		prod +7%	labor	
April	fert/pre-emergent	\$305	\$115	\$420
May	fertilizer	\$274	\$115	\$389
June	grub or insect	\$416	\$115	\$531
June	post-emer	\$110	\$170	\$280
July	fertilizer	\$274	\$115	\$389
Sep	fertilizer	\$274	\$115	\$389
Nov	fertilizer	\$274	\$115	\$389
June	seed	\$800	\$170	\$970
Sep	seed	\$800	\$170	\$970
aerate	3 times	\$0	\$425	\$425
	irrigation	\$3,933	\$170	\$4,103
	indirect costs			\$500
	<b>Total Cost</b>			<b>\$9,755</b>
<b>NATURAL PROGRAM</b>				
		Year 4	Year 4	Year 4
		cost	labor	total
		prod +7%		
April	fertilizer	\$0	\$0	\$0
June	fertilizer	\$0	\$0	\$0
June	liquid humate	\$150	\$120	\$270
July	fish/compost tea	\$500	\$720	\$1,220
Sep	fertilizer	\$748	\$135	\$883
Jun	seed	\$800	\$170	\$970
Sep	seed	\$800	\$170	\$970
	aerate 3x	\$0	\$425	\$425
Jun	topdress	\$0	\$0	\$0
	irrigation	\$2,360	\$170	\$2,530
	<b>Total Cost</b>			<b>\$7,268</b>

COMPARISON OF CONVENTIONAL (CHEMICAL) AND NATURAL (ORGANIC)  
TURF MANAGEMENT PROGRAMS: YEAR FIVE

CONVENTIONAL PROGRAM		Year 5	Year 5	Year 5
		Cost	cost	total
		prod + 7%	labor	
April	fert/pre-emergent	\$326	\$115	\$441
May	fertilizer	\$294	\$115	\$409
June	grub or insect	\$445	\$115	\$560
June	post-emergent	\$117	\$170	\$287
July	fertilizer	\$294	\$115	\$409
Sep	fertilizer	\$294	\$115	\$409
Nov	fertilizer	\$294	\$115	\$409
June	seed	\$856	\$170	\$1,026
Sep	seed	\$856	\$170	\$1,026
aerate	3 times	\$0	\$425	\$425
	irrigation	\$4,208	\$170	\$4,378
	indirect costs			\$500
	<b>Total Cost</b>			<b>\$10,279</b>
<b>NATURAL PROGRAM</b>				
		Year 5	Year 5	Year 5
		cost	labor	total
		prod + 7%		
April	fertilizer	\$0	\$0	\$0
June	fertilizer	\$0	\$0	\$0
June	liquid humate	\$160	\$120	\$280
July	fish/compost tea	\$535	\$720	\$1,255
Sep	fertilizer	\$800	\$135	\$935
Jun	seed	\$856	\$170	\$1,026
Sep	seed	\$856	\$170	\$1,026
	aerate 3x	\$0	\$425	\$425
Jun	topdress	\$0	\$0	\$0
	irrigation	\$2,525	\$170	\$2,695
	<b>Total Cost</b>			<b>\$7,642</b>