Lawn Care in a New World

Best Management Practices
for lawn maintenance without pesticides

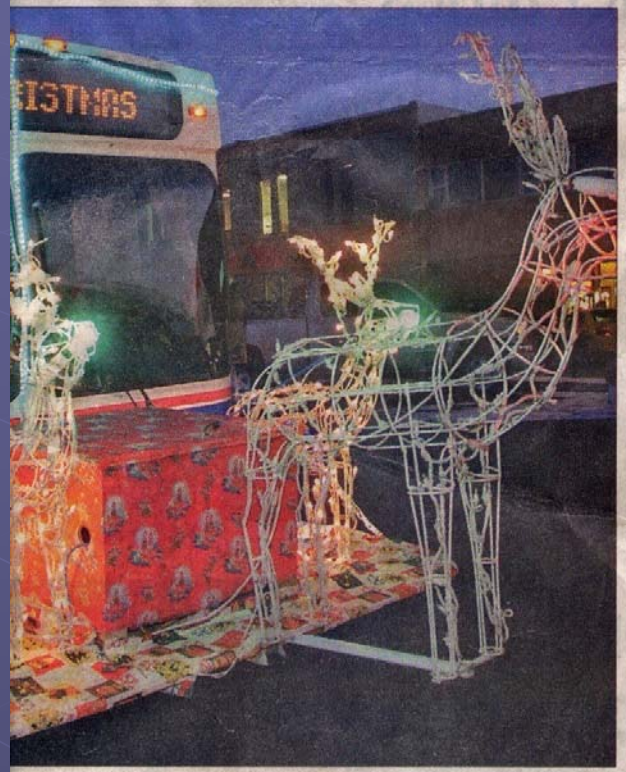
Mario Lanthier
CropHealth Advising & Research
Kelowna, British Columbia www.crophealth.com

My home town

DAILY COURIER

Tuesday, December 11, 2007, Kelowna, B.C.

Mon.-Thurs. $1, Fri. $1.25 (incl. GST)
www.kelowna dailycourier.ca



's sleigh bus

sit terminal on Monday in their tricked-out ride. The Santa sleigh bus will ing toys, food and donations.

Kelowna to ban pesticides

By RON SEYMOUR
The Daily Courier

Homeowners will respect a new bylaw that bans the use of Weed 'n Feed and other common lawn-care products, city officials predict.

The use of pesticides for so-called "cosmetic" purposes on lawns will be prohibited in 2009, city council decided in a 5-4 vote on Monday.

"I think most people will abide by the bylaw," environment manager Mark Watt confidently predicted.

But critics of the bylaw suggested many people would simply ignore it and continue to buy and apply Weed 'n Feed since the city cannot stop stores from selling the product.

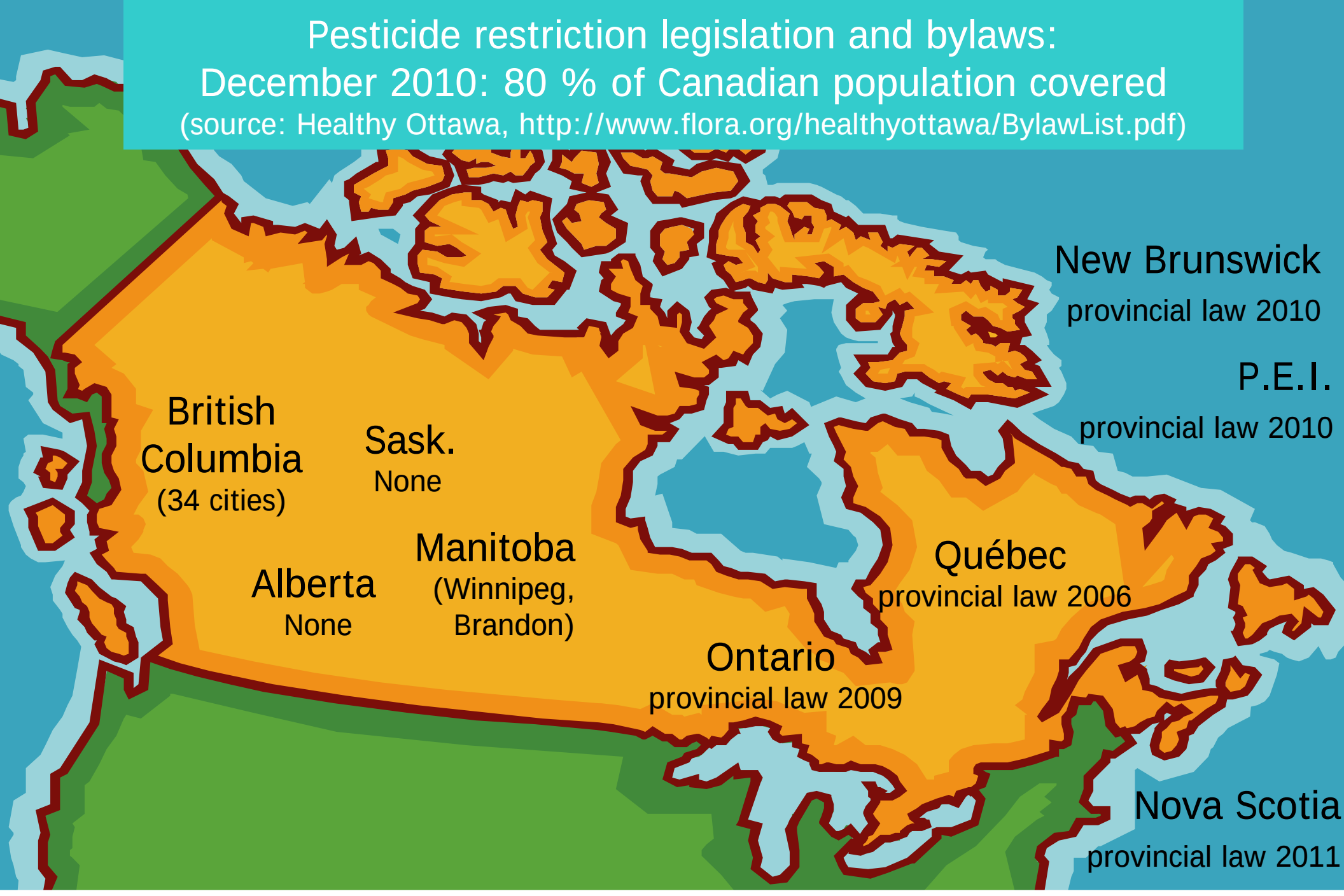
"People will just deal with weeds the same way they do now," said John Holland, who speaks for local lawn-care companies.

Bylaw to take effect in 2009, but some on council say it will be unenforceable

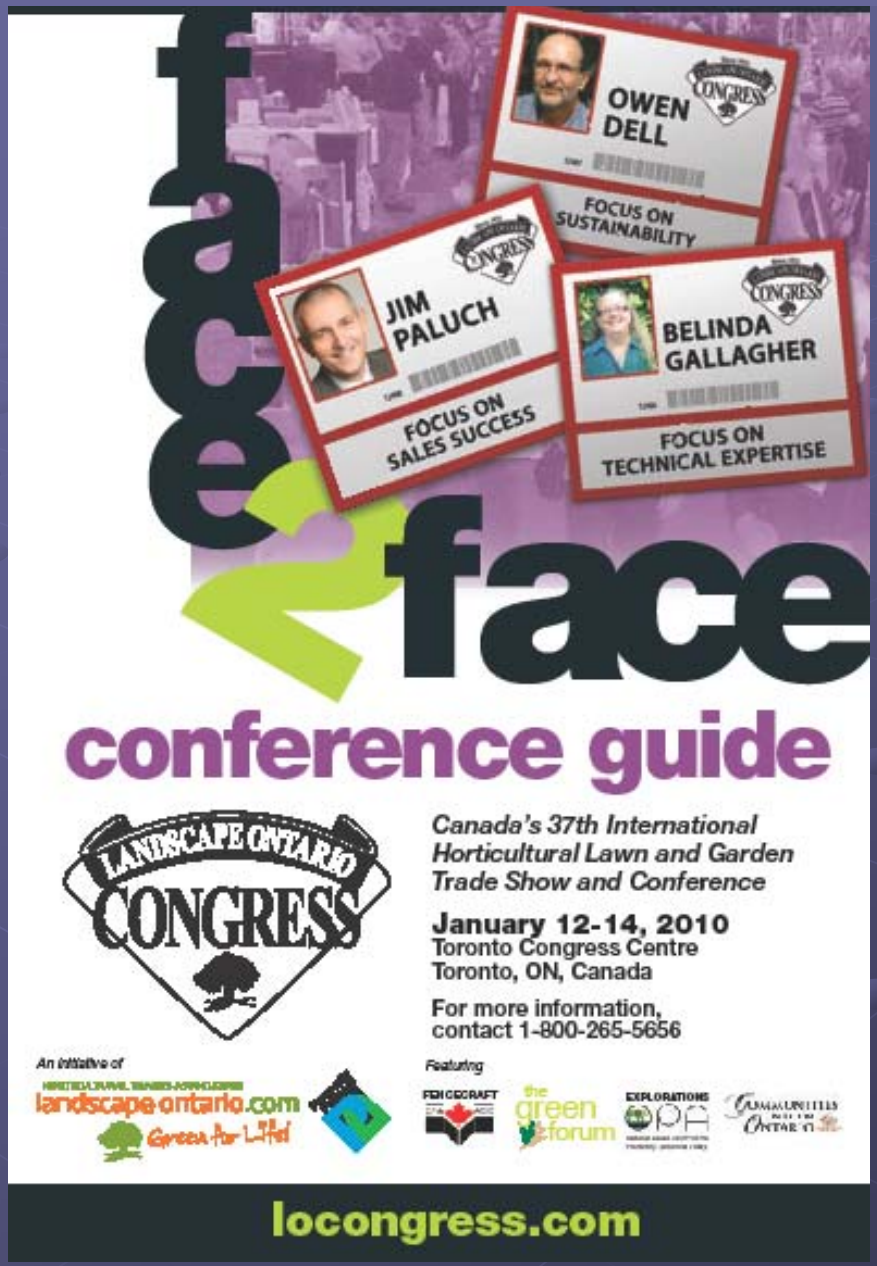
Council's decision Monday capped an 18-month debate and featured many of the arguments made at previous meetings when the pesticide ban was discussed.

Supporters said it is a reasonable effort to promote public

'had all the facts'


Pesticide restriction legislation and bylaws:
December 2010: 80 % of Canadian population covered
(source: Healthy Ottawa, http://www.flora.org/healthyottawa/BylawList.pdf)
New Brunswick
provincial law 2010
P.E.I.
provincial law 2010
British Columbia
(34 cities)
Sask.
None
Manitoba
(Winnipeg, Brandon)
Alberta
None
Québec
provincial law 2006
Ontario
provincial law 2009
Nova Scotia
provincial law 2011

So I went to hear from people who lived the ban



2010

Ontario Landscape Congress

45th Annual IPM Symposium

Successful Plant Health Care: Roots of Success

Net proceeds are donated to lawn care research or suitable alternatives.

Monday, January 11, Toronto
Doubletree by Hilton Toronto Airport Hotel, 655 Dixon Rd – Mississauga Room
Tuesday, February 23, Ottawa
Travelodge Hotel, 1376 Carling Ave – Carleton Ballroom
Tuesday, March 2, London
Best Western Lamplighter Inn, 591 Wellington Rd – Regency Ballroom
Tuesday, March 9, Barrie
NEW LOCATION **** Fenley's Banquet Hall, 565 Bryne Drive (CLICK HERE FOR DIRECTIONS)

Cost: on-site registration: $95 (GST included).

Schedule

7:30 am Registration Opens
8:00 am **IPM Chairman's Opening Remarks** – Mark Goodman
8:15 am **Ministry of the Environment (MOE) Update**
Roberto Sacilotto, Ministry of the Environment (Toronto)
Scott Olan, Ministry of the Environment (Ottawa)
Crystal Lafrance, Ministry of the Environment (London and Barrie)
9:00 am **How I Survived the Ban**
Moderator: Mark Goodman, Enviroking Lawncare
Chris Lemcke, Turf Operations Inc (Toronto and Barrie)
Gavin Dawson, Green Lawn Care (Toronto and Barrie)
Jeff Lowartz, CHT, Heritage Green (Ottawa)
Rob Richards, Great Lakes Lawn Care (London)
Dave Wright, Wright Lawn and Landscape Services (London)
Rod Splane, Wright Lawn Care and Landscape Services (London)
10:00 am **The Municipal Scene** – Tanya Steffler, Oshawa Parks and Recreation
10:30 am Refreshment Break

A comment from lawn care companies in Ontario:

"Frustrated. Disappointed. Treated unfairly. Helpless. That's how we felt going into the ban in 2009."

A comment from lawn care companies in Ontario:

"The customer expects the same today as 20 years ago – a weed free lawn."

A comment from lawn care companies in Ontario:

"We tell our customers there is no more quick fix.
How many weeds are they willing to accept ?"

A comment from lawn care companies in Ontario:

“This new way of working requires higher prices. We will loose the customers used to a cheap price.”

A comment from lawn care companies in Ontario:

"It has to be a complete service package. More visits are required. That takes time."

A comment from lawn care companies in Ontario:

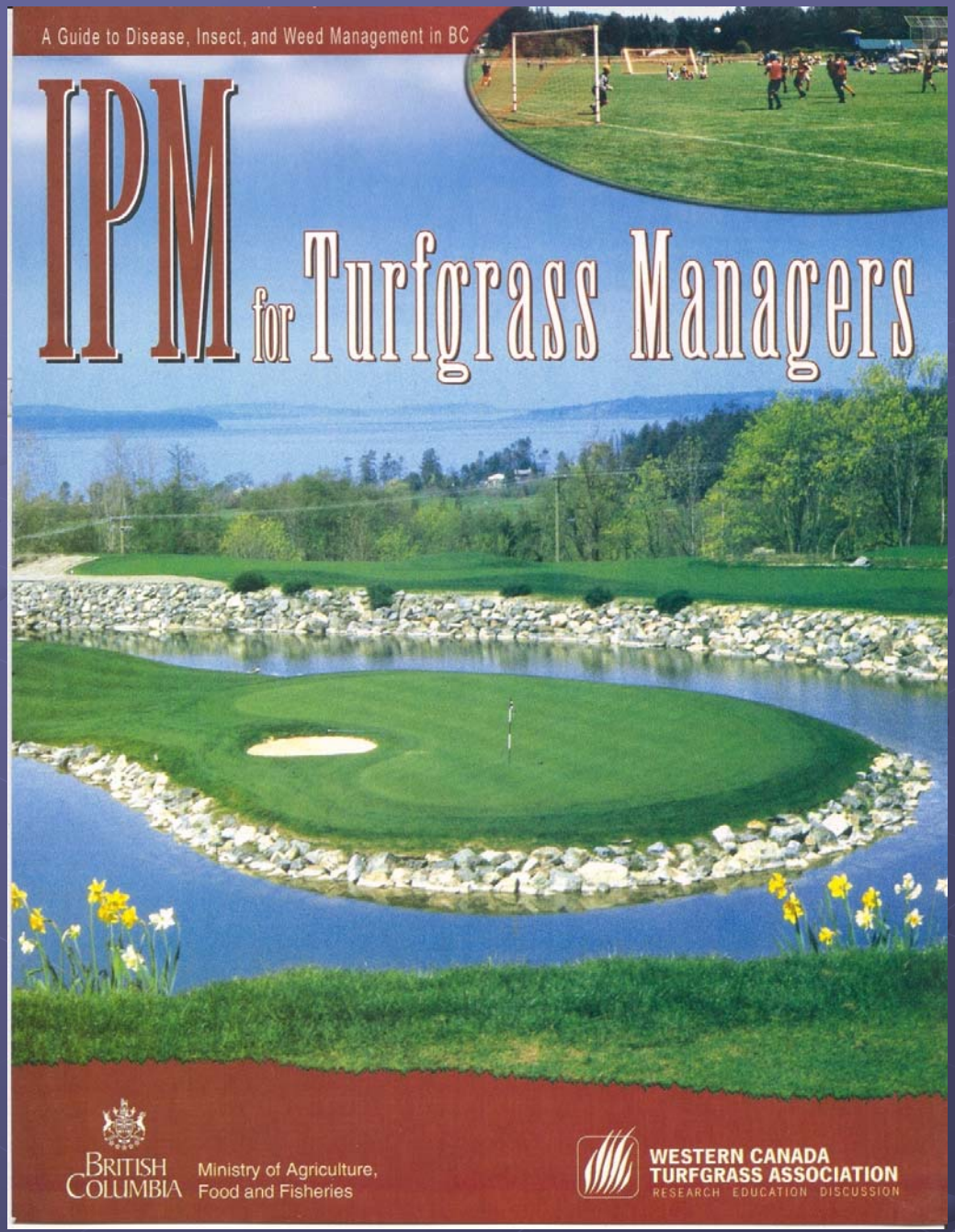
“ and are the best for a non-chemical weed control program in lawns.”

A comment from lawn care companies in Ontario:

"[redacted] and [redacted] are the best for a non-chemical weed control program in lawns."

What is one important cultural practice for lawns?

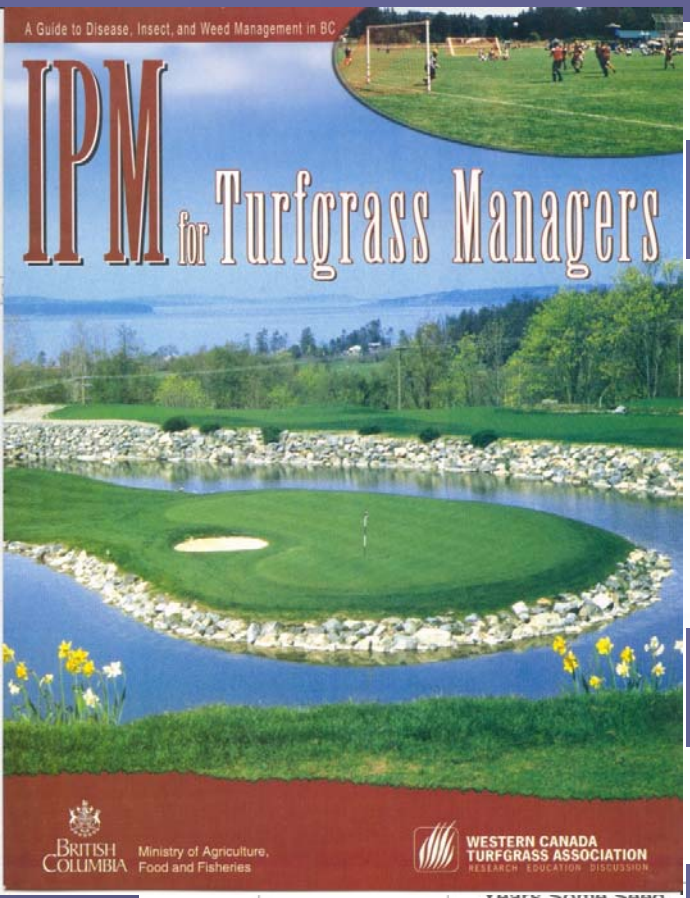
How can we implement this practice in a commercial program ?



Western Canada Turfgrass Association and BC Ministry of Agriculture

2002

Important practices for lawn care



Weed	Years Some Seed Remain Viable (Alive) in the Soil
Chickweed	10
Hedge Mustard	10
Canada Thistle	11 – 20
Oxeye Daisy	11 – 20
Lamb's-Quarters	21 – 40
Purslane	21 - 40
Redroot Pigweed	21 – 40
Shepherd's-Purse	35
Dodder	70
Curled Dock	>80

Mowing height

Mowing height

to 7 cm (bentgrass to 2.0 to 2.5 cm). Mowing will also control much seedling weed growth. A mulching mower that leaves clippings on the turf usually promotes good fertility.

In the coastal climate it is desirable to keep grass short going into winter in order to discourage an environment that promotes fungal diseases. In cold areas, leave longer growth, maintain nutrition (especially potassium) and provide good drainage to prevent winter injury.

Aeration

Aeration

penetration.

Watering schedule

Watering

water every one or two days. This encourages shallower, less competitive roots. Grass with deeper roots is better able to resist fungal diseases and drought. Only lawns on pure sand require daily watering. Over-watering actually promotes germination and invasion of weeds such as annual bluegrass.

Fertility, pH

Fertility

fertilizer to promote root health, topgrowth and colour. For large or special use turf areas it is desirable to undertake regular soil and/or tissue testing to ensure a balanced nutrition prescription. Too much nitrogen or phosphorus for example will promote annual bluegrass. Too much nitrogen or too little phosphorus can increase some fungal diseases.

De-thatching

De-thatching

drought tolerance, dry patches, spongy turf and ineffective fertilizer application. Where thatch layer is thick, remove it gradually (1 cm at a time) over a period of a few years. This will prevent severe scalping of the turf that would lead to increased weed invasion.

Re-seeding

Re-seeding

Sanitation

Sanitation

equipment before moving from a weedy area.

Weed identificat

Know your weeds
life cycle, biology
necessary for deve
strategy. This know
perennial weeds be
develop and allows
of control options.
winter annual, con
against it in the fal
seed production. If
would not be easily
choosing a herbici
whether your weed
label and at what g
susceptible.

Annual weeds

Annual weeds com
Most annuals depe
production and pro
ability to survive.
groups:

Summer a
spring, rea
or fall, set
crabgrass,
pigweed.
Winter an
fall, overw
spring, set
die, e.g., s

Some weeds exhibi
al habit, e.g.,

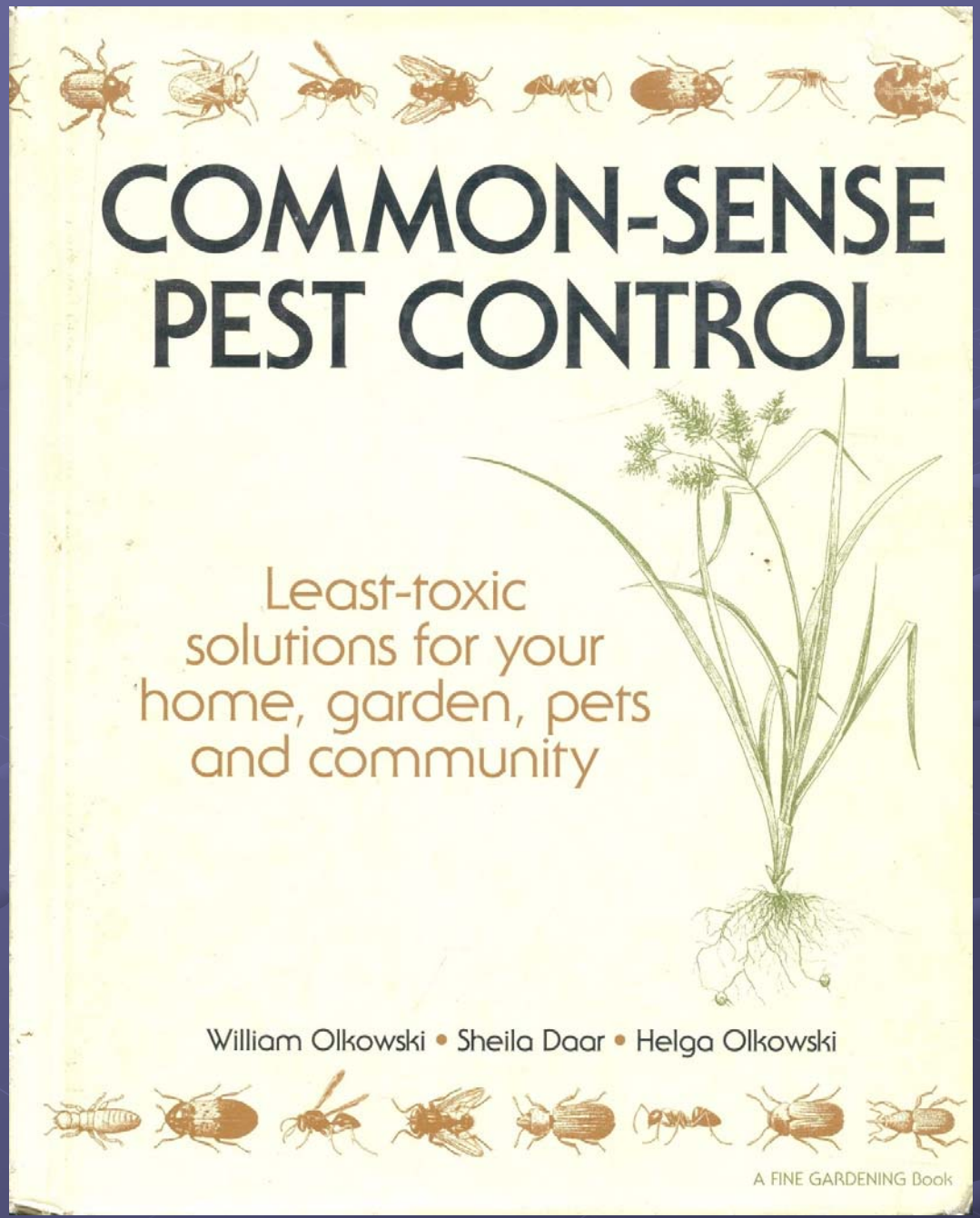
A comment from lawn care companies in Ontario:

“ and are the best for a non-chemical weed control program in lawns.”

So which ones are “the best” ?

A comment from lawn care companies in Ontario:

"Overseeding and fertilization are the best for a non-chemical weed control program in lawns."



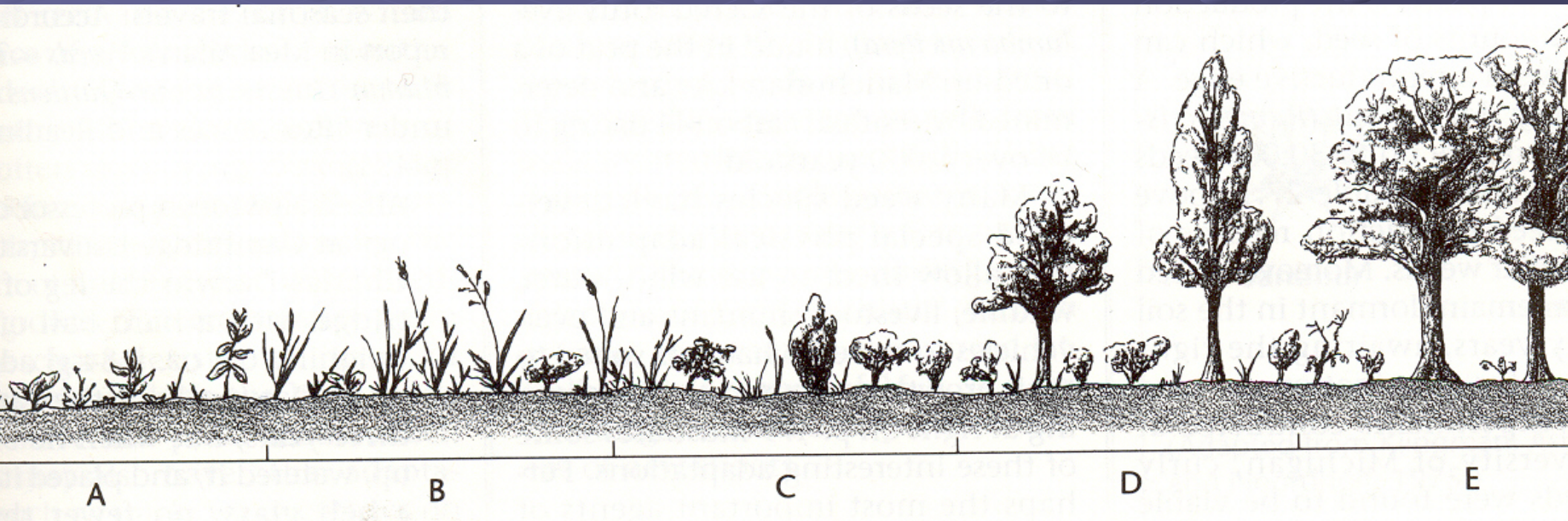
BioIntegral
Resource Center
Berkeley, California

1991

Vegetation Succession

A: broad-leaf weeds B: grasses C: shrubs D and E: trees

”Common Sense Pest Control”, 1994, www.birc.org



Why is there a weed in this lawn ?
How can we prevent this weed from establishing ?

Managing the Playing Fields for the Vancouver School Board Is a Question of – Timing?

By Chris Foxon

Background

School athletic programs and local sport associations are responsible for stimulating and fostering the demand for field sport activities and consequently playing field resources.

Physical Education departments of the Vancouver school system views these playing fields as outdoor classrooms. A safe usable playing surface is essential to the School Athletic program. Interschool competitions for Boys and Girls Soccer, Rugby, Field Hockey, Baseball, Football etc require good quality and safe playing surfaces.

The demand from organized groups for playing space has increased tremendously in the last 5-10 years.

Most of the fields of the Vancouver School Board were built in the 60's, 70's & early 80's. Some of the earlier fields were upgraded 10 years or so later. No new fields have been added to the inventory for the last 25 years.

The fields generally breakdown into 3 general categories; irrigated sand fields, irrigated soil fields and non-irrigated soil fields.

The Vancouver School Board has 31 irrigated grass playing fields and over 50 non irrigated non regulation size fields that are used intensively during the day as outdoor instructional areas for school programs.

Problems faced by maintenance staff

In addition to the problems created by age related deterioration of drainage systems, irrigation systems and turf surface, the year round demand is making normal maintenance very difficult.

Maintenance crews are allocated very restricted periods of time (usually less than 3 months) to repair turf that has had 9 months of intensive use and allow a rest period for turf root systems to re-establish. Soccer is especially destructive, and when played over the winter/spring season on fields of deteriorating quality the challenge to have them ready by September to begin the cycle all over again is sometimes quite daunting.

Through the years the grounds department has experimented with numerous pilot projects and systems to repair the fields as quickly as possible and our findings and methods have lead to seriously look at our maintenance techniques, the timing of the operations and the benefit.

Overall effective field management depends upon a balance being established between maximizing the use of the fields, controlling the amount of play in order to prevent excessive damage, using timely and effective grass management techniques and overall cooperation of the stakeholders. The extent to which a field can accommodate play and maintain its quality depends

Turf News (WCTA)

2002

The Way to Effectively Manage Pesticide-Free Athletic Fields

Turf News (WCTA) 2011

By Mike Jiggens

The next few years are apt to be rough for Ontario's sports turf managers, in the wake of a province-wide cosmetic pesticide ban implemented in April, but those up to the challenge can still produce acceptable playing surfaces, more than 250 members of the Sports Turf Association were told in September.

"I think we can overcome those challenges over the next few years, but it's going to be rough," said Dr. Eric Lyons, assistant professor of turfgrass science at the University of Guelph, speaking at the STA's 22nd annual field day at Brantford, Ont.'s Lions Park. Like the lawn care industry, municipal sports turf managers have been stripped of the traditional pest control products they have been accustomed to using the past several years. Lyons surmised the majority of his audience were managing turf for the first time this year

"It's time as sports turf managers to increase our profile and to increase our professionalism. If we're going to be successful, people have to know who we are and people have to respect us."

lines of communication with sports field user groups can greatly assist both parties. Lyons likened the proposed form of communication to that which golf course superintendents have with club members, explaining to them that the simple act of fixing a ball mark on a putting green goes a long way toward maintaining the surface's general health and playability.

"We deal with user groups who expect the fields to be perfect, but they don't take care of them."

Lyons suggested sports turf managers work with soccer, football and lacrosse coaches to urge them to conduct certain practice drills on areas of the fields which won't contribute further wear to areas traditionally worn during game play.

Sports turf managers must also change the way in which they are perceived by the public.

something we have to get better at as a group if we're going to survive

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Overseeding

Overseeding is no longer a practice confined to the fall season, Lyons said.

"Now, we're overseeding to compete with weeds. That means we need to overseed anytime there is excessive wear. Overseeding frequently is important. Overseeding a lot is important."

Most of Ontario experienced a wetter-than-normal month of July this year which would have been an ideal time to overseed, he said.

"Often" and "heavy" are the key words to consider when overseeding, Lyons said, but added sports turf managers must also realize more money will be needed for seed budgets.

Turf and Recreation (Ontario) 2004

Heavy overseeding may be the answer to cost-effective sports field maintenance

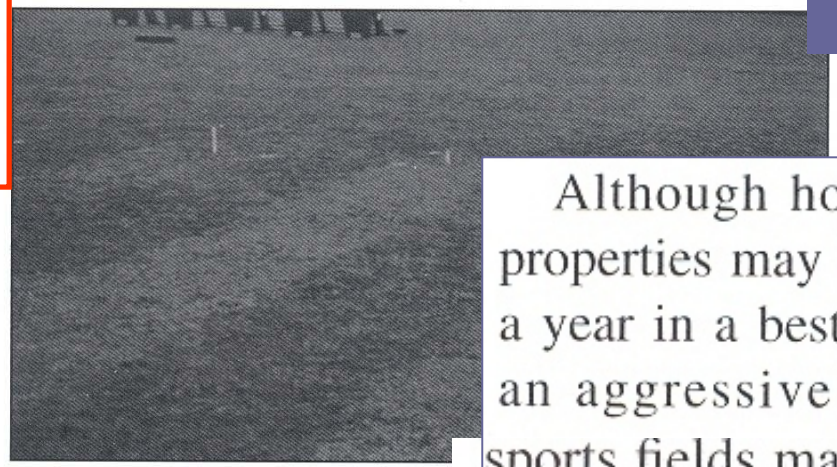
A comparatively low-cost overseeding program may be the key to improving safety and quality on high school sports fields, a New York state turfgrass researcher told a sports turf management session in January at the Ontario Turfgrass Symposium in Niagara Falls.

David Chinery of Cornell University recently co-authored a research report to the New York State Turfgrass Association entitled, "Heavy Repetitive Fall Overseeding to Improve Low-Input Sports Fields." He shared his findings with his Canadian audience in the wake of growing concerns about the safety of high school sports fields.

In his preparation of the report, Chinery surveyed high school football game and practice fields as well as soccer pitches in eight different New York state school districts. The fields were studied for quality parameters and maintenance practices and compared with ASTM standards.

Overseeding existing turfgrass areas to increase density is not an uncommon practice among turfgrass managers, he said, but noted its success rate is not easily accomplished. Chinery reported various cultivation practices should be performed first to improve the chances of seed germination and establishment at a high rate. These practices include core removal, spiking and vertical mowing.

Although home lawns and commercial properties may be overseeded once or twice a year in a best-case scenario, Chinery said an aggressive overseeding program for sports fields may involve four or five annual repetitions.



Plots show results of heavy overseeding at diff
From left, two pounds/M, six pou

"With limitations on the use of pesticides increasing, overseeding might seem to be a better option than ever," his report stated. "However, turfgrass managers often report disappointing results with overseeding. This is especially true on low-input fields or fields where fertilizer, irrigation, weed management and other cultural activities are limited or non-existent. The cultivation requirement attached to overseeding can be disruptive to the use of the turf area in question, as well as adding costs. Clearly, easier and more effective ways to overseed turfgrass areas are needed."

A research project was conducted last summer on two sports fields, adopting the recommendations of Cornell extension turfgrass specialist Dr. Frank Rossi who found that dramatic increases in turfgrass density were possible when high rates of perennial ryegrass were overseeded weekly on a simulated sports field.

The two fields used in the study were a practice football field at Averill Park High School in Averill, N.Y. and a multi-purpose soccer-football field in an inner city park at Prospect Park in Troy, N.Y.

The practice field had compacted clay loam soil and a low pH level of 5.9. It also had a mix of bare spots, crabgrass,

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Watson Wheel
Flat-Proof Turf Tires

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Problems faced by maintenance staff

In addition to the problems created by age related deterioration of drainage systems, irrigation systems and turf surface, the year round demand is making normal maintenance very difficult.

Maintenance crews are allocated very restricted periods of time (usually less than 3 months) to repair turf that has had 9 months of intensive use and allow a rest period for turf root systems to re-establish. Soccer is especially destructive, and when played over the winter/spring season on fields of deteriorating quality the challenge to have them ready by September to begin the cycle all over again is sometimes quite daunting.

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Overall effective field management depends upon a balance being established between maximizing the use of the fields, controlling the amount of play in order to prevent excessive damage, using timely and effective grass management techniques and overall cooperation of the stakeholders. The extent to which a field can accommodate play and maintain its quality depends

Annual Maintenance Field processes – Vancouver School Board

MOWING

From March 15 to October 15 the fields are cut with friction driven reel mowers twice a week at a height of 1 1/2 inches. The rotation of cut is 4 ways alternately. Excess grass clippings accumulate in heavy growth periods and are picked up as required to prevent turf spoiling.

FERTILIZING

Irrigated Sand Fields are fertilized 4 times per year @ 1.4 lbs. N/1000 sg.ft

- Mid March 23-3-23+ Micronutrients SCU
- Mid May 34-4-8 + Micro Nutrients
- Early July 23-3-23
- End August 23-3-23

Irrigated Soil Based Fields are fertilized 2 times per year @ 1.4 lbs/1000 sg.ft

- Mid May 23-3-23 + Micronurtrients
- End August 23-3-23 + Mircronutrients

VERTI-DRAIN all fields 2 times per year.

- June/July using solid core tine to a depth of 8-10 inches
- August/September using hardened hollow core tines to a depth of 6-8 inches

TOP DRESSING

Top dressing is done in July using 100% washed concrete sand at 50 tonnes/acre

OVERSEEDING

Overseeding is done 3 times per year at an application rate 4 lbs/1000 sg.ft using Premier Overseed Mix during the month of May, July and September.

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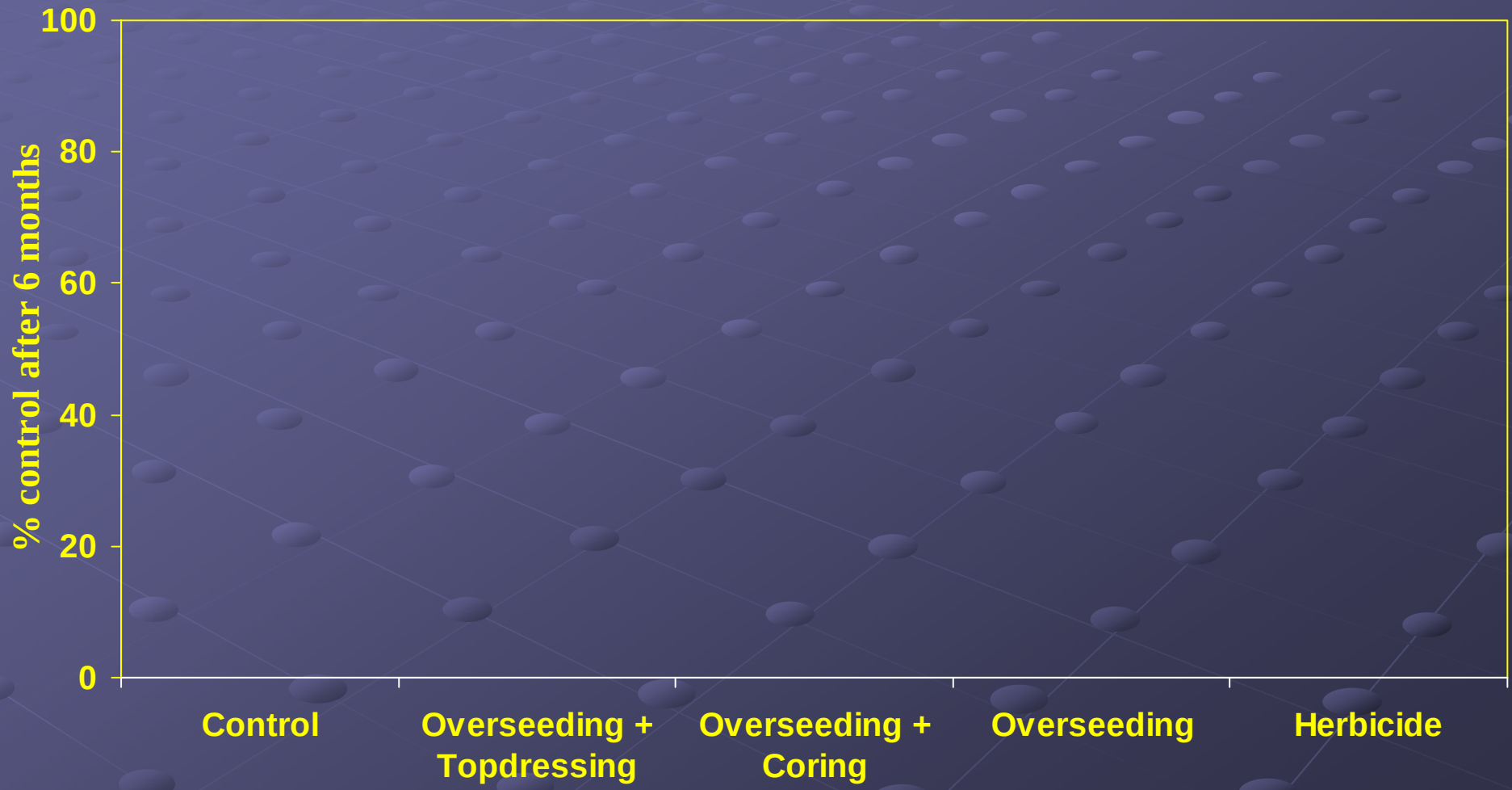
during the playing season. Holes filled with an organic/sand 80/20 mix that stays well and keeps the playing surface safe.

knit and be solid enough to take the wear and tear in September leaves very little time for error in planning the repair process

Dandelion control in lawns

Tripp *et al.* 1996. « Non-chemical renovation of turfgrass ». Guelph Turfgrass Institute.



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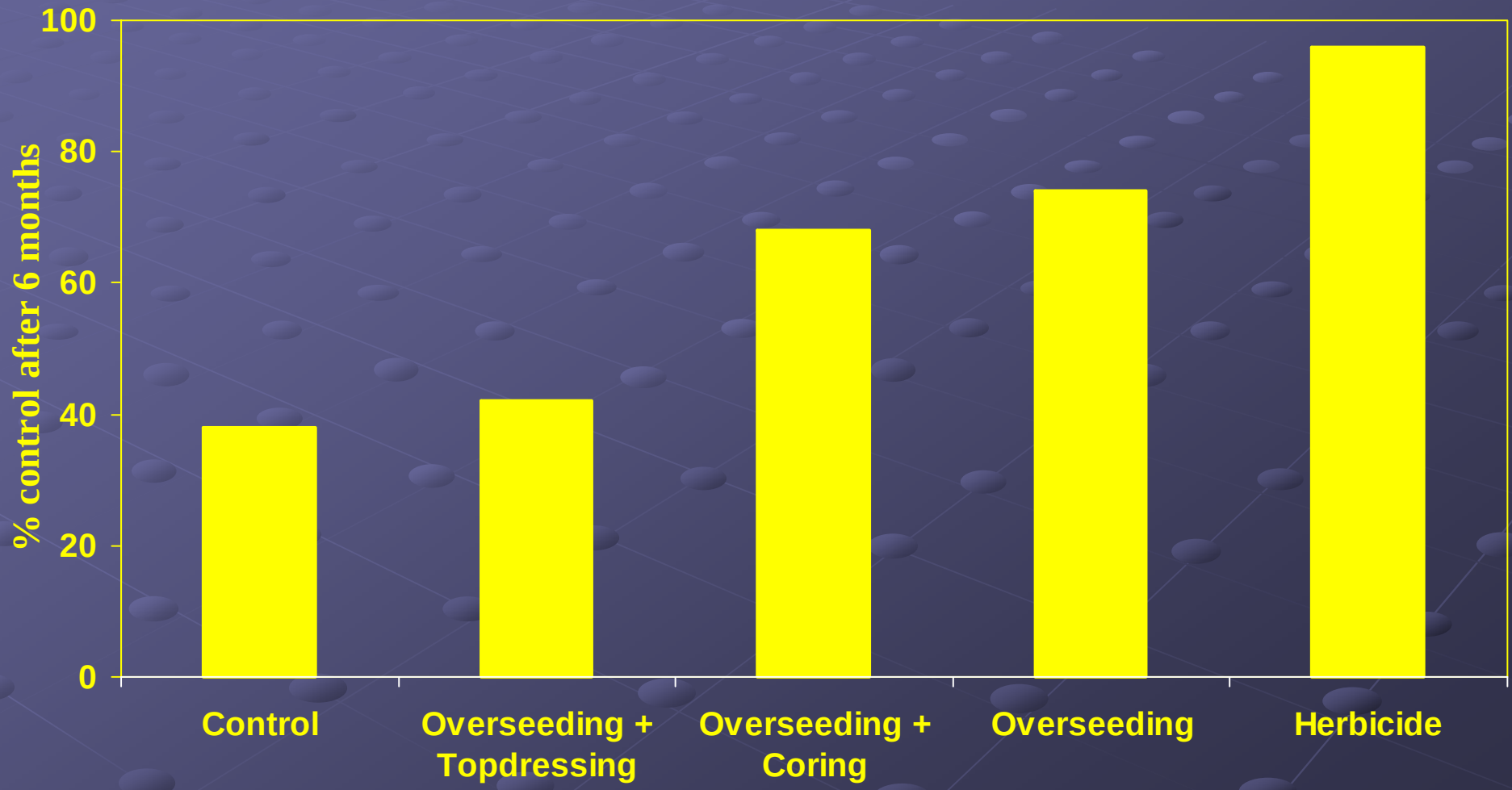

David Chinery
Cornell University
Turf & Recreation 2004

"Heavy, repetitive overseeding using perennial ryegrass can improve turfgrass density on low-input sports fields.

Greater increases were seen in plots receiving light traffic vs. heavy traffic."

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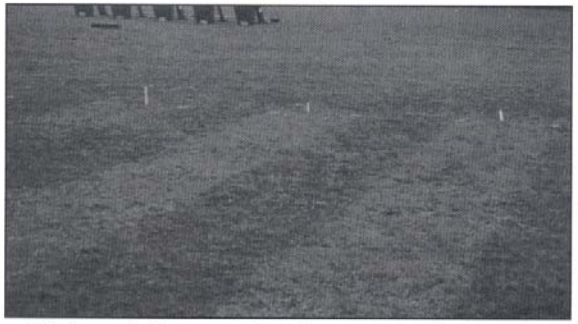

Plots show results of heavy overseeding at different rates at Averill Park High School. From left, two pounds/M, six pounds/M and 10 pounds/M.

"With limitations on the use of pesticides increasing, overseeding might seem to be a better option than ever," his report stated. "However, turfgrass managers often report disappointing results with overseeding. This is especially true on low-input fields or fields where fertilizer, irrigation, weed management and other cultural activities are limited or non-existent. The cultivation requirement attached to overseeding can be disruptive to the use of the turf area in question, as well as adding costs. Clearly, easier and more effective ways to overseed turfgrass areas are needed."

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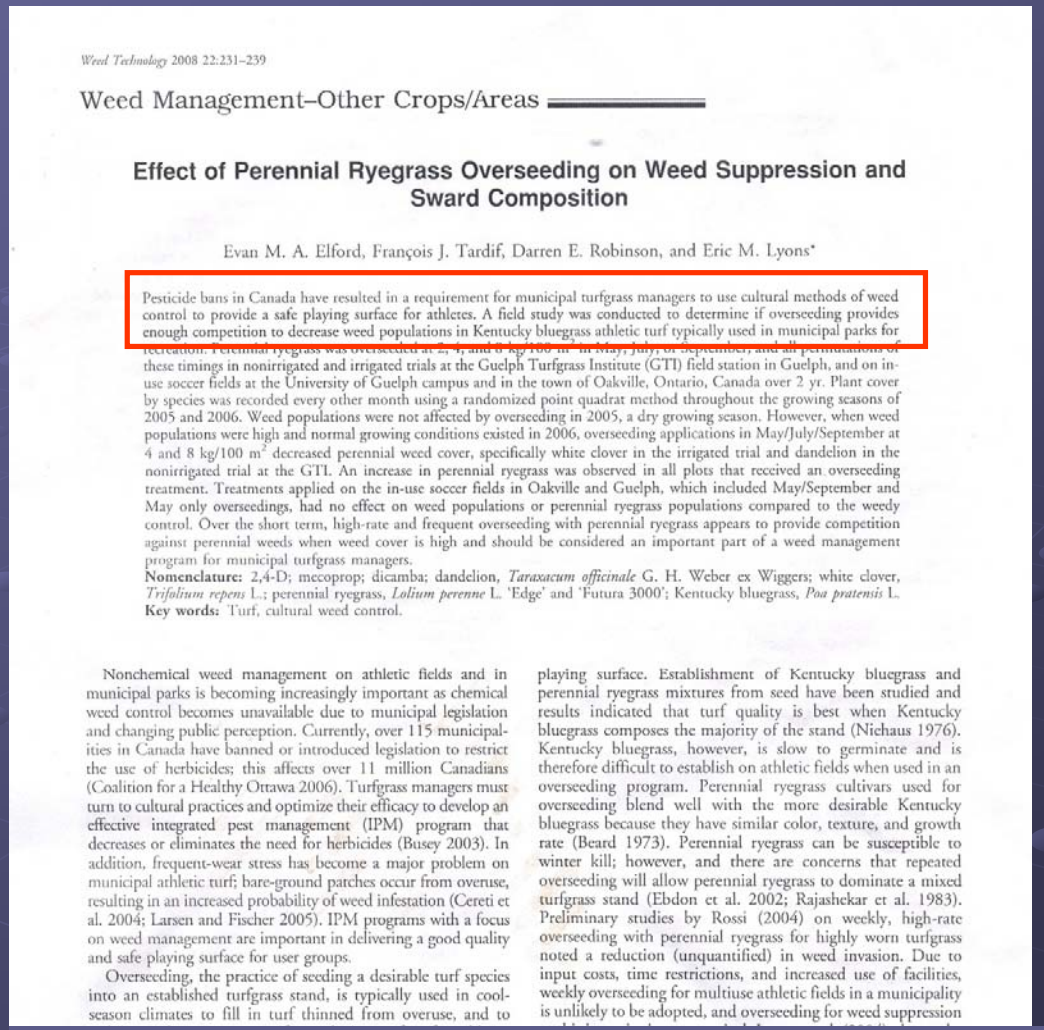
Reader Action Number 219

"Weed populations were not affected by overseeding in 2005, a dry growing season.

However, in 2006 when weed populations were high and normal growing conditions existed, overseeding applications in May-July-September at 4 to 8 kg/100 m^2 decreased perennial weed cover, specifically white clover in the irrigated trial and dandelion in the non-irrigated trial."



Weed Technology 2008 22:231–239

Weed Management–Other Crops/Areas

Effect of Perennial Ryegrass Overseeding on Weed Suppression and Sward Composition

Evan M. A. Elford, François J. Tardif, Darren E. Robinson, and Eric M. Lyons*

Pesticide bans in Canada have resulted in a requirement for municipal turfgrass managers to use cultural methods of weed control to provide a safe playing surface for athletes. A field study was conducted to determine if overseeding provides enough competition to decrease weed populations in Kentucky bluegrass athletic turf typically used in municipal parks for recreation. Perennial ryegrass was overseeded at 2, 4, and 8 kg/100 m^2 in May, July, or September, and all permutations of these timings in nonirrigated and irrigated trials at the Guelph Turfgrass Institute (GTI) field station in Guelph, and on in-use soccer fields at the University of Guelph campus and in the town of Oakville, Ontario, Canada over 2 yr. Plant cover by species was recorded every other month using a randomized point quadrat method throughout the growing seasons of 2005 and 2006. Weed populations were not affected by overseeding in 2005, a dry growing season. However, when weed populations were high and normal growing conditions existed in 2006, overseeding applications in May/July/September at 4 and 8 kg/100 m^2 decreased perennial weed cover, specifically white clover in the irrigated trial and dandelion in the nonirrigated trial at the GTI. An increase in perennial ryegrass was observed in all plots that received an overseeding treatment. Treatments applied on the in-use soccer fields in Oakville and Guelph, which included May/September and May only overseedings, had no effect on weed populations or perennial ryegrass populations compared to the weedy control. Over the short term, high-rate and frequent overseeding with perennial ryegrass appears to provide competition against perennial weeds when weed cover is high and should be considered an important part of a weed management program for municipal turfgrass managers.

Nomenclature: 2,4-D; mecoprop; dicamba; dandelion, *Taraxacum officinale* G. H. Weber ex Wiggers; white clover, *Trifolium repens* L.; perennial ryegrass, *Lolium perenne* L. 'Edge' and 'Futura 3000'; Kentucky bluegrass, *Poa pratensis* L.
Key words: Turf, cultural weed control.

Nonchemical weed management on athletic fields and in municipal parks is becoming increasingly important as chemical weed control becomes unavailable due to municipal legislation and changing public perception. Currently, over 115 municipalities in Canada have banned or introduced legislation to restrict the use of herbicides; this affects over 11 million Canadians (Coalition for a Healthy Ottawa 2006). Turfgrass managers must turn to cultural practices and optimize their efficacy to develop an effective integrated pest management (IPM) program that decreases or eliminates the need for herbicides (Busey 2003). In addition, frequent-wear stress has become a major problem on municipal athletic turf; bare-ground patches occur from overuse, resulting in an increased probability of weed infestation (Cereti et al. 2004; Larsen and Fischer 2005). IPM programs with a focus on weed management are important in delivering a good quality and safe playing surface for user groups.

Overseeding, the practice of seeding a desirable turf species into an established turfgrass stand, is typically used in cool-season climates to fill in turf thinned from overuse, and to playing surface. Establishment of Kentucky bluegrass and perennial ryegrass mixtures from seed have been studied and results indicated that turf quality is best when Kentucky bluegrass composes the majority of the stand (Niehaus 1976). Kentucky bluegrass, however, is slow to germinate and is therefore difficult to establish on athletic fields when used in an overseeding program. Perennial ryegrass cultivars used for overseeding blend well with the more desirable Kentucky bluegrass because they have similar color, texture, and growth rate (Beard 1973). Perennial ryegrass can be susceptible to winter kill; however, and there are concerns that repeated overseeding will allow perennial ryegrass to dominate a mixed turfgrass stand (Ebdon et al. 2002; Rajashekar et al. 1983). Preliminary studies by Rossi (2004) on weekly, high-rate overseeding with perennial ryegrass for highly worn turfgrass noted a reduction (unquantified) in weed invasion. Due to input costs, time restrictions, and increased use of facilities, weekly overseeding for multiuse athletic fields in a municipality is unlikely to be adopted, and overseeding for weed suppression

Elford *et al*
University of Guelph
Weed Technology 2008

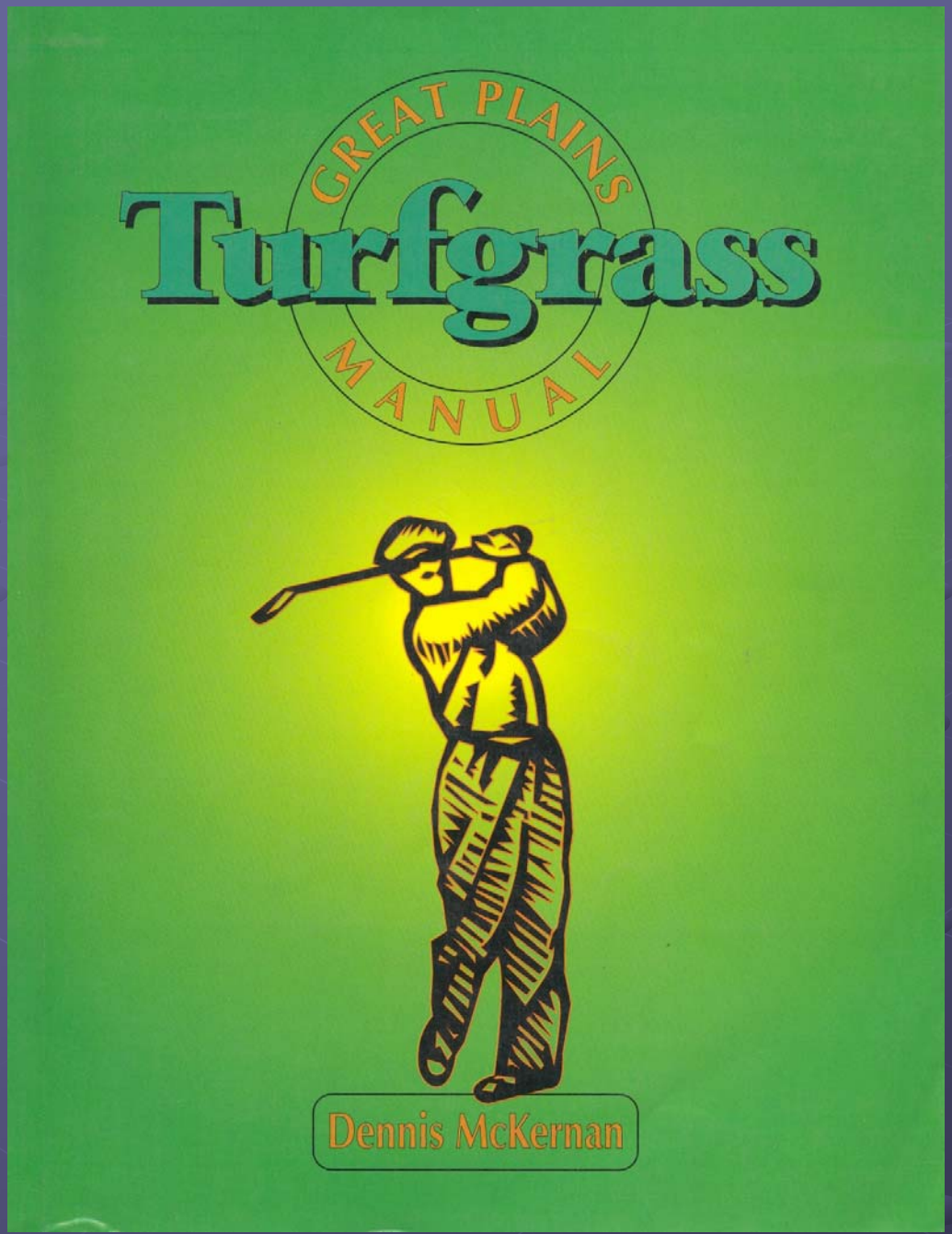
A question

Design an *overseeding* program for your job site.

What grass will you use ?

What is the seeding rate ?

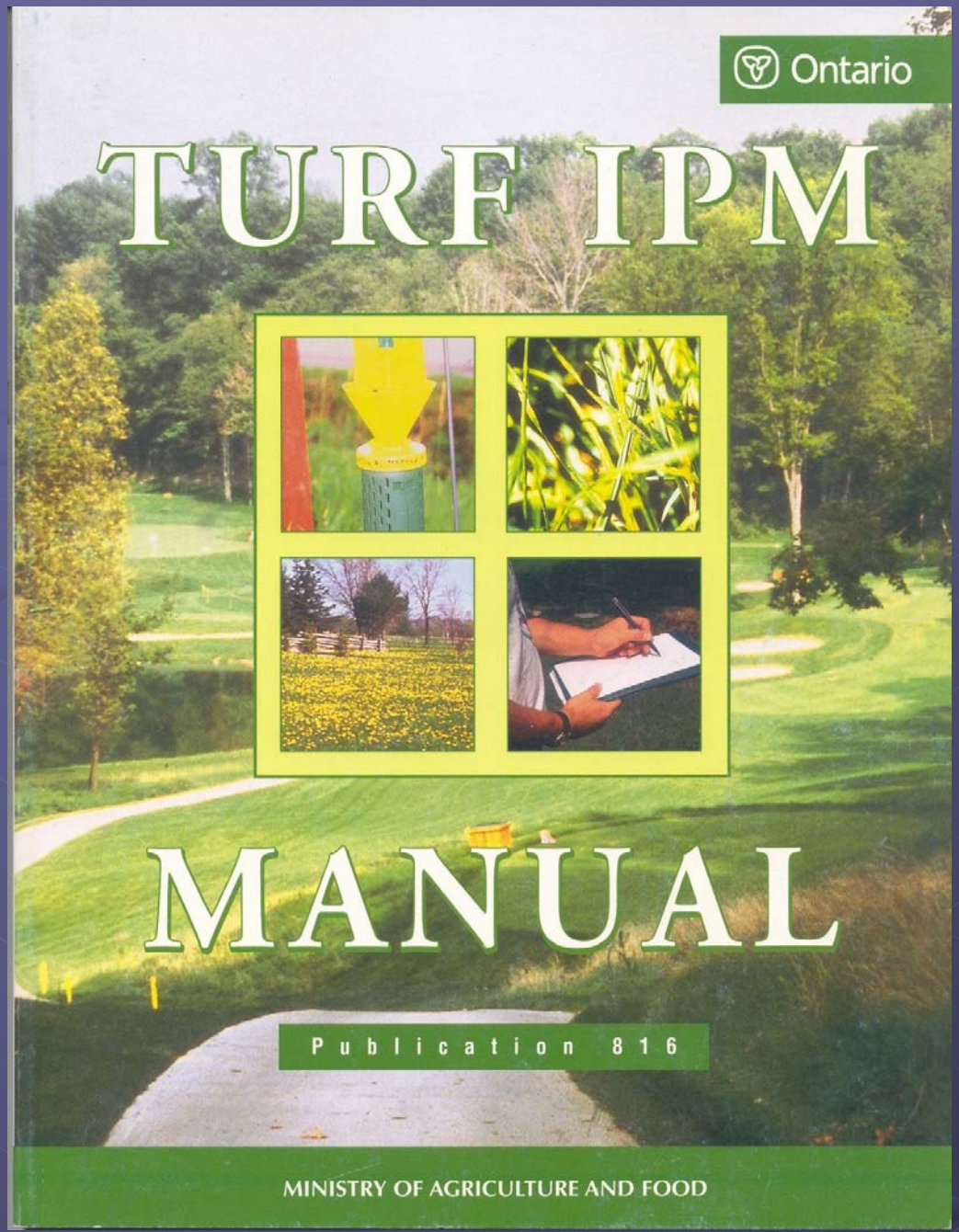
When should it be done ?



Publication from Alberta

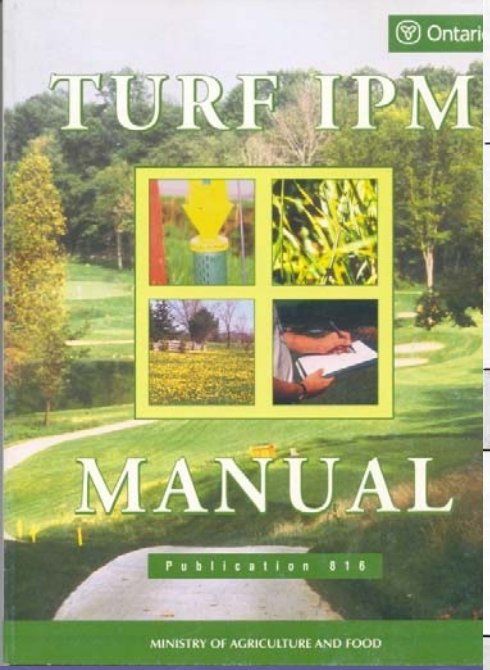
Table 2 Low Maintenance Grasses Seed Rates

Turfgrass	Approximate # seeds/kg	Pure Stand Seeding kg/ha	Pure Stand Seeding lb/acre	Reclamation Reduction Rate
Fescue				
Red, Chewings, Sheep	1 201 000	160 - 200	145 - 185	25%
Hard	1 496 000	125 - 160	115 - 145	15%
Tall	500 000	320 - 400	290 - 365	25%
Meadow	500 000	320 - 400	290 - 365	15%
Rough	500 000	320 - 400	290 - 365	15%
Bluegrasses				
Canada	5 498 000	50 - 70	45 - 68	30%
Kentucky	4 789 000	50 - 70	45 - 68	30%
Bromegrass	275 000	480 - 600	440 - 550	30%
Timothy	2 860 000	50 - 100	45 - 90	15%
Wheatgrasses				
Northern	920 000	140 - 220	125 - 200	20%
Crested	713 000	140 - 220	125 - 200	35%
Alkaligrass	2 640 000	50 - 100	45 - 90	20%
Reed Canarygrass	1 173 000	160 - 200	145 - 185	25%
Junegrass	3 400 000	40 - 60	20 - 30	25%
Blue Gramagrass	1 800 000	115 - 175	50 - 80	20%
Green Needlegrass	398 000	385 - 480	350 - 450	20%
Redtop	10 978 000	20 - 50	20 - 45	30%



Ontario Ministry of Agriculture and Food

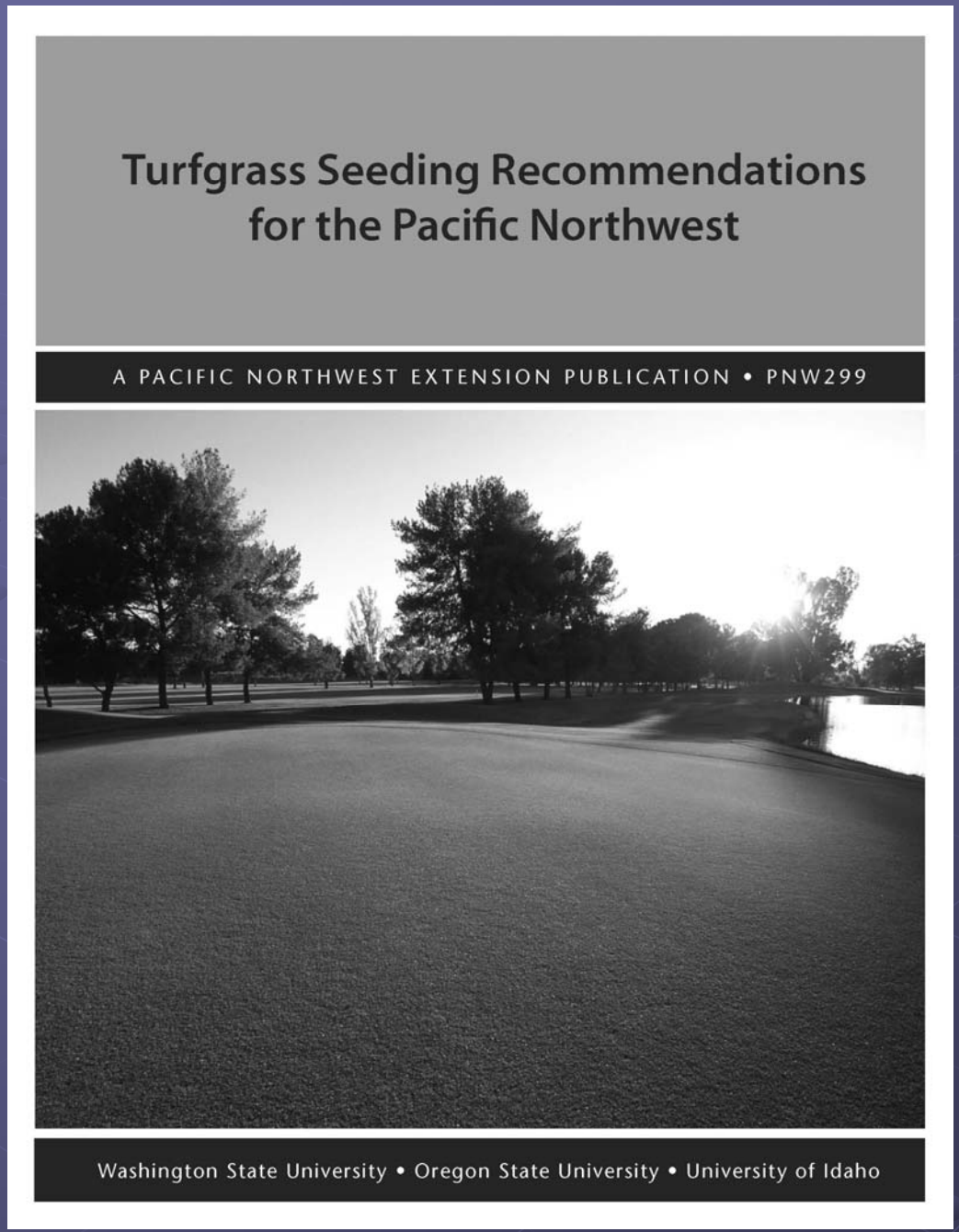
2003



Turfgrass Species Characteristics and Recommended Uses

(VH = very high, H = high, M = medium, L = low)
(E = excellent, VG = very good, G = good, F = fair, P = poor)

Species	Mowing Frequency	Establishment Rate	Nitrogen Req't kgN/100m²/month	Wear Tolerance	Drought Tolerance	Water Usage	Competitiveness	Thatch Formation	Shade Tolerance	Cold Tolerance	Recommended Uses	Seeding Rate (kg/100m²)
Kentucky bluegrass *Poa pratensis*	M	21 days	0.2–0.7	G	G	H	M	M–H	F–G	VG	Home lawns, sports fields, parks and sod farms	1.0–1.5
Supine bluegrass *Poa supina*	M	21 days	0.2–0.4	E	P	H	H	M–H	VG	VG	Sports fields and shaded greens. Should be seeded in a mixture with Kentucky bluegrass (10%–50% supine bluegrass, 50%–90% Kentucky bluegrass)	0.75–1.0
Perennial ryegrass *Lolium perenne*	H	4–6 days	0.2–0.5	E	VG	M	H	None	F–G	P	Home lawns, sports fields, tees on golf courses (not winter-hardy in all areas of Ontario)	2.5
Red fescue *Festuca rubra*	L	13–15 days	0.1–0.3	P	G	M	M	L–M	VG	G	Shady areas and low-maintenance areas on home lawns and golf course out-of-play areas	2.0
Chewings fescue *Festuca rubra* var *commutata*	L	Medium	0.1–0.3	F	G	L	H	M–H	VG	G	Shady areas and low-maintenance areas on home lawns and golf course out-of-play areas	2.0
Hard fescue *Festuca longifolia*	L	Slow to medium	Low but > sheep fescue	G	E	L	M	M	VG	G	Shady areas and low-maintenance areas on home lawns and golf course out-of-play areas	2.0–2.5
Sheep fescue *Festuca ovina*	L	Slow to medium	0	G	E	Best if not irrig.	M	M	VG	G	Shady areas and low-maintenance areas on home lawns and golf course out-of-play areas	2.0–2.5
Tall fescue *Festuca arundinacea*	H	Quite good	0.2–0.5	G	E	H	M	None	G	F	Sports fields, highways and boulevards (not winter-hardy in all areas of Ontario)	3.0–4.0
Creeping bentgrass *Agrostis palustris*	H	Medium	0.15–0.35	G	P	H	H	H	F	E	Golf course greens, tees, fairways and lawn bowling	0.3–0.5



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University Idaho University

2010

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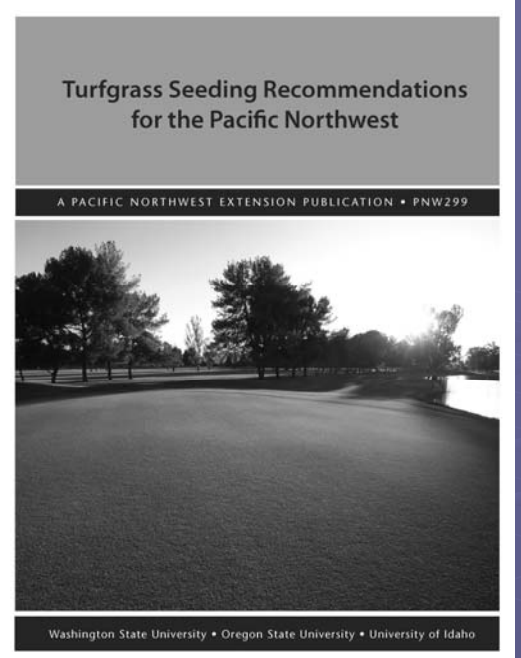


Overseeding Turfgrass Areas

Overseeding is the application of seed to depleted weeds east of the Cascades. If irrigation will not be provided, plant wheatgrasses in early spring or as a late fall dormant seeding.

Table 8. Overseeding recommendations for golf course fairways.

Grass	Seeding rate (percentage by weight)[a]	Western Washington and Western Oregon	Idaho, Eastern Washington, and Eastern Oregon
Perennial ryegrass	50	NR[b]	R[c]
plus Kentucky bluegrass	50	NR	R
Perennial ryegrass	80	R	R
plus colonial bentgrass	20	R	R

[a]Overseeding rates can vary from 75 to over 400 lb/acre. Contact your local Extension specialist for more information.
[b]Not recommended.
[c]Recommended.

Table 9. Overseeding recommendations for home lawns, parks, and cemeteries.

Grass	Seeding rate (lb/1,000 ft^2)	Western Washington and Western Oregon	Idaho, Eastern Washington, and Eastern Oregon
Perennial ryegrass	6	R[a]	R
Perennial ryegrass	4	R	R
plus creeping red, Chewings, or hard fescue	2	R	R
Creeping red, Chewings, or hard fescue	2	R	NR[b]
plus colonial bentgrass	0.5	R	NR
Kentucky bluegrass (blended varieties)	2	NR	R
Kentucky bluegrass (blended varieties)	1	NR	R
plus creeping red, Chewings, or hard fescue	2	NR	R
Perennial ryegrass	4	NR	R
plus Kentucky bluegrass	1.5	NR	R
Tall fescue	6–8	limited use	R

[a]Recommended.
[b]Not recommended.

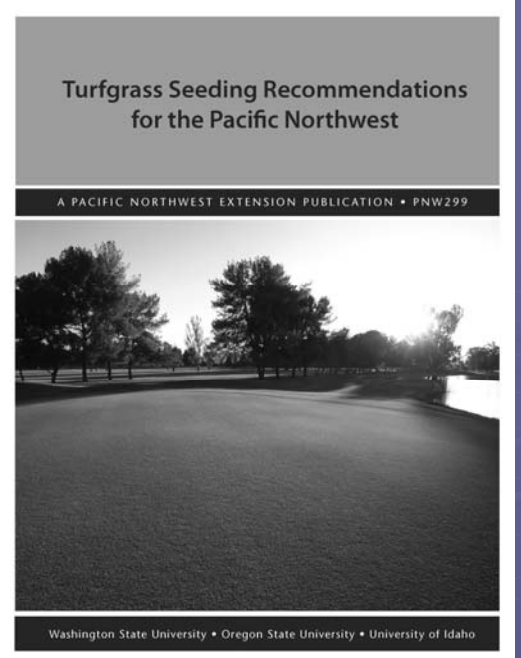


Table 10. Overseeding recommendations for athletic fields.

Grass	Seeding rate (lb/1,000 ft²)	Western Washington and Western Oregon	Idaho, Eastern Washington, and Eastern Oregon
Perennial ryegrass	6	R[a]	R
Perennial ryegrass	4	R	R
plus Kentucky bluegrass[b]	1.5	R	R
Perennial ryegrass	1	R	R
plus intermediate ryegrass[c]	3	R	R

[a]Recommended.
[b]Kentucky bluegrass seedlings are extremely poor competitors during establishment. If turfgrasses cover as much as 50% of the ground, seed turf-type perennial ryegrasses alone since Kentucky bluegrasses will not compete favorably.
[c]Use intermediate ryegrass very early or late during the seasons when soil temperatures are too cool to get quick cover by perennial ryegrass or Kentucky bluegrass. Intermediate ryegrass will act as a biennial in most cases.

Table 11. Seeding recommendations for roadside and slope stabilization[a].

Grass	Seeding rate (lb/1,000 ft²)	Western Washington and Western Oregon	Idaho, Eastern Washington, and Eastern Oregon
Crested wheatgrass[b]	0.5–1.0	NR[c]	R[d]
Streambank wheatgrass[b]	1.0	NR	R
Hard fescue[e]	1.0	NR	R
Hard fescue	0.35	NR	R
plus crested wheatgrass[e]	0.5	NR	R
Sheep or Idaho fescue[e]	1.0	NR	R
Common or improved perennial ryegrass	1.5	R	R
plus creeping red or Chewings fescue	1.0	R	NR
Common or improved perennial ryegrass	1.5	R	NR
plus creeping red or Chewings fescue	1.0	R	NR
plus white Dutch clover	0.1	R	NR
Colonial bentgrass can be added to the two preceding entries for wet sites	0.25	R	NR

[a]These rates are based upon prepared seedbeds seeded with a brillion drill or hydroseeding methods.
[b]On nonirrigated 8–15 inch rainfall areas, crested wheatgrass and streambank wheatgrass perform very well.
[c]Not recommended.
[d]Recommended.
[e]On nonirrigated 15–25 inch rainfall areas, sheep, hard, or Idaho fescue and crested wheatgrass perform well.

Authors: G.K. Stahnke, Associate Extension Agronomist, and E.D. Miltner, Associate Research Agronomist,

Ratings for cool-climate lawn grasses

Turfgrass Producers International, Illinois, 2002

- Kentucky bluegrass
  - Good for cold hardiness, Poor for shade tolerance
  - Medium for drought and wear tolerance
- Sheep fescue
  - Good for drought but poor for heat
  - Excellent for shade
- Tall fescue
  - Good for heat and drought, Good for shade tolerance
- Perennial ryegrass
  - Good tolerance to wear, fair tolerance to drought and heat
- Creeping bentgrass
  - Good for shade, Poor for drought or wear

« Alternative » lawn or Eco-lawn

Grasses mixed with English daisy, yarrow, strawberry clover

« Alternative » lawn mix:

Bornito fescue, Creeping red fescue, White clover

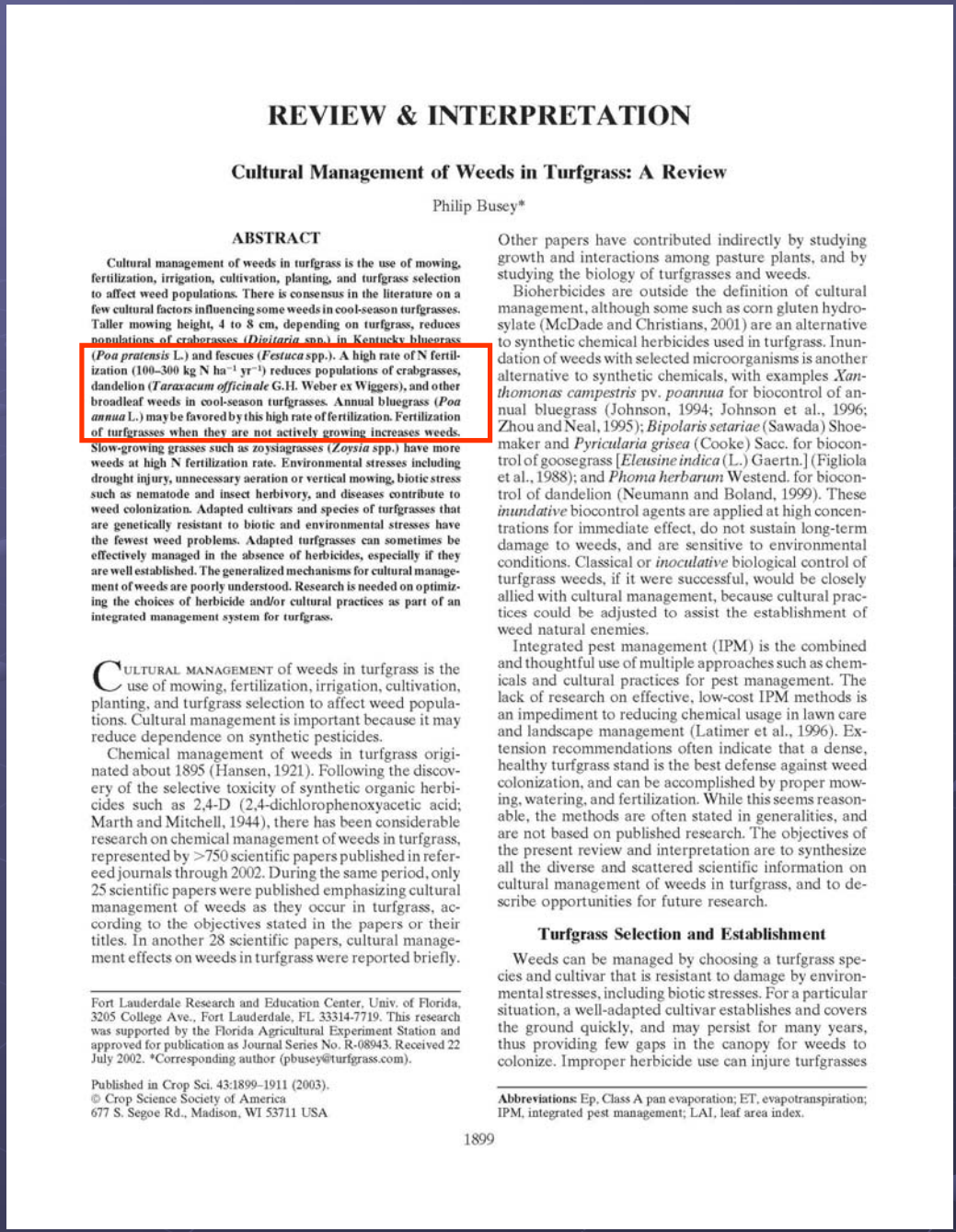
A comment from lawn care companies in Ontario:

"Overseeding and fertilisation are the best for a non-chemical weed control program in lawns."

P. Busey
University of Florida
Crop Science, 2003

"A high rate of N fertilization (100 to 300 kg N / ha / year or 2 to 6 lb N / 1000 ft^2 / year) reduces populations of crabgrasses, dandelion and other broadleaf weeds in cool-season turgrasses.

Annual bluegrass may be favored by this high rate of fertilization. Fertilization of turfgrasses when they are not actively growing increases weeds."



REVIEW & INTERPRETATION

Cultural Management of Weeds in Turfgrass: A Review

Philip Busey*

ABSTRACT

Cultural management of weeds in turfgrass is the use of mowing, fertilization, irrigation, cultivation, planting, and turfgrass selection to affect weed populations. There is consensus in the literature on a few cultural factors influencing some weeds in cool-season turfgrasses. Taller mowing height, 4 to 8 cm, depending on turfgrass, reduces populations of crabgrasses (*Digitaria* spp.) in Kentucky bluegrass (*Poa pratensis* L.) and fescues (*Festuca* spp.). A high rate of N fertilization (100–300 kg N ha^{-1} yr^{-1}) reduces populations of crabgrasses, dandelion (*Taraxacum officinale* G.H. Weber ex Wiggers), and other broadleaf weeds in cool-season turfgrasses. Annual bluegrass (*Poa annua* L.) may be favored by this high rate of fertilization. Fertilization of turfgrasses when they are not actively growing increases weeds. Slow-growing grasses such as zoysiagrasses (*Zoysia* spp.) have more weeds at high N fertilization rate. Environmental stresses including drought injury, unnecessary aeration or vertical mowing, biotic stress such as nematode and insect herbivory, and diseases contribute to weed colonization. Adapted cultivars and species of turfgrasses that are genetically resistant to biotic and environmental stresses have the fewest weed problems. Adapted turfgrasses can sometimes be effectively managed in the absence of herbicides, especially if they are well established. The generalized mechanisms for cultural management of weeds are poorly understood. Research is needed on optimizing the choices of herbicide and/or cultural practices as part of an integrated management system for turfgrass.

Cultural management of weeds in turfgrass is the use of mowing, fertilization, irrigation, cultivation, planting, and turfgrass selection to affect weed populations. Cultural management is important because it may reduce dependence on synthetic pesticides.

Chemical management of weeds in turfgrass originated about 1895 (Hansen, 1921). Following the discovery of the selective toxicity of synthetic organic herbicides such as 2,4-D (2,4-dichlorophenoxyacetic acid; Marth and Mitchell, 1944), there has been considerable research on chemical management of weeds in turfgrass, represented by >750 scientific papers published in refereed journals through 2002. During the same period, only 25 scientific papers were published emphasizing cultural management of weeds as they occur in turfgrass, according to the objectives stated in the papers or their titles. In another 28 scientific papers, cultural management effects on weeds in turfgrass were reported briefly. Other papers have contributed indirectly by studying growth and interactions among pasture plants, and by studying the biology of turfgrasses and weeds.

Bioherbicides are outside the definition of cultural management, although some such as corn gluten hydrosylate (McDade and Christians, 2001) are an alternative to synthetic chemical herbicides used in turfgrass. Inundation of weeds with selected microorganisms is another alternative to synthetic chemicals, with examples *Xanthomonas campestris* pv. *poannua* for biocontrol of annual bluegrass (Johnson, 1994; Johnson et al., 1996; Zhou and Neal, 1995); *Bipolaris setariae* (Sawada) Shoemaker and *Pyricularia grisea* (Cooke) Sacc. for biocontrol of goosegrass [*Eleusine indica* (L.) Gaertn.] (Figliola et al., 1988); and *Phoma herbarum* Westend. for biocontrol of dandelion (Neumann and Boland, 1999). These *inundative* biocontrol agents are applied at high concentrations for immediate effect, do not sustain long-term damage to weeds, and are sensitive to environmental conditions. Classical or *inoculative* biological control of turfgrass weeds, if it were successful, would be closely allied with cultural management, because cultural practices could be adjusted to assist the establishment of weed natural enemies.

Integrated pest management (IPM) is the combined and thoughtful use of multiple approaches such as chemicals and cultural practices for pest management. The lack of research on effective, low-cost IPM methods is an impediment to reducing chemical usage in lawn care and landscape management (Latimer et al., 1996). Extension recommendations often indicate that a dense, healthy turfgrass stand is the best defense against weed colonization, and can be accomplished by proper mowing, watering, and fertilization. While this seems reasonable, the methods are often stated in generalities, and are not based on published research. The objectives of the present review and interpretation are to synthesize all the diverse and scattered scientific information on cultural management of weeds in turfgrass, and to describe opportunities for future research.

Turfgrass Selection and Establishment

Weeds can be managed by choosing a turfgrass species and cultivar that is resistant to damage by environmental stresses, including biotic stresses. For a particular situation, a well-adapted cultivar establishes and covers the ground quickly, and may persist for many years, thus providing few gaps in the canopy for weeds to colonize. Improper herbicide use can injure turfgrasses

Fort Lauderdale Research and Education Center, Univ. of Florida, 3205 College Ave., Fort Lauderdale, FL 33314-7719. This research was supported by the Florida Agricultural Experiment Station and approved for publication as Journal Series No. R-08943. Received 22 July 2002. *Corresponding author (pbusey@turfgrass.com).

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677 S. Segoe Rd., Madison, WI 53711 USA

Abbreviations: Ep, Class A pan evaporation; ET, evapotranspiration; IPM, integrated pest management; LAI, leaf area index.

Tripp, Hall, Sagan
University of Guelph
1996

"Increasing N fertility resulted in decreases in plantain and black medic density and increased dandelion density.

Different weed species, therefore, do not respond in a similar manner to choices of N fertility regimes."

THE INFLUENCE OF 46 SPECIES MIXTURES AND 5 NITROGEN FERTILITY REGIMES ON THE EXCLUSION OF BROADLEAF WEEDS FROM TURFGRASS SWARDS.

T.A. Tripp, J.C. Hall and K.L. Sagan.
Department of Environmental Biology, University of Guelph, Guelph Ontario N1G 2W1

INTRODUCTION

A number of broadleaf weeds invade turfgrass swards in Canada including common dandelion (*Taraxacum officinale*), plantain (*Plantago* spp.), and black medick (*Medicago lupulina*). Control of these weeds is possible through the use of herbicides such a 2,4-D, dicamba, mecoprop, and mixtures if these three herbicides. Non-chemical methods of controlling these weeds have received little attention.

The best way to keep a lawn weed free is to maintain a dense healthy turf. Fertilizing with nitrogen (N) is one of the best ways to attain a dense healthy turf (OMAFRA Pub 384, 1994). Little attention has been paid to the effect of species and species mixtures on weed encroachment into a turfgrass sward. The purpose of this experiment is to determine the effect combination of different nitrogen fertility regimes and different mixtures of species have upon broadleaf weed invasion.

LITERATURE REVIEW

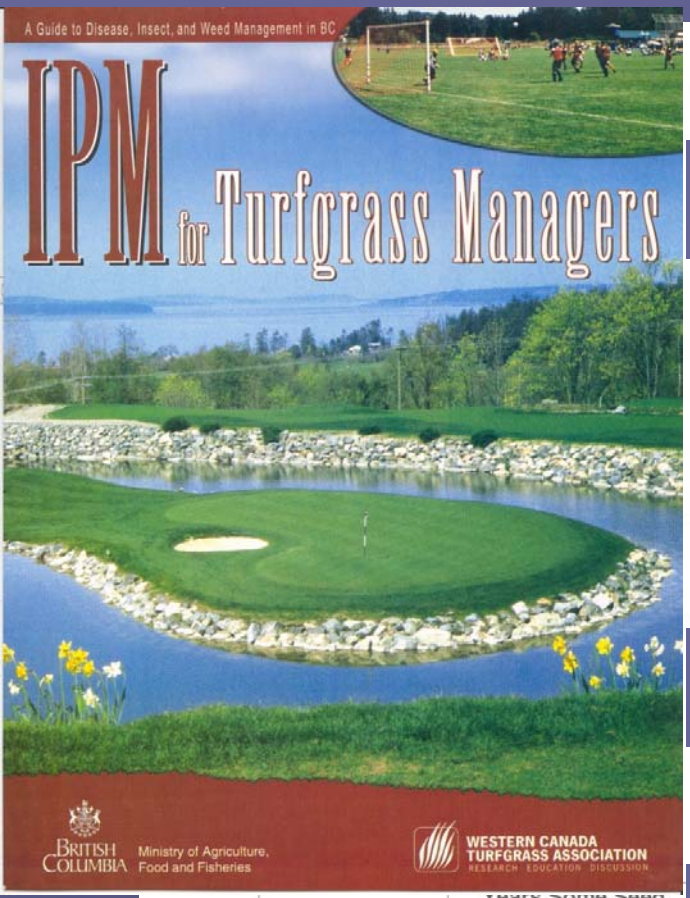
In Ontario there are a number of cool season grass species from which to choose. These include, perennial ryegrass (*Lolium perenne*), Kentucky bluegrass (*Poa pratensis*), tall fescue (*Festuca arundinacea*), and the fine fescues (*Festuca* spp.). Hall et al. (1993) found that choice of species influenced the extent of broadleaf weed infestation, with perennial ryegrass (*Lolium perenne*) out performing tall fescue(*Festuca arundinacea*), creeping red fescue (*Festuca rubra* var. *rubra*), hard fescue (*Festuca longifolia*), chewings fescue (*Festuca rubra* var. *commutata*) and Kentucky bluegrass (*Poa pratensis*), respectively. Gray and Call (1993) found that 0.98 kg nitrogen, 0.42 kg phosphorous and 0.82 kg potassium applied per 100 m^2 in the spring and fall reduced the density of Indian Mockstrawberry (*Duchesnea indica*) infesting tall fescue (*F. arundinacea*). Furthermore, fertilizer applications reduced dry matter of common blue violet (*Viola papilionacea*) infesting tall fescue (Gray and Call, 1993). Broadleaf dock (*Rumex obtusifolious*) responded to fertilization with increases in total dry matter but the increase was not as great in stands of *Lolium multiflorum* (Niggli, Nosberger and Lehmann. 1993). Hall *et al.* (1993) found that applications of 0.25 kg N/100m^2 in May, August and 0.5 kg N/100m^2 November resulted in the lowest amount of weed infestation in Kentucky bluegrass , perennial ryegrass, tall fescue, and 0.5 kg N/100m^2 in May and November produced the same result in the fine fescues. Although different turfgrass species respond differently to fertilizer applications, therefore increasing nitrogen fertility reduces weed infestations in the four common turgrass species grown in Ontario.

MATERIALS AND METHODS

In 1994 46 mixtures of Jaguar II tall fescue, Yorktown III perennial ryegrass, Liberty Kentucky bluegrass, Vista creeping red fescue and nine commercially available mixtures were planted. All plots were replicated in four completely randomized blocks. Five N fertility regimes were applied in five metre strips across each block in 1995 and 1996. Furthermore in 1995 weed seeds of *T. officinale*, *P. lanceolata*, and *M. lupulina* were sown throughout the plots. Weed populations were monitored over the course of the growing season in 1995 and in 1996. Data for August of each year was analyzed by means of orthogonal contrasts using the SAS sytem.

Plantain being “squizzed” by taller grasses

Important practices for lawn care



Weed	Years Some Seed Remain Viable (Alive) in the Soil
Chickweed	10
Hedge Mustard	10
Canada Thistle	11 – 20
Oxeye Daisy	11 – 20
Lamb's-Quarters	21 – 40
Purslane	21 - 40
Redroot Pigweed	21 – 40
Shepherd's-Purse	35
Dodder	70
Curled Dock	>80

Mowing height

Mowing height

to 7 cm (bentgrass to 2.0 to 2.5 cm). Mowing will also control much seedling weed growth. A mulching mower that leaves clippings on the turf usually promotes good fertility.

In the coastal climate it is desirable to keep grass short going into winter in order to discourage an environment that promotes fungal diseases. In cold areas, leave longer growth, maintain nutrition (especially potassium) and provide good drainage to prevent winter injury.

Aeration

Aeration

penetration.

Watering schedule

Watering

water every one or two days. This encourages shallower, less competitive roots. Grass with deeper roots is better able to resist fungal diseases and drought. Only lawns on pure sand require daily watering. Over-watering actually promotes germination and invasion of weeds such as annual bluegrass.

Fertility, pH

Fertility

fertilizer to promote root health, topgrowth and colour. For large or special use turf areas it is desirable to undertake regular soil and/or tissue testing to ensure a balanced nutrition prescription. Too much nitrogen or phosphorus for example will promote annual bluegrass. Too much nitrogen or too little phosphorus can increase some fungal diseases.

De-thatching

De-thatching

drought tolerance, dry patches, spongy turf and ineffective fertilizer application. Where thatch layer is thick, remove it gradually (1 cm at a time) over a period of a few years. This will prevent severe scalping of the turf that would lead to increased weed invasion.

Re-seeding

Re-seeding

Sanitation

Sanitation

equipment before moving from a weedy area.

Weed identificat

Know your weeds
life cycle, biology
necessary for deve
strategy. This know
perennial weeds be
develop and allows
of control options.
winter annual, con
against it in the fal
seed production. If
would not be easily
choosing a herbici
whether your weed
label and at what g
susceptible.

Annual weeds

Annual weeds com
Most annuals depe
production and pro
ability to survive.
groups:

Summer a
spring, rea
or fall, set
crabgrass,
pigweed.
Winter an
fall, overw
spring, set
die, e.g., s

Some weeds exhibi
al habit, e.g.,

Topdressing is in high demand

How to profit from this growing, high-value service

TOPDRESSING is a fundamental practice in the maintenance of sports fields, golf courses, and residential lawns. No wonder this natural, efficient service is gaining in popularity.

Using sustainable practices is ranked high in our daily life and, for a business owner who wants to maintain a profitable business, topdressing represents a great way to share in an expanding market—and do so responsibly and with sustainability.

Turf & Recreation (Ontario)

2011

What is topdressing?

Topdressing is the direct application of a layer of soil mixture onto grass. The thickness of this layer varies from one-eighth to a quarter-inch. Topsoil is usually used for sports fields, but a soil containing at least 75 per cent compost is recommended for residential lawns.

Why should we topdress?

Whether it is included in a maintenance program or used to restore damaged lawns, topdressing with compost offers many advantages that are usually found in other maintenance procedures but separately. According to Roy Gross, from St. Louis Composting, "We are looking for results when we decide to topdress."

Topdressing, when applied correctly, rejuvenates a lawn and has a beneficial effect on flowers, trees, and shrubs. The application of one single layer of compost fulfills between 50 to 100 per cent of the annual fertilizing needs. Compost is the

Topdressing with compost

Golf courses use sand for topdressing...

Aeration and Topdressing for the 21st Century

Two old concepts are linked together to offer up-to-date recommendations.

By Pat O'Brien and Chris Hartwiger

Putting green aeration and topdressing are literally and figuratively dirty words. Golfers begrudgingly accept the fact that to protect the long-term health of the grass on a putting green, it is necessary to aerate and topdress each year. With more sophisticated products and techniques, gone are the days when putting greens were aerated in the spring and fall and buried in a blanket of sand. But lost in the changes to these programs may be an incomplete understanding of how much aeration and topdressing are needed to protect the long-term health of the greens.

The long-term health of putting greens depends on maintaining sand as the primary medium. If organic matter accumulates beyond a reasonable degree, the physical benefits of sand are diminished and putting green physical properties decline along with the health of the turf. For too long golf courses have been making changes in their aeration and topdressing programs without comparing these changes to a standard or target level. A previous *Green Section Record* article titled "Core Aeration by the Numbers" detailed how tine size and spacing affects the amount of surface area impacted by an aeration treatment and made a recommendation to impact 15-20% of the surface each year (O'Brien and Hartwiger, 2001). This recommendation did not go far enough because it did not include surface topdressing applications, which go hand in hand with core aeration in diluting organic matter accumulation. This article expands upon these concepts and links core aeration and sand topdressing.

Table 1
Conversion rates for sand topdressing

Ft.³ of Sand Lbs. per 1,000 ft²	Lbs. per 1,000 ft² Dry Sand	Depth of Application in inches
0.50	50	0.006
1.00	100	0.012
2.00	200	0.024
4.00	400	0.048
50.00	5000	0.600

THE SIGNIFICANCE OF CORE AERATION AND SAND TOPDRESSING

According to University of Georgia turfgrass researcher Dr. Bob Carrow, the number-one problem experienced on sand-based putting greens is the excessive accumulation of organic matter in the upper portion of the soil profile (Carrow et al., 2002). Core aeration and sand topdressing are the two most effective means to control the content and distribution of organic matter in this zone. The scientific literature is full of references to the benefits of core aeration and sand topdressing. Unfortunately, details on how much aeration and topdressing are needed are lacking.

Using dry sand and the proper topdressing equipment improves worker productivity and helps reduce golfer complaints.

The moment any type of grass is planted on a putting green rootzone mix, the soil physical properties in the upper few inches of the rootzone begin to change (Habeck and Christians, 2000; Curtis, 2001). In a new putting green the cycle of root growth, decline, and new growth is repeated year after year. Roots grow down through the soil in the large soil pores (macropores) and provide the plant with needed water, oxygen, and nutrients. When a root is no longer viable, it begins to plug up soil macropores and can hinder the ability of living plants to function.

Dr. Carrow conducted extensive research (Carrow, 1998) in the mid-1990s on the organic matter dynamics in the rootzone of sand-based putting greens. He concluded as organic matter in a sand-based putting green reaches 3-4% by weight, the percentage of soil macropores begins to decrease. The reduction of pore space has three distinct implications, and a host of primary problems can be expected: 1) The diffusion of oxygen into the rootzone begins to decline. Oxygen is vital for plant growth as well as soil microorganism balance and function. 2) Water infiltration decreases, which can result in puddling and saturation of the surface. 3) Moisture content in the upper rootzone increases, which can make the surface less firm. The decrease in macropores (aeration pores) is accompanied by an increase in capillary or water-holding pores.

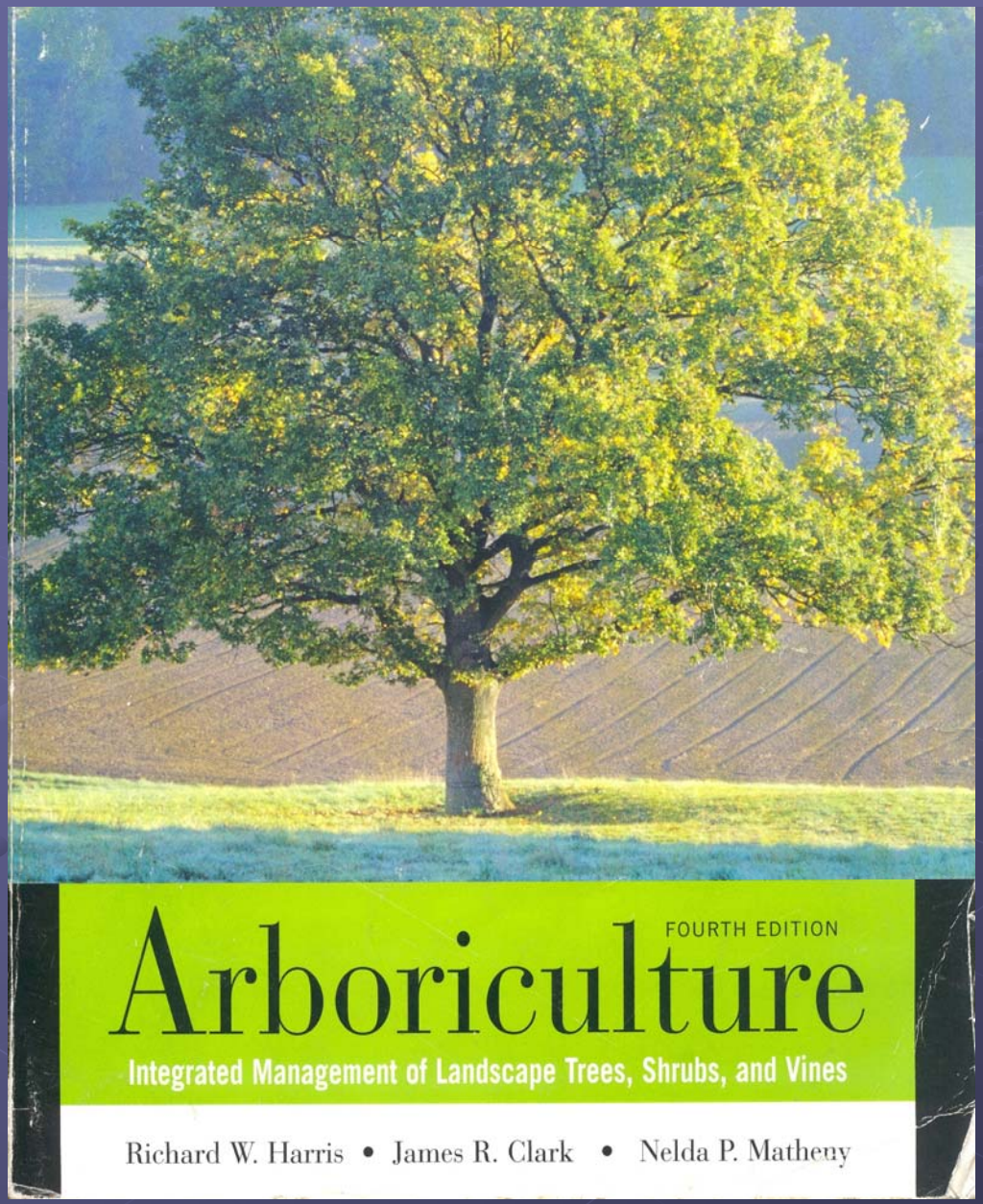
If organic matter accumulation begins to exceed 3-4% by weight, putting greens become vulnerable to a host of secondary problems such as disease, wet wilt, soft surfaces, poor root growth, black layer, and more frequent high-temperature injury.

Table 1
Conversion rates for sand topdressing

Ft.³ of Sand Lbs. per 1,000 ft²	Lbs. per 1,000 ft² Dry Sand	Depth of Application in inches
0.50	50	0.006
1.00	100	0.012
2.00	200	0.024
4.00	400	0.048
50.00	5000	0.600

2003
WCTF Turf News

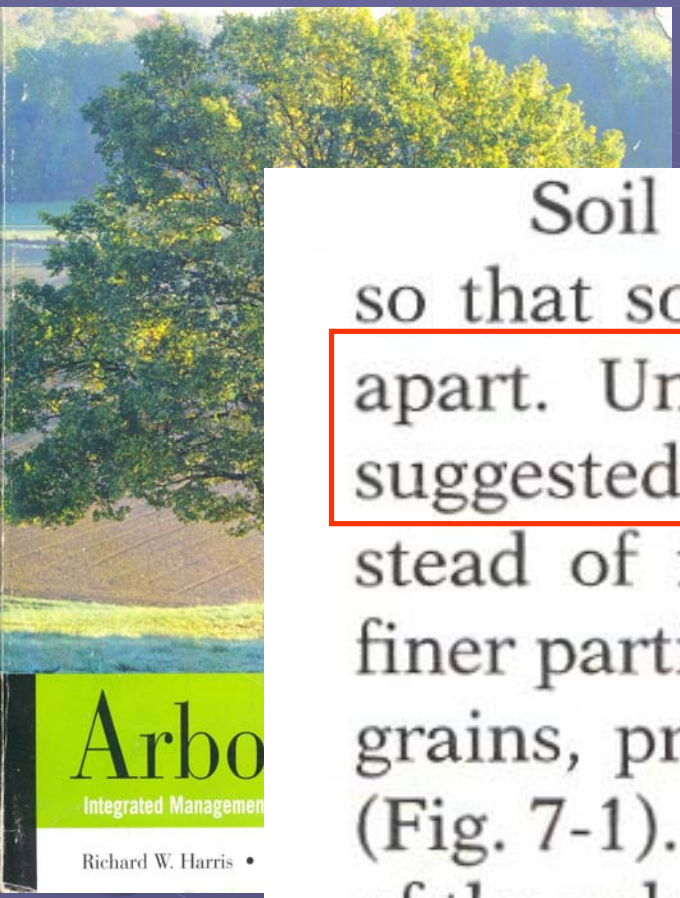
... but is it a good practice over lawns ?



2004

Available from ISA (International Society of Arboriculture)

Do not topdress with sand except over sandy soil



Soil amendments essentially dilute the soil so that some of the particles are spread farther apart. Unfortunately, sand still is occasionally suggested as an amendment (Flemer, 1986). Instead of increasing porosity, as sand is added, finer particles occupy the voids between the sand grains, producing a denser, less porous mixture (Fig. 7-1). Not until sand constitutes 45% or more of the volume will the mixture begin to have some of the properties attributed to sandy soils.

A question for you

What is your experience with top dressing ?

What product can we use ?

At what rate ?

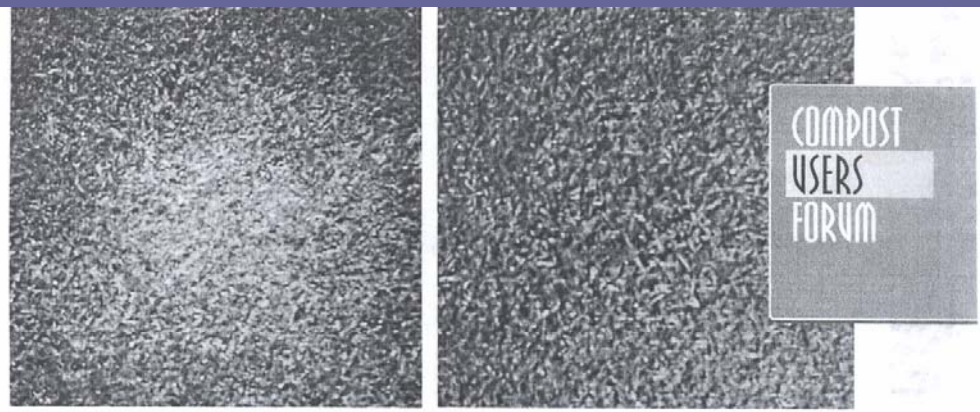
When should it be done ?

Recommendation for home lawns

Nelson and Boehm
Cornell University
Published 2002 in Biocycle

1: Top dressing each month
5 kg / 100 m^2 (10 lbs / 1000 ft^2)
Apply after aeration

2: One application in fall
Turkey litter or cow manure
100 kg / 100 m^2 or 1 cm depth
(200 lbs / 1000 ft^2 or 0.5 inch)



Illustrating suppression of Pythium root rot on creeping bentgrass in compost-amended soil, above photos show effects 14 days after inoculation of no compost (left) and 20 percent compost, v:v (right).

Compost-Induced Suppression Of Turf Grass Diseases

This first part of a detailed report shows how composted products promote healthy turf grass, suppress disease development and reduce need for costly fungicide and fertilizer inputs.

Part I

Eric B. Nelson and Michael J. Boehm

UNTIL the 1940s, composts served as one of the principal sources of fertilizer used on golf courses and athletic fields. The utilization of composts declined dramatically, however, with the advent of synthetic, urea-based fertilizers, and organic fertilizers such as Milorganite, which offered more consistent and predictive nutrient release characteristics. After nearly 60 years of heavy reliance on chemical inputs, we find ourselves in the midst of a resurgence in the use of organic matter amendments and topdressings for managing high quality turf grass. Recent research on the use of composts on turf grass has focused on the suppression of turf grass diseases, the potential for reducing fungicide and fertilizer inputs, and the effects of composts on the physical, chemical and microbiological properties of soils.

Currently there are between 20 and 30 million acres of turf grass in the United States, consisting of lawns, parks, golf courses, sod farms, industrial and institutional grounds, right-of-ways, etc. Fungal diseases represent one of the most important limiting factors to maintaining the aesthetics and functional quality of turf grass plantings. Managing diseases is particularly difficult on golf course turf where agronomically unrealistic cutting heights, high traffic and compaction, and low nutrient inputs to maintain unnecessarily high green speeds, have placed unprecedented stresses on turf grass plants, making them highly susceptible to infection.

The application of fungicides has historically been the major tactic for controlling diseases on high quality turf grasses. Because of the ideal conditions for disease development, golf course turf grasses receive more fungicide inputs than any other agricultural or horticultural crop, with total dollars spent exceeding 20 percent of the total U.S. fungicide market. The vast majority of those

Quantity needed for a typical front lawn
Not a lot of compost for a lot of good results !

Boulter, Boland, Trevors
University of Guelph
Plant Disease 2002

"Applications of compost every 3 weeks throughout the season suppressed dollar spot of turf to levels not significantly different than applications of chlorothalonil applied at the manufacturer's lowest recommended rate every 2 weeks (p=0.05)."

Evaluation of Composts for Suppression of Dollar Spot (*Sclerotinia homoeocarpa*) of Turfgrass

Jeanine I. Boulter, Greg J. Boland, and **Jack T. Trevors,** Department of Environmental Biology, University of Guelph, Guelph, Ontario, Canada, N1G 2W1

ABSTRACT

Boulter, J. I., Boland, G. J., and Trevors, J. T. 2002. Evaluation of composts for suppression of dollar spot (*Sclerotinia homoeocarpa*) of turfgrass. Plant Dis. 86:405-410.

The use of composts in turfgrass disease management allows for a reduction in pesticide use in chemical control practices. Disease suppressive properties of composts rely on a number of factors including microbial activity, microbial population dynamics, nutrient concentrations, and other associated chemical and physical factors. Five composts were evaluated for suppression of dollar spot caused by *Sclerotinia homoeocarpa*. The dollar spot disease suppressive properties of selected compost formulations prepared in different years was evaluated. A third objective was to examine the effects of storage of compost (1 year) on the suppression of dollar spot. Field experiments were conducted in 1998 with compost prepared in 1997 to 1998. Applications of compost every 3 weeks throughout the season suppressed dollar spot of turf to levels not significantly different than applications of chlorothalonil fungicide applied at the manufacturer's lowest recommended preventative rate of 38.4 ml a.i./100 m^2 every 2 weeks ($P = 0.05$). Single applications of composts at the start of the 1998 season were not effective in reducing disease. Field experiments in 1999 evaluated batches of two selected compost formulations, one batch produced in 1998 to 1999, another stored since production in 1997 to 1998. Composts were effective in suppressing disease to levels not significantly different than the fungicide controls, which showed up to 33% disease in 1998 and up to 31% disease in 1999 ($P = 0.05$). Storage of composts for up to 1 year did not affect their ability to reduce dollar spot severity ($P = 0.05$). The use of composts as plant disease suppressants is not likely to replace the use of commercial fungicides in dollar spot management. However, multiple applications of compost may reduce incidence and severity of dollar spot to levels at which chemical control may be reduced or eliminated for a significant portion of the season.

Additional keywords: *Agrostis palustris*, creeping bentgrass, organic amendments, turf

Dollar spot, caused by *Sclerotinia homoeocarpa* F.T. Bennett, is an important turfgrass disease (41). More money is spent on controlling dollar spot than any other turf disease of golf courses (11). Although fungicides are commonly used for its management, the need for high frequency of applications, associated costs, nontarget effects, development of fungicide resistant populations, and perceived health risks to humans and the surrounding environment has stimulated the search for alternative methods of disease management (7,30). Cultural controls are also utilized as management strategies and dollar spot may be partially controlled with applications of nitrogen and thorough but infrequent watering (6,37). An exciting alternative in turfgrass disease management is the development and use of organic amendments such as composts, organic fertilizers, and sludges, or inoculation of turf with specific bacterial or fungal species known to suppress disease (2).

The use of composts and other organic amendments for disease suppression has the potential to be beneficial in reducing fungicide use. Although compost may not control turfgrass diseases to a level that will replace the use of fungicides, their integration into current disease management practices may reduce the use of fungicides. Naturally suppressive composts can be integrated into normal golf course maintenance programs by using composts to replace sphagnum peat or other organic materials used in top-dressing mixtures.

Composts are known to suppress plant diseases through a combination of physiochemical and biological mechanisms. Physiochemical factors such as nutrient levels, organic matter, moisture, and pH reduce disease severity by directly or indirectly affecting the pathogen or host capacity for growth (12,24,42). Biological factors include microbial populations in compost, microbial competition for nutrients with pathogens (4,5,16), antibiotic production (30,42), production of lytic and other extracellular enzymes (19,25,26), parasitism and predation (3,15), and induction of host-mediated resistance in plants (27).

Dollar spot is one of the more commonly studied diseases for suppression with composts, sludges, and other organic materials (17,20,23,31,33). Sustane turkey litter compost (Sustane Corporation, Cannon Falls, MN) and sludge composts provided some suppression of dollar spot (33). The organic fertilizers, Harmony/KLM and Ringer Commercial Greens Super, and the synthetic fertilizers, urea and Nitroform, provided similar levels of dollar spot disease suppression (17). Compost can be a beneficial material where a high proportion of organic matter may offset sand content and increase or restore microbial populations (1). High levels of microbial activity in composts were postulated as the primary factor in disease control (8,9,28,29,31–33,35). Several bacterial and fungal species that have been found in composts (e.g., *Fusarium heterosporum, Acremonium* spp., *Rhizoctonia* spp., *Enterobacter cloacae, Pseudomonas fluorescens,* and *Pseudomonas lindbergii*) are known to be highly antagonistic to dollar spot (11,13,29). However, physiochemical factors, which include fertilizer effects and other factors, are often implicated in control (11,38). Microbial populations in compost are thought to provide nutrients and other chemical compounds to pathogen-competing microorganisms and plant hosts through continual breakdown of composted material (18,31). There are several examples where nutrient competition was a factor in suppression of plant pathogens (5,8,10,16,21,27,34,40,42). For example, nitrogen, a known cultural control method for dollar spot, is considered partially or even completely responsible for dollar spot control with composts and other natural organic fertilizers (23).

The lifespan of usefulness of biologically active products such as compost has been an area of concern. Changes in microbiological activity in stored compost may affect suppression of pathogens when competitive and antagonistic effects of microbial populations are suspected mechanisms of disease control.

One objective of this study was to evaluate the ability of five commercially available composts, top-dressed on creeping bentgrass (*Agrostis palustris*) putting greens at selected application rates and

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Nelson and Boehm
Cornell University
Published 2002 in Biocycle

COMPOST USERS FORUM

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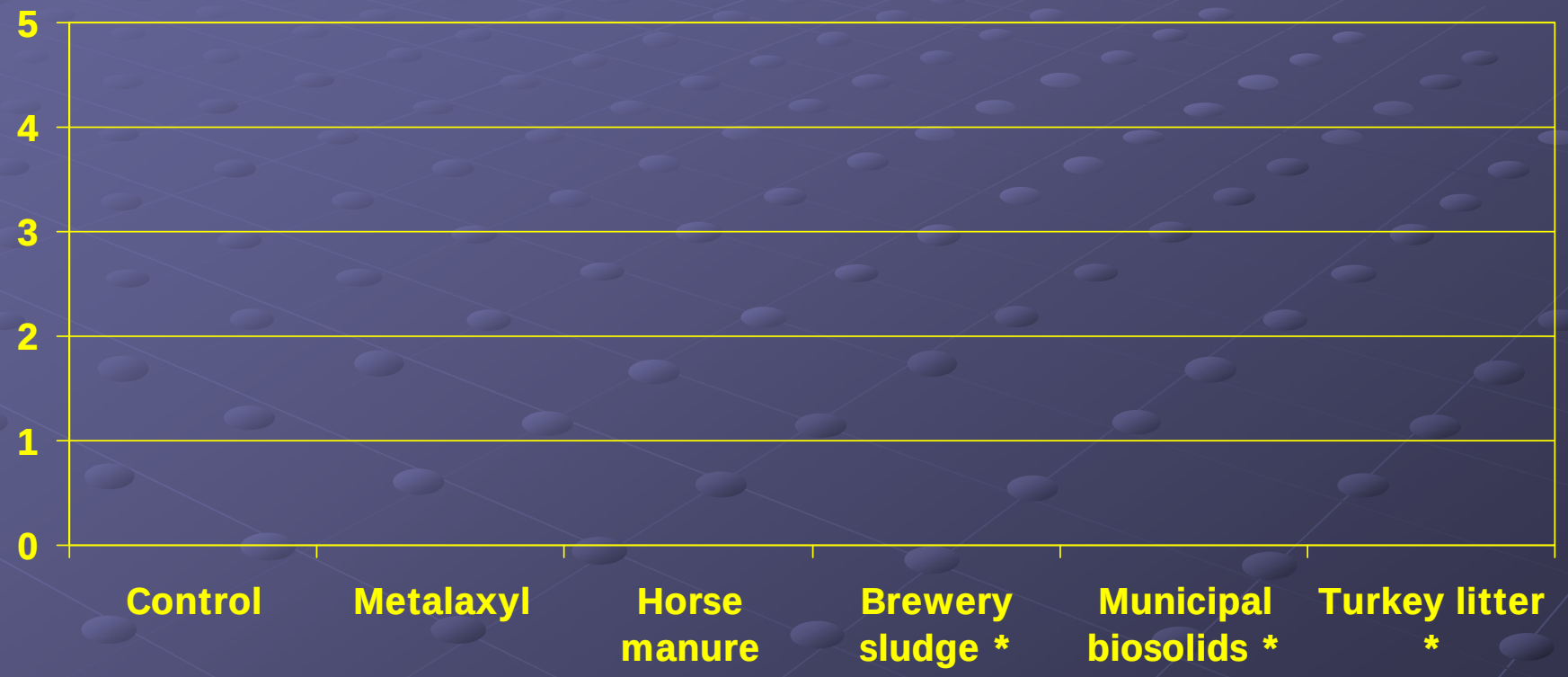
Field suppression of *Pythium g.* in creeping bentgrass

Craft and Nelson (Cornell University). 1996. Applied Environ. Microbiology



Inoculation with *Pythium* on 19 June by placing inside core at 5 cm depth.
Topdressing once on 19 June with mixture of 70% sand + 30% compost.
Disease severity at 26 DAT. Rating from 1 (none) to 5 (over 75% necrotic).

Field suppression of *Pythium g.* in creeping bentgrass

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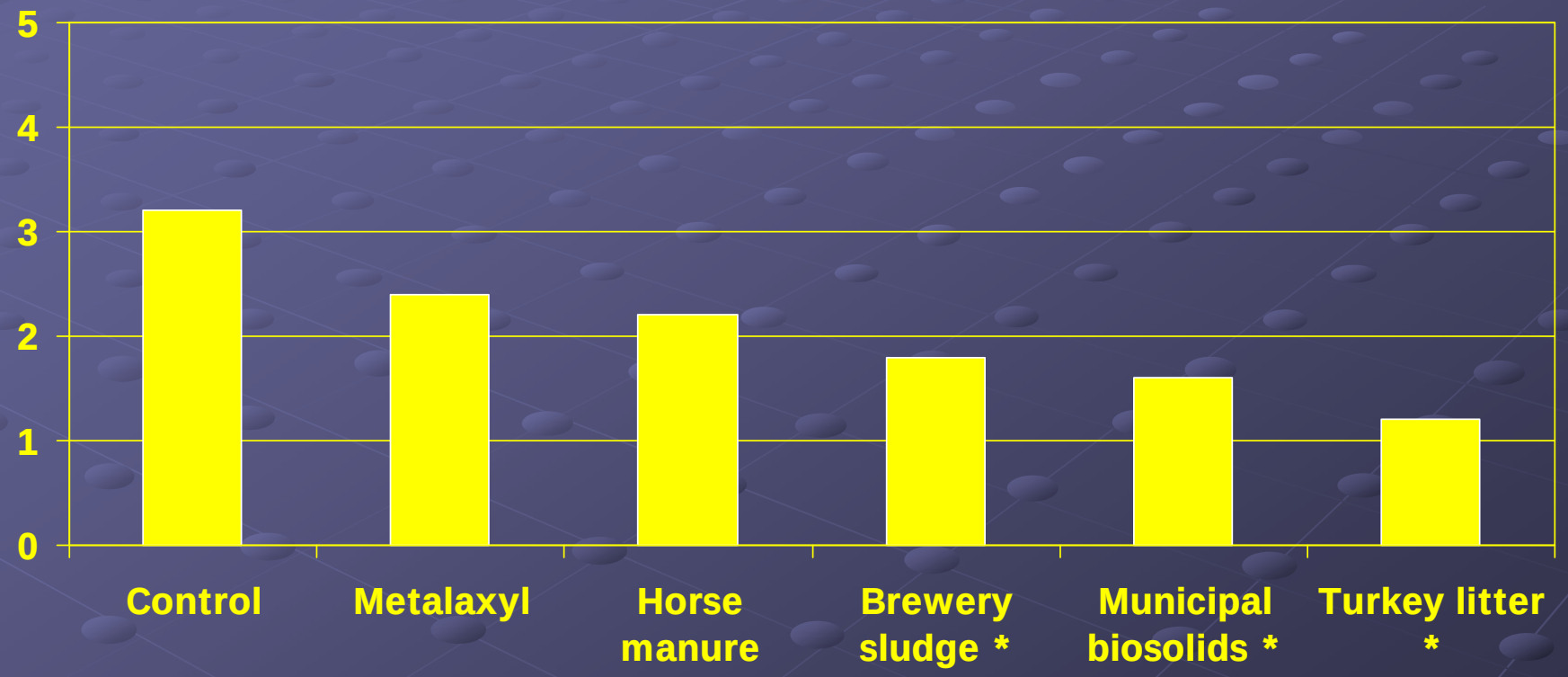

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Disease severity at 26 DAT. Rating from 1 (none) to 5 (over 75% necrotic).

Beneficial microorganisms on corn roots

Harman. 2000. Plant Disease.

14 beneficial soil micro-organisms have been identified

Use composted manure for soil biology of grasses

Trials in 2000-2001 with compost as a liquid

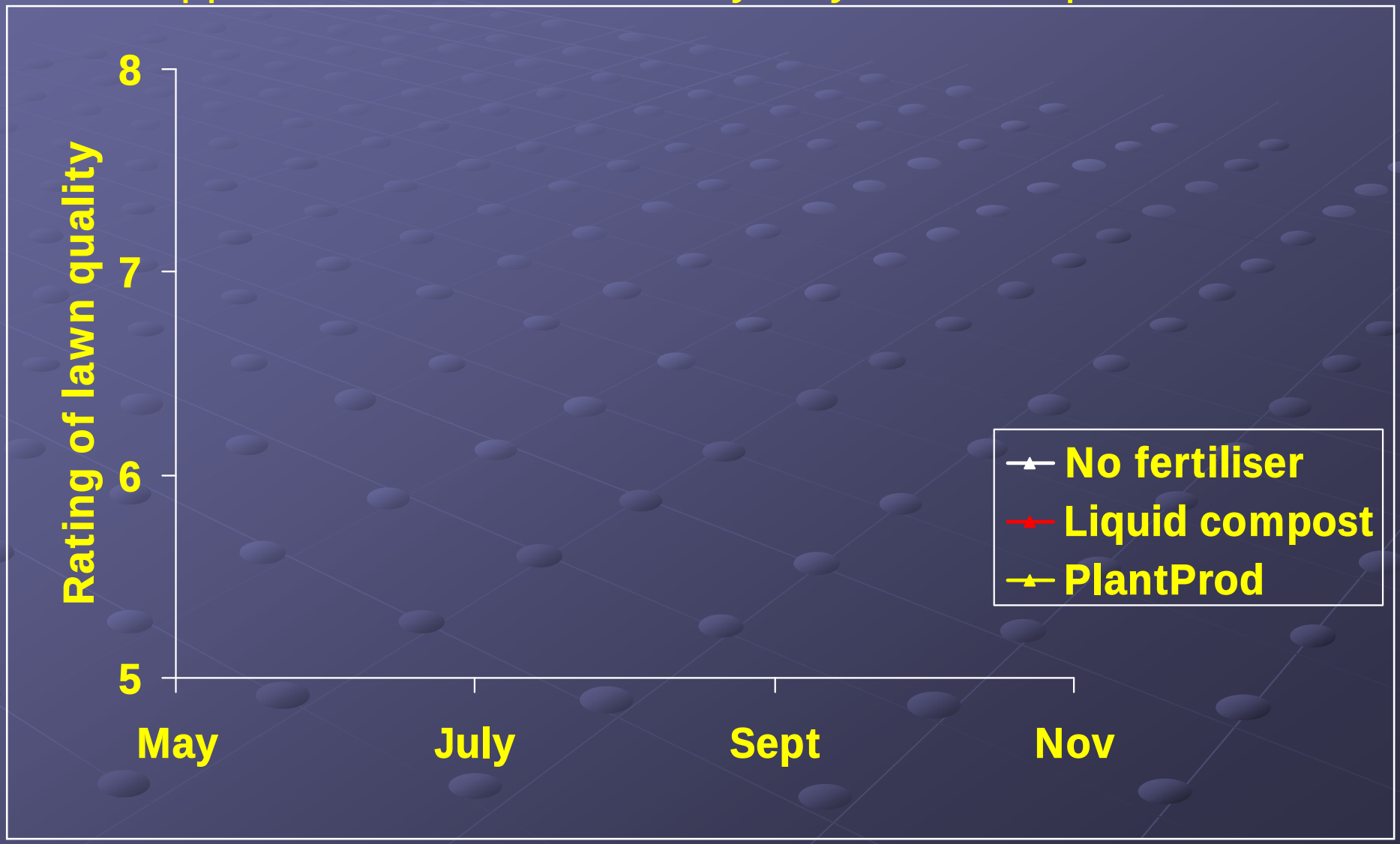
Treatments: RainGrow, PlantProd 35-5-10

Excellent results with all treatments

Impact of fertilization on lawn

Treatments applied at 1 kg of N / 100 m^2 / year (low rate)

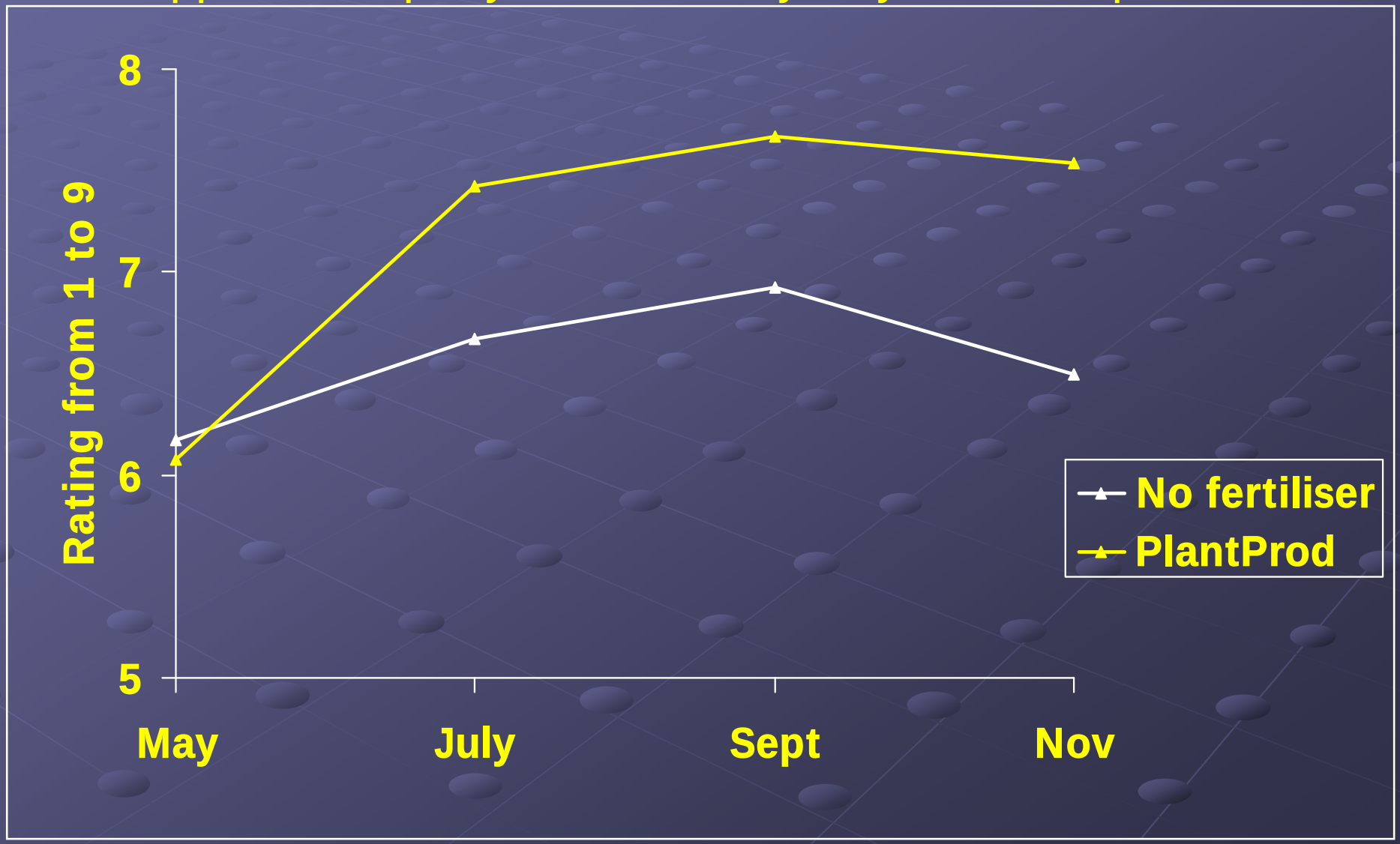
Applications made from early May to late September



Impact of fertilization on lawn

PlantProd 30-5-10 Lawn fertilizer

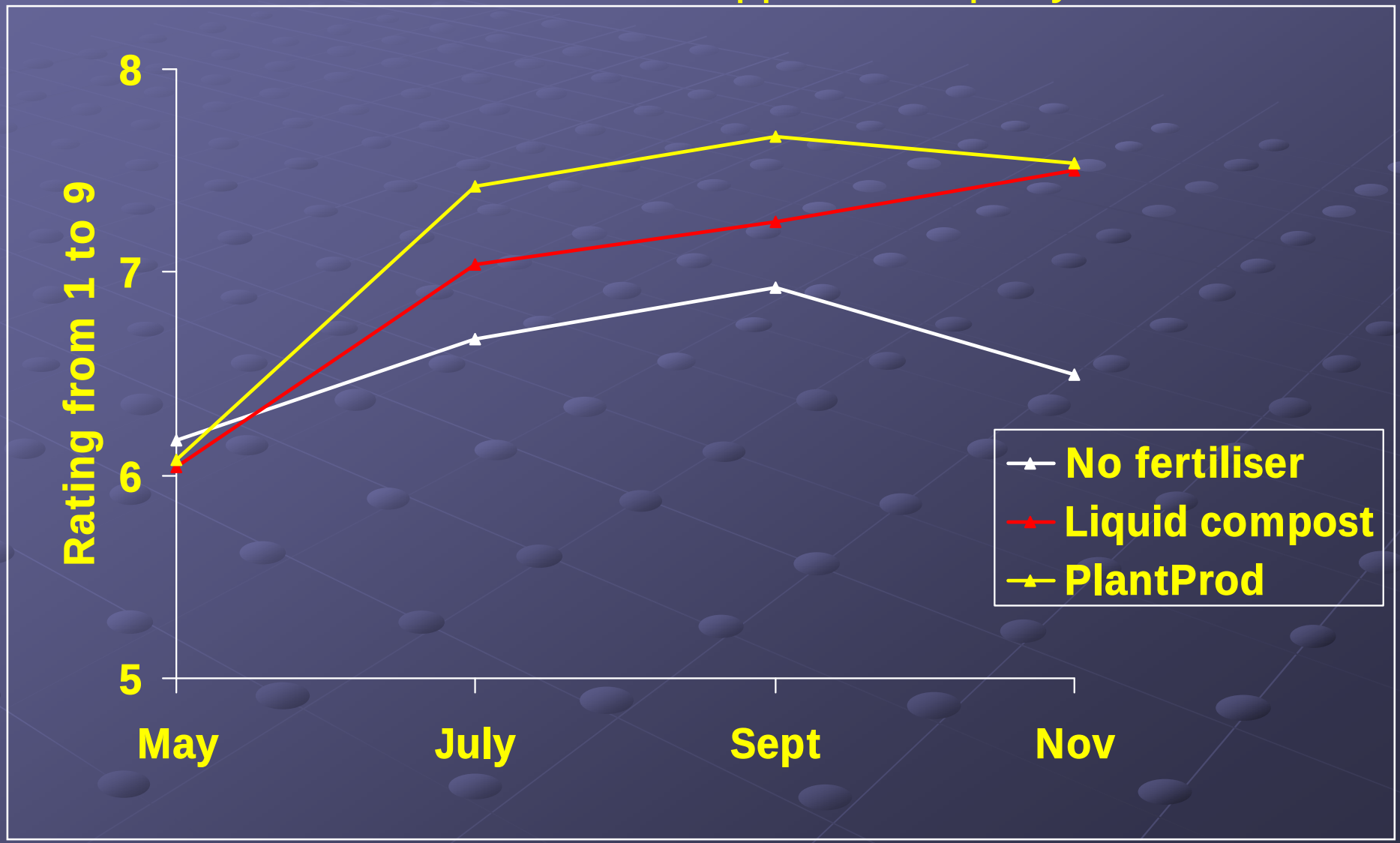
6 applications per year from early May to late September



Impact of fertilization on lawn

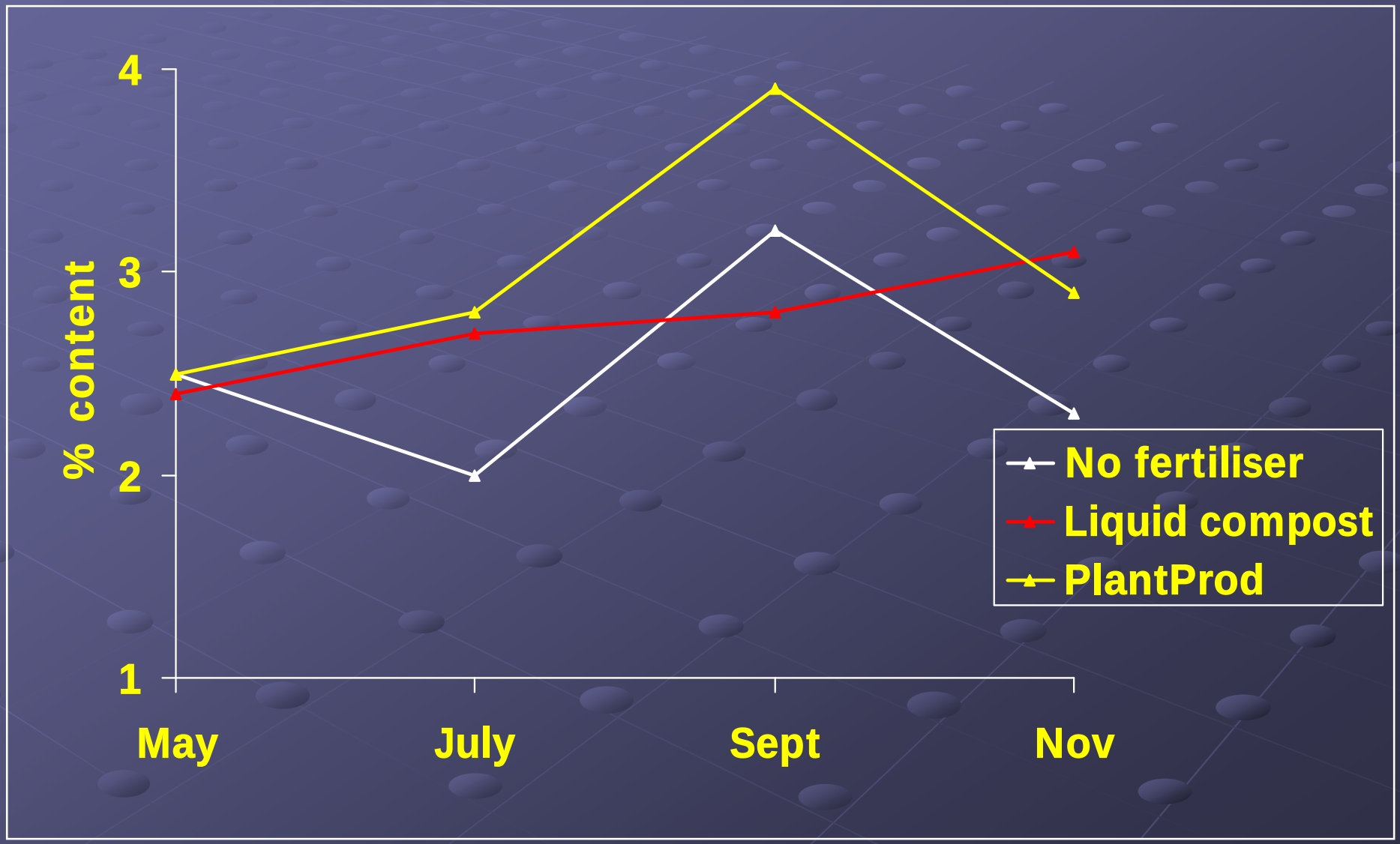
PlantProd 30-5-10 at 6 applications per year

RainGrow 4-2-3 at 12 applications per year



Impact of fertilization on lawn

Nitrogen content in grass blades



Wait a minute...

Are there commercial companies
that do these things
and manage lawns without using pesticides ?

In Harmony Landscape Services (Seattle)

The Lawn Jockey (Seattle, Oregon)

Compost tea spraying by Sheyna (Portland)

Aerated compost tea – Supply lots of air

It is organic (or close to it...)

New herbicides for lawn weeds

- Sarritor (active ingredient *Sclerotinia minor*) 2007
  - post-emergence control of dandelion
  - requires warm temperature and follow-up moisture

- Fiesta (active ingredient is a chelated iron) 2010
  - post-emergence control of broadleaf weeds
  - treated weeds dessicate within 24 hours

- TurfMaize (liquid corn gluten meal) 2011
  - pre-control of dandelion, plantain, clover

- Unnamed (active ingredient is *Phoma macrostoma*)
  - post-emergence control of broadleaf weeds

Chelated iron - Domestic container

Chelated Iron – Commercial container

FIESTA™

LAWN WEED KILLER

Solution

COMMERCIAL
CONCENTRATE
HERBICIDE

GUARANTEE: IRON (present as FeHEDTA) 4.43%

REG. NO. 29030 PCP ACT

READ THE LABEL BEFORE USING

KEEP OUT OF REACH OF CHILDREN

POTENTIAL SKIN SENSITIZER

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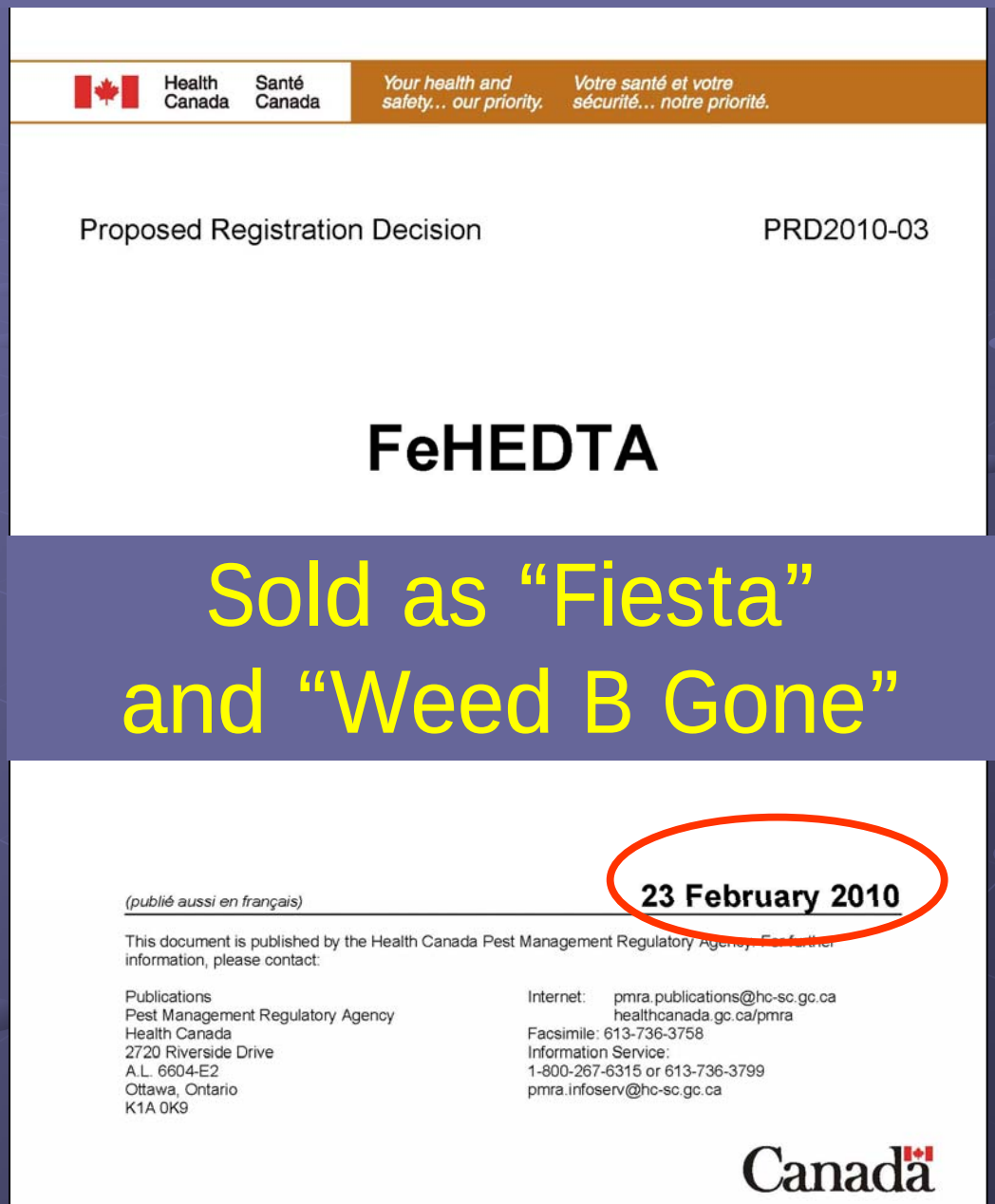
•Saanichton, BC, V8M 2C2 •
Telephone:1-(250)-652-5888

Trying iron chelate – at application, after 2 days

Trying iron chelate – at application, after 14 days

Decision document from Health Canada



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Your health and safety... our priority. / *Votre santé et votre sécurité... notre priorité.*

Proposed Registration Decision PRD2010-03

FeHEDTA

Sold as “Fiesta” and “Weed B Gone”

(publié aussi en français)

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Canada

Based on chelated iron – it "burns" the weeds

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What Is FeHEDTA?

Iron is a metallic chemical element (symbol "Fe") that acts as a selective herbicide when chelated with hydroxyethylenediaminetriacetic acid (HEDTA) to form FeHEDTA. Broadleaved plants are generally more susceptible to the herbicidal effects of FeHEDTA than are grass species. The mechanism of selectivity is not entirely understood but is believed to relate in part to differences in uptake. As Fe can function as a catalyst for oxygen reduction, thereby producing unstable and highly reactive oxygen species, including hydroxyl radicals that cause cellular damage, the excessive uptake of FeHEDTA by many broadleaved species leads to tissue necrosis and ultimately plant death.

Health Considerations

Can Approved Uses of FeHEDTA Affect Human Health?

FeHEDTA is unlikely to affect your health when used according to label directions.

Exposure to FeHEDTA may occur when handling and applying the product. When assessing health risks, two key factors are considered: the levels where no health effects occur and the levels to which people may be exposed. The dose levels used to assess risks are established to protect the most sensitive human population (for example, children and nursing mothers). Only uses for which the exposure is well below levels that cause no effects in animal testing are considered acceptable for registration.

---

3 "Consultation statement" as required by subsection 28(2) of the *Pest Control Products Act*.

4 "Decision statement" as required by subsection 28(5) of the *Pest Control Products Act*.

Independent efficacy studies

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Phytotoxicity was visually assessed from 1 - 43 days after application, or 5 - 21 days after a second application (made 14 - 29 days after the first), and was reported as percent phytotoxicity or percent injury. The number and timing of evaluations was specific to trial.

Overall injury to turf was low and consisted mainly of leaf darkening and some necrosis. These effects had usually diminished by 4 weeks after application in field trials. In greenhouse trials, the low injury initially observed to perennial ryegrass seedlings did not decrease by the last evaluation conducted 2-4 weeks after a first application of 0.4 - 1.0 g a.i./m^2. In two of the three greenhouse trials, injury to perennial ryegrass one week following a second application of 0.8 or 1.0 g a.i./m^2 was greater than that observed one week following the first application. In the one field trial in which two applications of 0.8 g a.i./m^2 was made, injury was greater following the second application.

The submitted tolerance data conditionally support a claim of tolerance for established turf comprised of one or more of Kentucky bluegrass, perennial ryegrass, and fescue treated with 0.5 - 1.0 g a.i./m^2. The submitted tolerance data are adequate to support a maximum of two applications per season with no less than 4 weeks between applications.

Table 5.1.1 Weed species for which efficacy claims are conditionally supported for the NEU1173H products applied at 0.5 - 1.0 g a.i./m^2.

Pest species or group	Scientific name	Other common names	Life cycle
Claim of control			
Dandelion	*Taraxacum officinale*	common dandelion	P
English daisy	*Bellis perennis*	European daisy	P
False dandelion	*Hypochaeris radicata*	spotted cat's ear, common cat's ear, hairy cat's ear, coast dandelion	P
White clover	*Trifolium repens*	Dutch clover, creeping white clover	P
Black medic	*Medicago lupulina*	hop clover	A or B
Bull thistle	*Cirsium vulgare*	common thistle,	WA, B, or MP
Canada thistle	*Cirsium arvense*	creeping thistle, field thistle	P
Common chickweed	*Stellaria media*	chickweed, common starwort	A, WA or SLP
Creeping buttercup	*Ranunculus repens*	buttercup, creeping crowfoot	P
Slender speedwell	*Veronica filiformis*	creeping speedwell	P
Narrow-leaved plantain	*Plantago lanceolata*	English plantain, buckhorn, buckhorn plantain, black plantain, lance-leaved plantain, ribgrass	P
Dovefoot geranium	*Geranium molle*	dove's-foot geranium, dove's-foot, crane's-bill, woodland geranium	A, B, or P
Lawn burweed	*Soliva pterosperma or S. sessilis*	spurweed	WA
Moss	various species		
Algae	various species		
Claim of suppression			
Broadleaf plantain	*Plantago major*	common plantain, plantain	P

A: annual; WA: winter annual; B: biennial; P: perennial; MP: monocarpic perennial; SLP: short-lived perennial.

Domestic container of *Sclerotinia minor*

Day of application and 24 hours later

Source: www.sarritor.ca

Decision document from Health Canada

Health Canada / Santé Canada
Pest Management Regulatory Agency / Agence de réglementation de la lutte antiparasitaire

ERC2007-02

EVALUATION REPORT

***Sclerotinia minor* strain IMI 344141**

Sold as “Sarritor”

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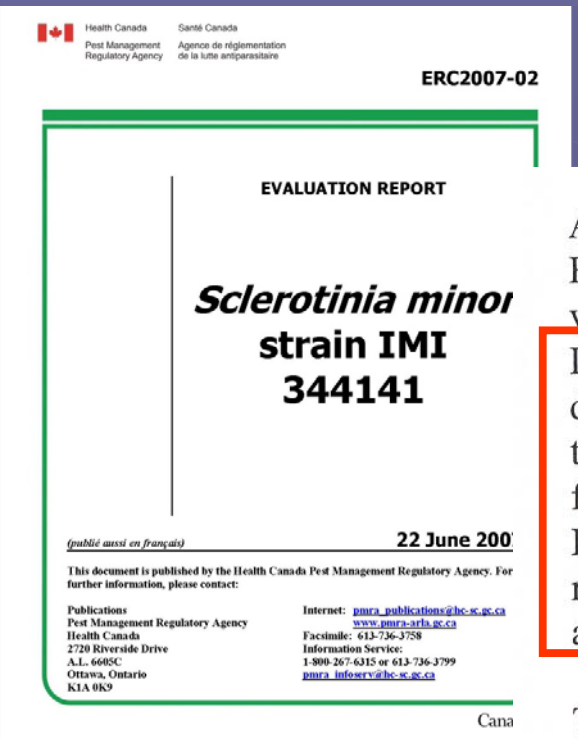
Independent studies show 75% to 85% control



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Pest Management Regulatory Agency / Agence de réglementation de la lutte antiparasitaire

ERC2007-02

EVALUATION REPORT

Sclerotinia minor
strain IMI 344141

(publié aussi en français) 22 June 200

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Cana

As Sarritor Granular Biological Herbicide (Commercial) and Sarritor Domestic Granular Biological Herbicide contain a living fungus, the level of dandelion top growth suppression may vary with environmental factors that influence fungal germination, growth and development. Data from 6 trials indicated that a rate of 60 g product/m^2 is required for an acceptable level of dandelion top growth suppression in turf where conditions are suboptimal, i.e., where daily high temperatures are outside of the range of 18-24°C. Mean dandelion top growth suppression following the application of Sarritor Granular Biological Herbicide (Commercial) or Sarritor Domestic Granular Biological Herbicide at 60 g product/m^2 in these trials was 77.5% at the first rating (7 DAT), 77.0% at the second rating (11-15 DAT), 85.0% at the third rating (21-28 DAT) and 75.2% at the last rating (42-45 DAT).

The biological activity of Sarritor Granular Biological Herbicide (Commercial) and Sarritor Domestic Granular Biological Herbicide is very rapid with symptoms appearing within 3 to 5 days after application. Sarritor Granular Biological Herbicide (Commercial) and Sarritor Domestic Granular Biological Herbicide provided 80 - 90% density reduction of the established dandelion immediately after treatment when the environmental conditions are optimal. A few weeks after treatment, the fungus population density decreases below the effective threshold. Consequently, the suppression of dandelion top growth with Sarritor Granular Biological Herbicide (Commercial) or Sarritor Domestic Granular Biological Herbicide declined and dandelion regrowth was found later in the season. The use of proper turf management practices, i.e., fertilizer, irrigation, etc. are essential in the prevention of re-growth of the treated dandelion plants.

Corn gluten meal - Domestic containers

A by-product of corn syrup manufacturing

Pre-emergence control of crabgrass and dandelion

Corn gluten meal on crabgrass

Carey and Gunn. Guelph Turfgrass Institute. 2001

Apply 1 to 2 weeks before weed germination (mid May, late August)

Treatment	Application	% crabgrass control
Untreated		
Sludge 8-2-0		
Corn gluten	½ rate	
Corn gluten	26 lbs / 1000 ft^2	
Dimension	Label rate	

Corn gluten meal on crabgrass

Carey and Gunn. Guelph Turfgrass Institute. 2001

Apply 1 to 2 weeks before weed germination (mid May, late August)

Treatment	Application	% crabgrass control
Untreated		0 %
Sludge 8-2-0		4 %
Corn gluten	½ rate	5 %
Corn gluten	26 lbs / 1000 ft^2	51 %
Dimension	Label rate	92 %

Corn gluten meal is a product for home owners

Contains nitrogen and other nutrients

Tompkins et al

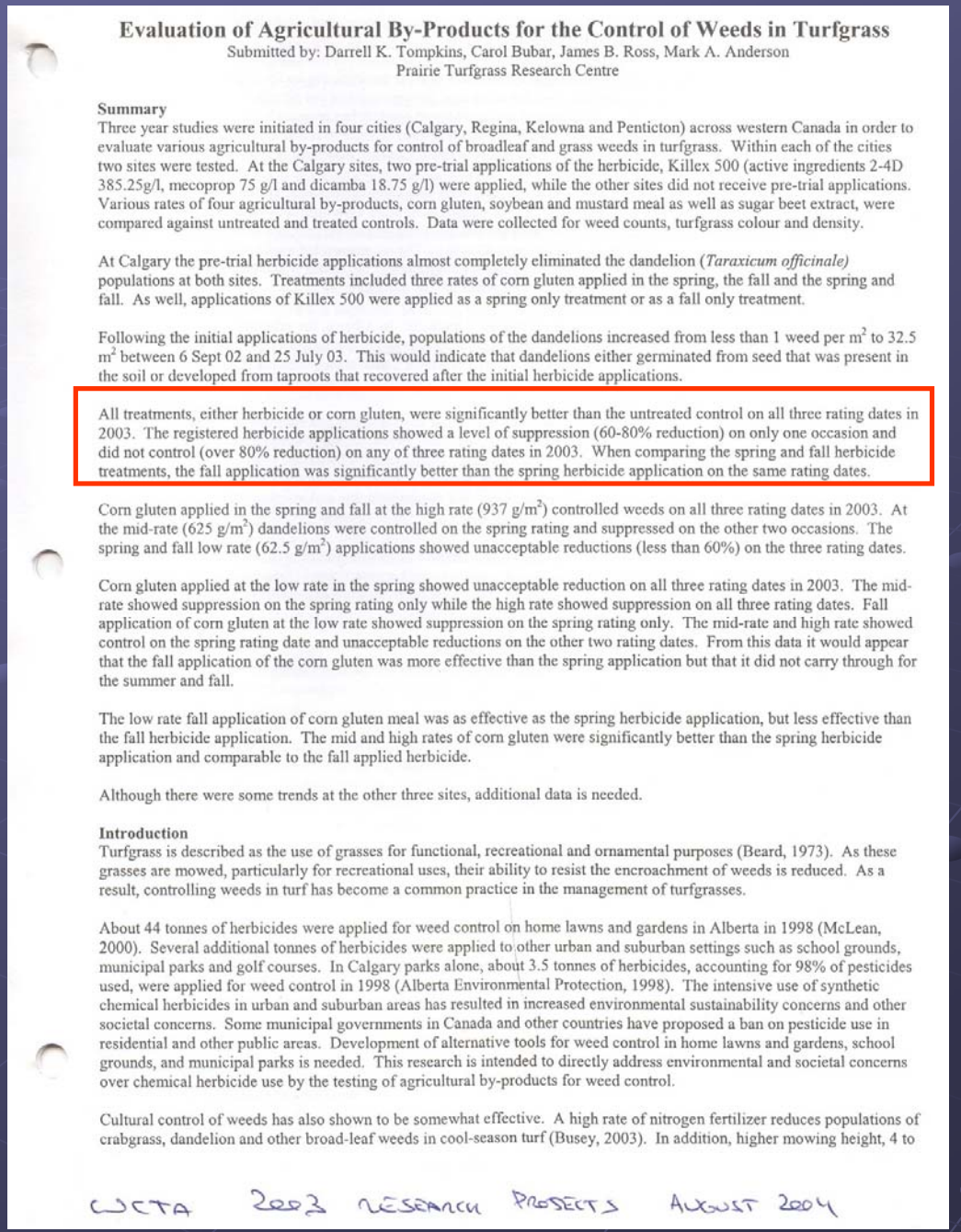
Prairie Turfgrass Research Centre

2003 (WCTA)

"All treatments, herbicide or corn gluten, were significantly better than the control on all three rating dates in 2003.

Corn gluten applied in the spring at the label rate of 62.5 g/m^2 showed unacceptable reduction on all three rating dates in 2003.

The 10X label rate showed suppression on the spring rating only while the 15X label rate showed suppression on all three rating dates."



Evaluation of Agricultural By-Products for the Control of Weeds in Turfgrass

Submitted by: Darrell K. Tompkins, Carol Bubar, James B. Ross, Mark A. Anderson
Prairie Turfgrass Research Centre

Summary

Three year studies were initiated in four cities (Calgary, Regina, Kelowna and Penticton) across western Canada in order to evaluate various agricultural by-products for control of broadleaf and grass weeds in turfgrass. Within each of the cities two sites were tested. At the Calgary sites, two pre-trial applications of the herbicide, Killex 500 (active ingredients 2-4D 385.25g/l, mecoprop 75 g/l and dicamba 18.75 g/l) were applied, while the other sites did not receive pre-trial applications. Various rates of four agricultural by-products, corn gluten, soybean and mustard meal as well as sugar beet extract, were compared against untreated and treated controls. Data were collected for weed counts, turfgrass colour and density.

At Calgary the pre-trial herbicide applications almost completely eliminated the dandelion (*Taraxicum officinale)* populations at both sites. Treatments included three rates of corn gluten applied in the spring, the fall and the spring and fall. As well, applications of Killex 500 were applied as a spring only treatment or as a fall only treatment.

Following the initial applications of herbicide, populations of the dandelions increased from less than 1 weed per m^2 to 32.5 m^2 between 6 Sept 02 and 25 July 03. This would indicate that dandelions either germinated from seed that was present in the soil or developed from taproots that recovered after the initial herbicide applications.

All treatments, either herbicide or corn gluten, were significantly better than the untreated control on all three rating dates in 2003. The registered herbicide applications showed a level of suppression (60-80% reduction) on only one occasion and did not control (over 80% reduction) on any of three rating dates in 2003. When comparing the spring and fall herbicide treatments, the fall application was significantly better than the spring herbicide application on the same rating dates.

Corn gluten applied in the spring and fall at the high rate (937 g/m^2) controlled weeds on all three rating dates in 2003. At the mid-rate (625 g/m^2) dandelions were controlled on the spring rating and suppressed on the other two occasions. The spring and fall low rate (62.5 g/m^2) applications showed unacceptable reductions (less than 60%) on the three rating dates.

Corn gluten applied at the low rate in the spring showed unacceptable reduction on all three rating dates in 2003. The mid-rate showed suppression on the spring rating only while the high rate showed suppression on all three rating dates. Fall application of corn gluten at the low rate showed suppression on the spring rating only. The mid-rate and high rate showed control on the spring rating date and unacceptable reductions on the other two rating dates. From this data it would appear that the fall application of the corn gluten was more effective than the spring application but that it did not carry through for the summer and fall.

The low rate fall application of corn gluten meal was as effective as the spring herbicide application, but less effective than the fall herbicide application. The mid and high rates of corn gluten were significantly better than the spring herbicide application and comparable to the fall applied herbicide.

Although there were some trends at the other three sites, additional data is needed.

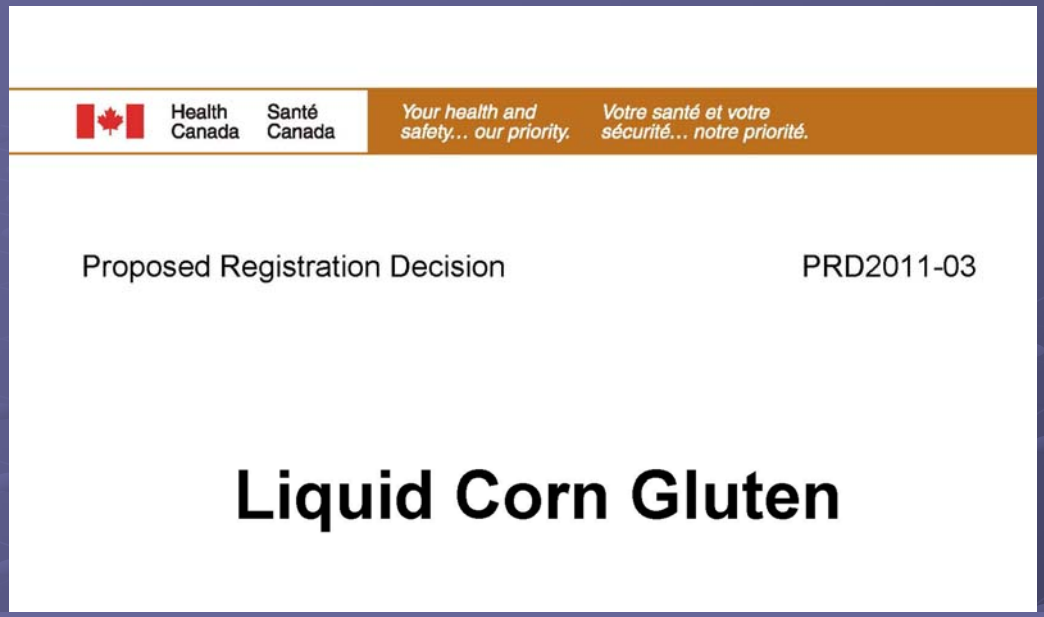
Introduction

Turfgrass is described as the use of grasses for functional, recreational and ornamental purposes (Beard, 1973). As these grasses are mowed, particularly for recreational uses, their ability to resist the encroachment of weeds is reduced. As a result, controlling weeds in turf has become a common practice in the management of turfgrasses.

About 44 tonnes of herbicides were applied for weed control on home lawns and gardens in Alberta in 1998 (McLean, 2000). Several additional tonnes of herbicides were applied to other urban and suburban settings such as school grounds, municipal parks and golf courses. In Calgary parks alone, about 3.5 tonnes of herbicides, accounting for 98% of pesticides used, were applied for weed control in 1998 (Alberta Environmental Protection, 1998). The intensive use of synthetic chemical herbicides in urban and suburban areas has resulted in increased environmental sustainability concerns and other societal concerns. Some municipal governments in Canada and other countries have proposed a ban on pesticide use in residential and other public areas. Development of alternative tools for weed control in home lawns and gardens, school grounds, and municipal parks is needed. This research is intended to directly address environmental and societal concerns over chemical herbicide use by the testing of agricultural by-products for weed control.

Cultural control of weeds has also shown to be somewhat effective. A high rate of nitrogen fertilizer reduces populations of crabgrass, dandelion and other broad-leaf weeds in cool-season turf (Busey, 2003). In addition, higher mowing height, 4 to

Decision document from Health Canada



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Proposed Registration Decision PRD2011-03

Liquid Corn Gluten

Sold as “TurfMaize Liquid Corn Gluten”

(publié aussi en français)

8 June 2011

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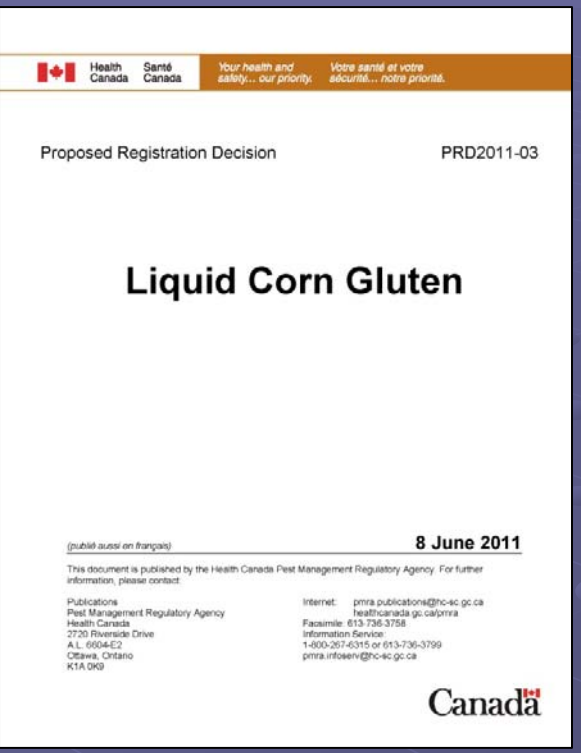
Canada

Pre-emergence control in lawns of dandelion, crabgrass and white clover



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Overview

Proposed Registration Decision for Liquid Corn Gluten

Health Canada's Pest Management Regulatory Agency (PMRA), under the authority of the *Pest Control Products Act* and its Regulations, is proposing full registration for the sale and use of Liquid Corn Gluten Manufacturing Concentrate and TurfMaize Liquid Bio-Herbicide Corn Gluten Weed Preventer, containing the active ingredient Liquid Corn Gluten, as a pre-emergent dandelion, crabgrass (smooth and large) and white clover seed germination inhibitor for use on lawns where established perennial ryegrass and Kentucky bluegrass are the predominant grass species.

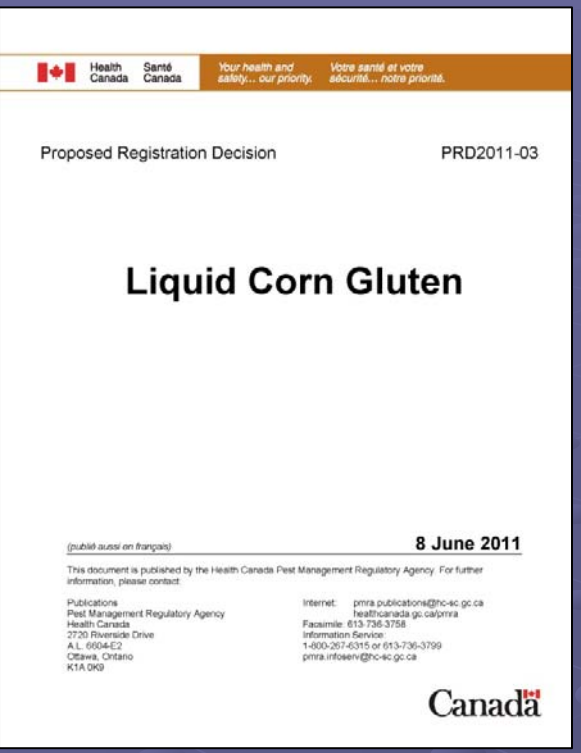
An evaluation of available scientific information found that, under the approved conditions of use, the product has value and does not present an unacceptable risk to human health or the environment.

This Overview describes the key points of the evaluation, while the Science Evaluation provides detailed technical information on the human health, environmental and value assessments of Liquid Corn Gluten Manufacturing Concentrate and TurfMaize Liquid Bio-Herbicide Corn Gluten Weed Preventer.

What Does Health Canada Consider When Making a Registration Decision?

The key objective of the *Pest Control Products Act* is to prevent unacceptable risks to people and the environment from the use of pest control products. Health or environmental risk is considered acceptable[1] if there is reasonable certainty that no harm to human health, future generations or the environment will result from use or exposure to the product under its proposed conditions of registration. The Act also requires that products have value[2] when used according to the label directions. Conditions of registration may include special precautionary measures on the product label to further reduce risk.

Independent efficacy studies



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Canada

4.2 Effects on Non-Target Species

Corn gluten meal is a naturally occurring substance with a non-toxic mode of action. It has been used for many years as a food source for pets and farm animals, including aquaculture. Thus, liquid corn gluten is not expected to be toxic to terrestrial or aquatic organisms. Based on the use pattern of TurfMaize Bio-Herbicide Corn Gluten Weed Preventer, the exposure of non-target terrestrial and aquatic organisms to liquid corn gluten is expected to be minimal. As a result, environmental risk to terrestrial and aquatic organisms should also be minimal.

5.0 Value

5.1 Effectiveness Against Pests

5.1.1 TurfMaize Liquid Bio-herbicide Corn Gluten Weed Preventer

Information submitted to support the pest claims included a rationale in order to utilize the more substantive efficacy data for corn gluten meal from which liquid corn gluten is derived. The information provided consisted of 2 published seed germination research studies, 1 published greenhouse research study, 2 unpublished field studies and the U.S. Patent for Corn Gluten Hydrolysate (a.k.a. liquid corn gluten). All information was assessed in context with the label claim that the product may inhibit the seed germination of dandelion, crabgrass (smooth and large) and white clover.

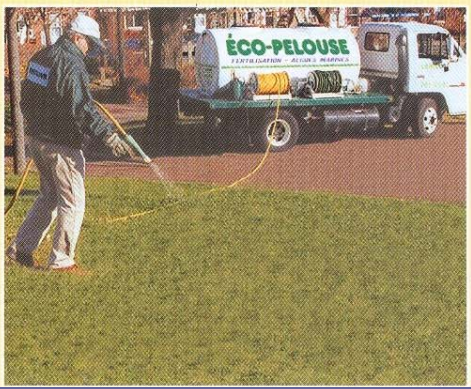
Who prepared this ad ?

ÉCO-PELOUSE

pour un environnement sain et agréable

Une pelouse en bonne santé et bien fertilisée

- Consomme une grande quantité de gaz carbonique (CO_2)
- Rejette dans l'air de l'oxygène et en diminue les sources allergènes
- Réduit les polluants en suspension dans l'air
- Rafraîchit l'air et réduit l'effet de serre
- Réduit l'érosion par l'eau, par le vent et aide à conserver nos sources d'eau potable
- Offre une surface de jeu plus sécuritaire
- *50 pi² de pelouse bien entretenue fournit l'oxygène à une famille de quatre personnes.*



ÉCO-PELOUSE

for a healthy and enjoyable environment

A healthy and well-fertilized lawn

- Consumes a higher quantity of carbonic gas (CO_2)
- Releases oxygen in the air and reduces its sources of allergens
- Decreases the amount of pollutants in suspension in the air
- Cools the air and lessens the greenhouse effect
- Reduces erosion caused by water and wind and helps preserve our fresh water supplies
- Provides a safer play area
- *50 sq.ft. of well-maintained lawn provides enough oxygen for a family of four people.*

A lawn care company in Québec

Let’s examine their invoice of services

LANIEL
ECO-PELOUSE

650 Henri-Duhamel
Verdun (Québec)
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Fax: 514-767-9372

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Call Laniel ...
It's natural.

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You will find below a quotation on different treatments that our technicians can perform at your house. Please notch your choice and return a copy by mail or phone to let us know.

SEASON 2009 F

UNDESIRABLE OUTDOOR BUG CONTROL			
SPIDER-RID	Outdoor spider control.	House, fence and outdoor buildings.	☐
SPECIAL	Three treatments.	Ground, trees, for exterior insects control including one SPIDER-RID treatment.	☐
EARWIGS ANTS	Two treatments. One treatment: $100.00 plus taxes, not guaranteed.	At proper area for exterior control of earwigs and ants. Two treatments: $180.00 plus taxes, guaranteed.	☐

LIQUID CALCIUM	Made at the suitable time with "Éco-Pelouse" treatment. Correct soil acidity and turfgrass rooting also improve.	☐

NEW

"ÉCO-PELOUSE" FERTILISATION SEAWEEDS BASE PHOSPHORUS FREE		
SPRING	1- "ÉCO-PELOUSE" fertilization with chelated iron.	☐ 39.00
LATE SPRING	2- "ÉCO-PELOUSE" fertilization with manual weed control*.	☐ 39.00
SUMMER	3- "ÉCO-PELOUSE" fertilization with chelated iron.	☐ 39.00
FALL	4- "ÉCO-PELOUSE" fertilization with manual weed control*.	☐ 39.00

Taxes included for 4 treatments if paid before April 30th.

COST PER APPLICATION _____

NUMBER OF APPLICATIONS X _____ = _____

* Only the 4 treatments program includes manual weed pulling (maximum of 5 minutes per 1000 sqft)

LAWN INSECT CONTROL		
WHITE GRUBS	Summer	☐
CHINCH BUG	Summer	☐

TREE REVITALIZATION SERVICE		
EARLY SPRING	1- Dormant oil spray eliminates 80% of insects.	☐
SPRING	2- Deep root fertilization by injection.	☐
SUMMER	3- Spray for insect and disease control.	☐
FALL	4- "WINTER PRE-STRESS" Deep root fertilization by injection.	☐

Cost per treatment: $69.00 plus taxes for an area of 2000 sq feet or less.

NEW

AVAILABLE NATURAL SERVICES		
SPRING	Biological local weeds control.	☐
SUMMER	Natural repellent for mosquitoes.	☐
FALL	Biological local weeds control.	☐

LAWN AERATION OVERSEEDING		
SPRING	$15.00 per 1000 sq feet, minimum charge $69.00	☐
FALL	$15.00 per 1000 sq feet, minimum charge $69.00	☐
SHRIMP COMPOST	Allows a better water retention and favours soil restructuration.	☐

156 m
69.00 minimum

Fertilization with “seaweed”

NEW

“ÉCO-PELOUSE” FERTILISATION SEAWEEDS BASE PHOSPHORUS FREE

SPRING	1- “ÉCO-PELOUSE” fertilization with chelated iron.	☐ 39.00
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LAWN INSECT CONTROL

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CHINCH BUG	Summer	☐

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Cost per treatment: $69.00 plus taxes for an area of 2000 sq feet or less.

Biological weed control, compost and overseeding

TREE REVITALIZATION SERVICE		
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SPRING	2- Deep root fertilization by injection.	☐
SUMMER	3- Spray for insect and disease control.	☐
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FALL	$15.00 per 1000 sq feet, minimum charge $69.00	☐
SHRIMP COMPOST	Allows a better water retention and favours soil restructuration.	☐
SEEDING	Seeds with natural resistance to insects (endophytes).	☐

Full offering – The customer decides what is done

ÉCO-PELOUSE
pour un environnement sain et agréable

ÉCO-PELOUSE
for a healthy and enjoyable environment

Une pelouse en bonne santé et bien fertilisée
- Consomme une grande quantité de gaz carbonique (CO_2)
- Rejette dans l'air de l'oxygène et en diminue les sources allergènes
- Réduit les polluants en suspension dans l'air
- Rafraîchit l'air et réduit l'effet de serre
- Réduit l'érosion par l'eau, par le vent et aide à conserver nos sources d'eau potable
- Offre une surface de jeu plus sécuritaire
- *50 pi² de pelouse bien entretenue fournit l'oxygène à une famille de quatre personnes.*

A healthy and well-fertilized lawn
- Consumes a higher quantity of carbonic gas (CO_2)
- Releases oxygen in the air and reduces its sources of allergens
- Decreases the amount of pollutants in suspension in the air
- Cools the air and lessens the greenhouse effect
- Reduces erosion caused by water and wind and helps preserve our fresh water supplies
- Provides a safer play area
- *50 sq.ft. of well-maintained lawn provides enough oxygen for a family of four people.*

PROGRAMME DE REVITALISATION DES ARBRES
TREE REVITALIZATION PROGRAM

Le programme le plus complet pour redonner à vos arbres et arbustes une apparence aussi saine que belle.
- un traitement d'huile horticole au stade dormant
- une fertilisation printanière par injection aux racines
- un contrôle de maladies fongiques
- une vaporisation antipesticide au feuillage
- une fertilisation automnale par injection aux racines afin de préparer vos arbres et arbustes au stress de l'hiver

The most complete program to give back to your trees and shrubs their healty and beautiful appearance.
- 1 dormant oil spray treatment
- 1 spring deep-root feeding fertilizer by injection
- 1 fungi diseases control
- 1 antiparasitic foliage spray treatment
- 1 fall deep-root feeding fertilizer by injection to prepare your trees and shrubs for winter stress

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As a member of the EQAPOL we have to comply to a strict ethical code. Our certified technicians use only government approved products.)

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SEASON 2009 F

UNDESIRABLE OUTDOOR BUG CONTROL			
SPIDER-RID	Outdoor spider control.	House, fence and outdoor buildings.	☐
SPECIAL	Three treatments.	Ground, trees, for exterior insects control including one SPIDER-RID treatment.	☐
EARWIGS ANTS	Two treatments. One treatment: $100.00 plus taxes, not guaranteed.	At proper area for exterior control of earwigs and ants. Two treatments: $180.00 plus taxes, guaranteed.	☐

LIQUID CALCIUM	Made at the suitable time with "Éco-Pelouse" treatment. Correct soil acidity and turfgrass rooting also improve.	☐

NEW

"ÉCO-PELOUSE" FERTILISATION SEAWEEDS BASE PHOSPHORUS FREE		
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COST PER APPLICATION _____

NUMBER OF APPLICATIONS X _____ = _____

* Only the 4 treatments program includes manual weed pulling (maximum of 5 minutes per 1000 sqft)

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CHINCH BUG	Summer	☐

TREE REVITALIZATION SERVICE		
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SPRING	2- Deep root fertilization by injection.	☐
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FALL	4- "WINTER PRE-STRESS" Deep root fertilization by injection.	☐

Cost per treatment: $69.00 plus taxes for an area of 2000 sq feet or less.

NEW

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FALL	$15.00 per 1000 sq feet, minimum charge $69.00	☐
SHRIMP COMPOST	Allows a better water retention and favours soil restructuration.	☐

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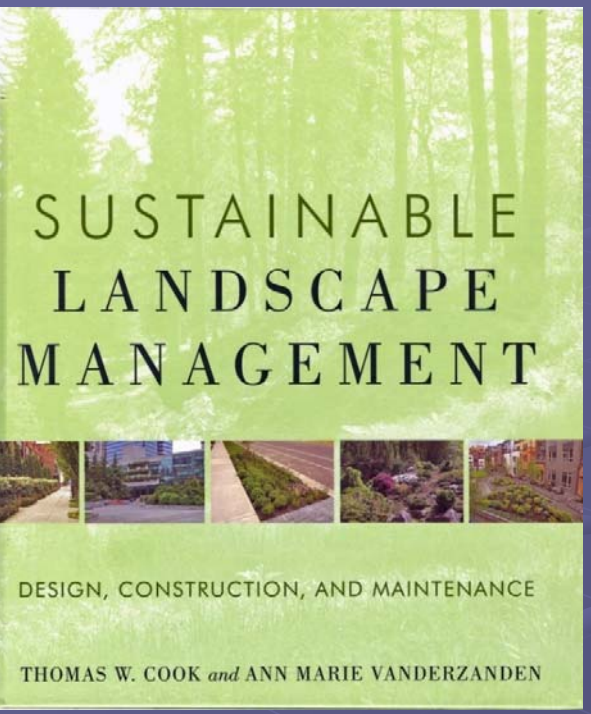
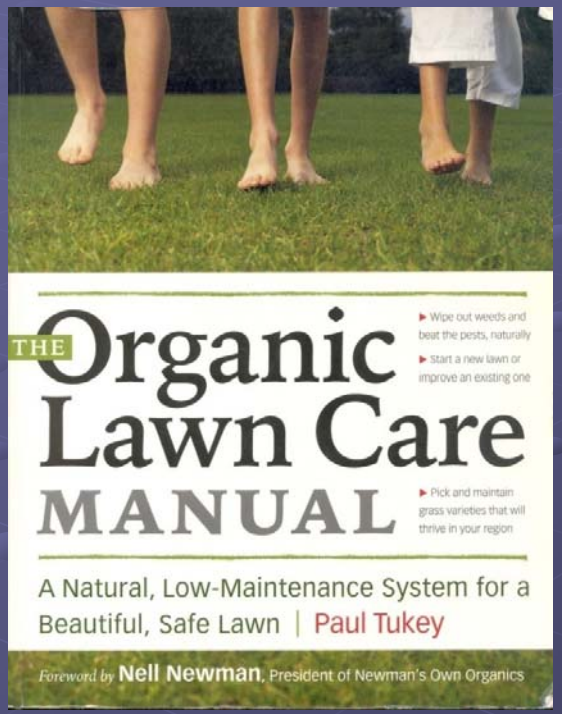
My mom. She hires this lawn care company.

My mom wants a perfect lawn (and grand-kids).

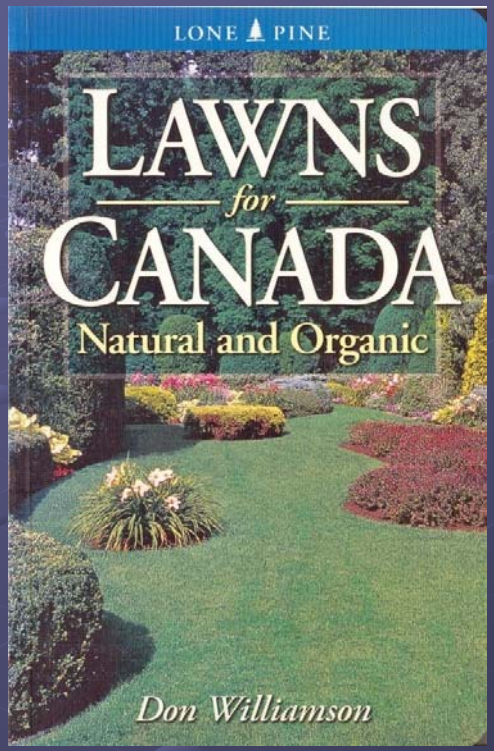
Publications for professionals



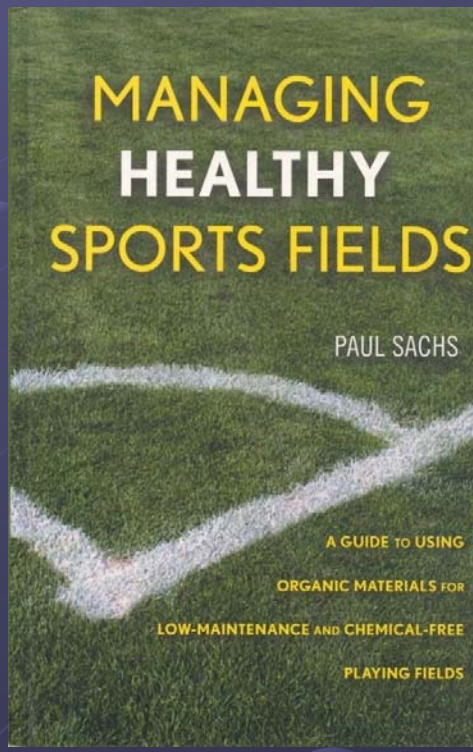
Thomas Cook
Oregon State Univ.
2011



Paul Tukey
2007



Lone Pine Pub.
2005



Paul Sachs
2004

Thank you for being here !

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