

Sports Turf Manager

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Establishing Turfgrass Without Herbicides: Musings on the Future

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In a situation where most effective herbicides are banned for sports field managers, how does a manager establish or renovate successfully? As of yet, there are no easy answers, but prospects may not be entirely hopeless. In this article, I'll provide some approaches that you might keep in mind if you're in this boat. Some are cultural or management principles that you know and apply already. Others are ideas borrowed from systems such as organic crop production where these questions have been faced for years. Hopefully some may be feasible for you, at least on a trial basis, and with the assurance that many of these approaches are being pursued actively in research programs.

Weeds in Establishing Turfgrass

We've always dealt with weed pressure in newly established or renovated turf areas, so turf managers are well aware of some of the things necessary to consider:

Weed seed bank. Most areas that have had vegetation on them, whether turf or other cover, have a bank of weed seeds that has accumulated from weeds on site, or have moved in with wind and water from off-site. This is one of the main problems to deal with. In agriculture (and sometimes in turf management), we may have the luxury of time to repeatedly till the soil, allowing weed seeds to germinate and be plowed down to reduce this seed bank. Knowing what is likely to come up in your situation, either from historical records of the site or first-hand observation, will allow you to anticipate the potential size and detail of the expected problem.

Perennial weeds. In the past, these would have been targeted with non-selective herbicides (e.g. glyphosate) which are no longer available. Again, repeated tilling may reduce this problem, but is probably unrealistic in many turf installation situations.

New rootzone material. Often, installation jobs involve bringing in new rootzone material, topsoil or sand, which has the potential to aggravate a weed problem (if the material is not weed-free), or help solve the problem, by burying it.

OTS HIGHLIGHT
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pages 12-13.

What Are We Replacing?

There are three types of herbicides which are used to deal with three different sets of problems in establishing turf (and for which we need alternative solutions):

Nonselective herbicides (e.g. glyphosate).

These allow us to kill perennial weeds (and unwanted grass) prior to establishment.



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25 SCHOOL TURF. Despite being an important part of the educational system, sports fields are often at the bottom of the funding “food chain.”



Figure 1

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OTS HIGHLIGHT

Continued from our front cover.

Pre-emergent herbicides, fumigants.

These reduce the pressure from the weed seed bank prior to seeding/sodding.

Post-emergent selective (broadleaf) herbicides. These remove weeds from the establishing turf.

What Are Some Alternatives?

Repeated tillage. This can reduce pressure from both annual and perennial weeds, but is costly in time and labour as weed seeds must be allowed to germinate to make it effective.

Addition of weed-free rootzone material. Topsoil, sand or custom mixtures can effectively bury many problem weeds. The amount of material required will depend on the weed species, but needs to be at least 10 cm (4") to be effective. Natural source material will need to be sterile or sterilized to avoid bringing in weed seed, but this

may be a simpler and cheaper process than dealing with weeds on site.

Alternative herbicides (pre- and post).

These products may become more widely available, efficacious and cost effective. Materials such as acetic acid (non-selective post-emergence), corn gluten meal (non-selective pre-emergence), Sarritor, and chelated iron (selective post-emergence) are currently available or under development as Schedule 11 herbicides, but may not be adequately effective or inexpensive for large scale turf installation purposes.

Heat treatments. These have shown to be effective in some situations for non-selective and targeted control of weeds, both established and seed.

1) Steam treatments. Wet heat (hot water, steam) is many times more effective than the same temperature of dry heat (flaming). The effectiveness of steaming or hot water is dependent on the ability to contain the heat long enough to kill plants and seeds (Figure 1, Table 1). The difficulty of generating enough heat or hot water to fill reasonably sized covers or enclosures may limit the usefulness of this method,

but there may be technological fixes for this. Generating hot water or steam is also very expensive in terms of fuel, and generates greenhouse gases, which is a definite drawback. There are also safety risks with both wet and dry heat methods. In some horticultural applications, relatively safe chemicals (calcium oxide, potassium hydroxide) have been added to effectively increase the temperature generated by steam through their exothermic reaction with the water.

2) Flaming. Direct flaming of vegetation and the rootzone with propane or other fuels can kill existing vegetation, but is much less effective at raising the soil temperature enough to kill weed seeds, and much less effective than wet heat. Nevertheless, research is being pursued on this alternative (Figure 2).

Figure 1. Steam treating rootzones for weed control. Steam generator requires inputs of water, diesel, and hydro. Steam containment frame is 1 x 2 m. Guelph Turfgrass Institute (GTI) 2009.

Figure 2. Plots treated with acetic acid (bleached) or propane flaming (black) to study effectiveness for weed control in renovation pre-treatments. GTI 2009.

3) Solarization. Using solar radiation to heat the soil under a plastic film has been shown to be effective in some areas to kill weed seeds prior to planting. This has the advantage over other heat methods of being environmentally benign and potentially scalable to larger areas, but remains to be tested in our climate. The promising aspect is that the time when solarization is most likely to be effective (summer and fall) is followed by the optimal time for turf seeding. This is another alternative that is being actively researched.

Turf choice and timing and method of installation. These factors will definitely have an impact on producing turfgrass with fewer weeds. They are not new options, but we may need to rethink some of the old “best choices” in light of the loss of traditional herbicides.

1) Timing. The optimal timing (fall) remains the same, but our windows for successful installation may be smaller, and requirements for backup irrigation, etc., may be more stringent.

2) Seed species, mixtures. Species such as perennial ryegrass (resistant to weed pressure because of aggressive growth, as well as producing natural allelopathic chemicals?) may play a bigger role in successful installations. Solving winter hardiness problems by breeding or management will be critical in using different choices of species or mixtures. Mixture

recommendations, as well as seeding approaches that were based on availability of herbicides, will probably need to be revisited in research.

3) Hydroseeding vs. dry seeding. There are some differences in weed pressure between hydroseeding and dry seeding methods, but hydroseeding has not been investigated fully as a method to install turf while suppressing weeds. Choice of seed mixtures, rates of seeding, various types of mulches, and other aspects of the hydroseeding method could hold promise in improving weed control.

4) Sodding vs. seeding. Of course, sodding is a very effective way to shift the need for weed control to the sod producer, and sodding can produce essentially weed free turf for a long time if installed and maintained properly. Nevertheless, choices with sodding (timing, post-installation maintenance, large-roll sod to reduce seams, etc.) can reduce the likelihood of weed invasion or growth.

Prospects

The next little while (months, years?) is going to be challenging for any sports turf manager needing to install large areas of weed-free turf in Ontario. We have a few tools, and are working as fast as we can to get more, but it will be a time of experimentation, trial and error, and sharing of ideas and information. If you, as turf managers, have ideas that you think should be tested, do your best to pass them along to the turf researchers who are investigating as many options as they can.

GTI Field Day

AUGUST 19, 2010

If you attend the research field day at the GTI this summer, you'll be able to see what we're doing and share your ideas. Visit www.guelphTURFgrass.ca for details as they become available.

Table 1. Effect of steaming of rootzone on weed pressure in seeded turfgrass.

Treatment	Weed Presence Rating			
	07/03	07/30	08/31	09/18
Steamed	0.11 a	3.63 a	3.18 a	4.40 a
Unsteamed	0.04 b	1.30 b	1.18 b	2.84 b
Isd	0.03	0.31	0.32	0.47

