RESEARCH UPDATE

Learning better sod production from Europe

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Sod and seed fields represent the backbone of the turfgrass industry's production aspects. Sod demand is so tied to the construction industry that periodic shortages occur, as now in parts of the country.

Several factors have resulted in the recent need for accelerated sod production technology. These are:

1. Shortage of supply brought on by the "construction boom."

2. Increased cost of land and taxes, resulting in higher production cost per acre.

3. Suburbanization pressures on developing land rountinely used for sod production.

Accelerating production of sod would mean either more total product could be produced by a given sod grower on the same number of acres (important during a time of shortage) or the same amount of product grown on considerably less land (can spread the per acre cost over more product). Also, if sod could be produced faster, the sod grower might be more willing to grow a wider range of specialized crops of different turfgrass species and/or cultivars.

Normal production time for a cool-season sod is about nine to 18 months. Reducing the production time to less than nine months has seldom been accomplished without the use of netting. Sod production with netting has been cut to about eight weeks. But that method has not been widely used because of its high cost and its difficulty to install before seeding.

Another way to accelerate production could be to use a root impermeable layer system (RILS) which would restrict root growth above the layer.

In this case, sod strength could be developed by the massive root system produced in place of the traditional site of soil strength, namely the secondary stems of the rhizome and/or stolon. This approach has been used commercially in Western Europe by growing sod on a 3/4-inch layer of compacted pine bark mulch on black plastic (Fig. 1).

One sod grower in Ohio proposed the technique more than 10 years ago for a cool-season sod. Research has shown that it is possible to produce a warm-season grass sod in less than 65 days on a four-inch thick organic layer or plastic.

An advantage of using RILS for sod production is that any reasonably level land close to an urban center could be used for production. In addition, urban and suburban centers must dispose of organic wastes, like sewage and sludge and leaves. If used in this sod production system, it could provide an attractive economic and environmental alternative to landfills, incineration or land application.

Figure 1: The sod develops an extensive root system.

With this in mind, studies were initiated in 1986 by Cornell University to examine the feasibility of the RILS for cool-season sod production. The objectives of these studies were to:

Reducing sod production time to less than nine months has seldom been accomplished without the use of netting.

- determine how long it would take to produce Kentucky blue or bluegrass-ryegrass mixture sod by RILS vs conventional sod production techniques;
- determine if the season of the year had an effect on the time required to get a harvestable sod by RILS; and
- determine if the physical and chemical properties of the organic medium have an effect on the time of production.

Experiments were conducted during 1986 under both greenhouse conditions and in the field at the Cornell Turfgrass Field Research Laboratory, Ithaca, N.Y.

Under greenhouse conditions the following factors were studied: two temperatures, three rooting media and two seeding mixtures. The temperatures selected would conform to cool conditions of spring and fall (70°F day/60°F night) and warmer summer temperatures (80°F day/70°F night).

Black plastic was used to line flats filled with one of the following organic materials: composted pharmaceutical residue (Lederle Laboratories, Pearl River, N.Y.), composted horse manure/stable waste (Saratoga Organics, Saratoga, N.Y.) or air-dried, aerobically-digested sewage sludge (Groton, N.Y.).

Seed of either straight Kentucky bluegrass (cv. Adelphi) or a mixture of 50 percent bluegrass and 50 percent perennial ryegrass (cv. All*Star) were mixed into the organic medium. Sod tensile strength and germination were determined periodically over the 90-day period of the study.

Composted horse manure provided the best conditions for germination. Within seven days, 50 percent germination occured; within 21 days, 100 percent. In comparison, the germination on the other two media ranged from 15 percent to 37 percent after 21 days. These differences in germination also carried over into sod strength (see table 1).

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Table 1. Days to produce a harvestable sod (≥ 3.3 psi)

Seed Type*	Organic Medium	Cooler Temperature (60°F/50°F)	Warmer Temperature (80°F/70°F)
		days	
100 KBG	Composted horse manure	54-57	68-71
100 KBG	Pharmaceutical residue	68-71	82
100 KBG	Sewage sludge	82	—**
50 KBG:59 RG	Composted horse manure	54-57	54-57
50 KBG:50 RG	Pharmaceutical residue	54-57	54-57
50 KBG:50 RG	Sewage sludge	—*	82

* 100 KBG (100% 'Adelphi' Kentucky bluegrass, 50 RG (50% 'Allstar' perennial ryegrass)
** A "—" means the sod strength of ≥ 3.3 psi was not obtained over the 90 days of the study.

Table 2. Weeks to produce a harvestable sod (≥ 3.3 psi)

Seed Type*	Rooting Media	Seeding date, 1986 June 18	August 3	September 11
		Weeks		
100 KBG	Composted horse manure	17.5	—*	—
100 KBG	Pharmaceutical residue	11.5	7.5	—
100 KBG	Soil	—**	—	—
50 KBG:50 RG	Composted horse manure	10.8	9.0	—
50 KBG:50 RG	Pharmaceutical residue	8.0	5.3	—
50 KBG:50 RG	Soil	—	—	—

* 100 KBG (100% 'Adelphi' Kentucky bluegrass, 50 RG (50% 'Allstar' perennial ryegrass)
** A "—" means the sod strength of ≥ 3.3 psi was not obtained over the course of the study.

Based on our equipment, a commercially suitable sod should have a strength of at least 3.3 psi. Under either temperature condition, Kentucky bluegrass sod could be produced within 57 days on composted horse manure and between 68 and 82 days on composted pharmaceutical residue. A harvestable sod (+3.3 psi) was produced faster on these two rooting media when a seed mixture of bluegrass and ryegrass was used. Sod production on sewage sludge was found to be slower and was related to a high soluble salt level in the sludge.

Using the greenhouse results, composted horse manure and pharmaceutical residue were tested in the field. Another treatment was included in the field, which was to seed the existing soil (Hudson silty clay loam) and manage it under conventional sod production methods. The time of seeding was used to replace the different temperature greenhouse. Seedings were made in early summer (June 18), late summer (August 3) and the recommended fall seeding (September 11).

The best time to seed (see table 2) to produce the fastest harvestable sod was late summer (August 3), followed by early summer (June 18). The fall seeding did not result in a harvestable sod. Of the organic rooting media, pharmaceutical residue produced one to six weeks faster than in composted horse manure. None of the seeding in the soil resulted in harvestable sod in 1986, typical for soil seedings.

The late summer seeding was probably superior to other times for several reasons. First, it was very wet in August and September, which did not result in any drought stress normally experienced in late summer seedings. The fall was also very wet, cool, and winter arrived sooner than normal.

Pharmaceutical residue proved to be a better rooting medium than composted horse manure. This was true primarily because of both better fertility (higher in nitrogen) and waste relations. However, by itself, pharmaceutical residue was too soft for normal mowing equipment and required a fly mower.

Further testing is under way at Cornell to examine different rooting media under larger scale production (five acres). It appears that if mechanization of planting and harvest is done, the RIL System of sod production can either increase the total sod produced on the same acreage or keep the same production amount on less acreage.

To a consumer or producer of sod, the RIL System might offer a wider selection of sod in terms of species of grass as well as cultivars. The sod grower could have the ability to produce sod to a bid specification and supply "exotic" or more difficult to grow sods of cool season grasses like tall fescue (without bluegrass), perennial ryegrass and bentgrass.