MULCH TYPE EFFECTS ON TURF ESTABLISHMENT

J. C. Sorochan and J. N. Rogers III.
Department of Crop and Soil Sciences
Michigan State University

Introduction

Mulches have a demonstrated ability to provide favorable growing conditions for turfgrass establishment. The use of mulch benefits turfgrass establishment by maintaining consistent moisture levels. Moisture is important for seed germination, especially during imbibition. Mulches also reduce the potential of seeds lost to either runoff or wind erosion. One disadvantage to mulching is the method of application, as it often requires large machinery or bulky materials (straw and hydro mulch). The objective of this study was to determine the effect of different mulches on turfgrass establishment. The mulches studied were: Germinator™, straw, fine grade compost, crumb rubber, hydro mulch, PennMulch™, and a clay loam native soil. Germinator™ is a new product that acts as a polymer and sticking agent intended to maintain moisture levels and prevent erosion. Straw (chopped wheat stock) is a traditional mulch that allows good air movement and is relatively low costing, but has the potential to introduce weed seed through its use. A fine grade compost, of yard waste, as a mulch provides additional nutrients in organic forms and holds moisture. Crumb rubber (approximately 0.25 inches, 6 mm) is a mulch that demonstrates the ability to provide higher temperatures for longer periods of time as a result of its black color. Easily applied, crumb rubber also provides protection for the crown of the turfgrass plant, important after establishment in traffic situations. Hydro mulch is shredded paper that is pre-mixed with water, and is very effective at maintaining soil moistures. PennMulch™ is a new product in the form of compressed pellets of shredded paper, and can be applied by using a drop spreader. After applying the PennMulch™, water applications break up the pellets and provide a swollen uniform cover. A clay loam native soil contains nutrients and has good water holding capacity, as well as a plot with no mulch (control) was used for comparison. Ecomat™ is a recycled wood fiber mat and was used as the growth medium on plastic sheeting for the turfgrass establishment. Sod production on plastic is a unique practice and demonstrates many advantages versus traditional sod production. Root shearing during sod harvesting is eliminated when grown on plastic which allows the sod to establish faster than conventional sod. The sod is light weight due to the absence of soil, potentially allowing for cheaper shipping costs and larger sod pieces. The sod pieces are held together by the binding of the roots, thus enabling the production of turfgrasses with bunch type growth habits. The turfgrasses for this experiment were *Poa supina* (supina bluegrass) and *Lolium perenne* (perennial ryegrass). A comparison of mulch types allowed for a direct determination of their effectiveness during establishment of grasses with different growth habits.

Materials and Methods

The experimental design was a 2 by 8 factorial randomized complete block design with three replications. Each of the 48 plots were 4 foot by 3 foot, and the studies were done at the Hancock Turfgrass Research Center on the Michigan State University campus. *Poa supina* (supina bluegrass) and *Lolium perenne* (perennial ryegrass) were the two types of turfgrasses studied, and were seeded at 1.5 lbs. / 1000 ft.^{2} and 6 lbs. / 1000 ft.^{2}, respectively. The mulches included: Germinator™, straw, crumb rubber, hydro mulch, PennMulch™, clay loam native soil, fine grade compost, and a control (no mulch). Each mulch was applied at rates which equaled coverage at 0.25 inch depth. The four seeding dates were: 3 July 1995, 29 Sept. 1995, 5 July 1996, and 1 Oct. 1996 representing both adverse and ideal seeding times for turfgrass establishment of cool season grasses. Fertility was applied at the beginning of each week for four weeks using Lebanon Country Club 13-25-12 starter fertilizer at 1 lb. N / 1000 ft^2. The high fertility schedule was a result of the absence of a soil medium to hold the nutrients for the developing turfgrass plants. No additional micronutrients were provided for the duration of the experiments. Percent cover was recorded every 7, 14, 21 and 28 days to determine turfgrass density (0-100%). Irrigation was applied as needed. The data collected was analyzed for statistical differences using the MSTAT program.

Results and Discussion

Table 1 (ANOVA Table) shows the significant differences between the two main effects (turf species and mulch type) and the split treatment (seeding dates), as well as their interaction with one another. Significant differences occurred at 7, 14, 21, and 28 days after seeding for all three two-way interactions with the exception of the turf species by mulch type interaction 7 days after seeding.

Table 2 is showing the percent turfgrass cover for the turf species by mulch type interaction for all four seeding dates 28 days after seeding. *Lolium perenne* had significantly greater turfgrass cover than the *Poa supina* when the Germinator, crumb rubber, straw, and compost are used as mulches. The PennMulch™, hydro mulch and straw, regardless of turf species, showed significantly greater turfgrass cover than the control; while, the Germinator™, crumb rubber, and compost only showed greater turfgrass cover with the *Lolium perenne*, hence the interaction.

Table 3 is showing the percent turfgrass cover for the mulch type by season interaction for the two turf species 28 days after seeding. Overall, the straw, PennMulch™, and hydro mulch respectively, appeared to be the best mulches for turfgrass cover regardless of the seeding date. All three mulches showed consistently greater turfgrass cover than the control with the exception of the fall 1996 seeding date. The crumb rubber in the fall of 1995 showed a significant difference in turfgrass cover versus the other three seeding dates. This may be a result of the dark color, and poor water holding capacity of the crumb rubber; where, during adverse growing conditions the crumb rubber is unable to hold moisture. The compost as a mulch showed significant differences in turfgrass cover versus the control for the first two seeding dates but not during the second year of seeding. The turfgrass cover, for the compost, was much greater during both seeding dates in 1995 than in 1996. The percent turfgrass cover for the fall 1996 seeding date may be a result of the average low temperatures limiting turfgrass germination (Table 4). During the first 21 days after seeding the average temperatures were low with 5 days dropping below freezing resulting in suboptimal growing conditions.

Table 5 is showing the species by season interaction 28 days after seeding. Both turfgrass species showed significant differences in turfgrass cover for the four seeding dates. The summer 1995 and fall 1995 seeding dates showed that the *Lolium perenne* did significantly better than the *Poa supina* which, was to be expected because of its faster germination rate. The interaction is occurring where, the *Poa supina* has greater turfgrass cover, than the *Lolium perenne* during the summer 1996 seeding date.

Table 5 is showing the average high and low temperatures for the four seeding dates 21 days after seeding. The low temperatures for the first 21 days in the fall 1996 study can be directly attributed to the poor growth for all treatments compared to the three previous seeding dates. The summer 1996 temperatures were somewhat more consistent and cooler than the summer 1995 which, may attribute to the improved performance of the *Poa supina*.

It appears that straw, PennMulch™ and hydro mulch respectively, are the best overall mulches for providing the greatest turfgrass cover during germination, regardless of the seeding date. However, the crumb rubber as a mulch is very effective when growing conditions are optimum (Fall 1995).

Table 1. Significance of Treatment Effects for Turfgrass Cover

	Days after seeding			
Source	7	14	21	28
Turf spp. (T)	**	**	**	**
Much type (M)	**	**	**	**
T x M	n/s	**	*	*
Seeding Date (D)	**	**	**	**
T x D	**	**	**	**
M x D	**	**	**	**
T x M x D	*	n/s	n/s	n/s

*, ** Significant at the 0.05, 0.01 probability levels, respectively.

Table 2. Species by Mulch Interaction 28 Days After Seeding (Averaged Over Seeding Dates)

	Turfgrass species	
Mulch type	*Poa supina*	*Lolium perenne*
	Percent cover (%)	
Control	11.9	11.3
Germinator	11.9	22.8
PennMulch	42.7	44.0
Hydro mulch	34.5	42.8
Crumb rubber	19.8	30.3
Native soil	9.3	11.8
Straw	36.8	54.1
Compost	13.8	30.2
$LSD_{(0.05)}$	9.0	

Table 3. Mulch Type by Season Interaction 28 Days After Seeding (Averaged over Turfgrass Species)

	Date			
Mulch type	Summer 1995	Fall 1995	Summer 1996	Fall 1996
			Percent cover (%)	
Control	11.5	14.2	19.8	1.0
Germinator	21.5	19.5	26.7	1.8
PennMulch	45.0	64.2	55.2	9.0
Hydro mulch	44.2	51.5	53.8	5.0
Crumb rubber	9.0	65.2	18.3	7.7
Native soil	7.3	12.7	21.5	0.8
Straw	44.3	52.5	79.7	5.2
Compost	33.5	40.7	10.8	3.0
$LSD_{(0.05)}$ for different mulches within the same date			13.0	
$LSD_{(0.05)}$ for different dates within the same mulch type			16.6	

Table 4. Average Temperatures for the First 21 Days After Seeding

	Seeding dates			
	Summer 1995	Fall 1995	Summer 1996	Fall 1996
Temperature (°C)				
Average low	17.0	7.2	13.0	3.0
Average high	28.3	19.6	27.4	16.5

Table 5. Species by Season Interaction 28 Days After Seeding (Averaged over Mulch Types)

Turfgrass spp.	Summer 1995	Fall 1995	Summer 1996	Fall 1996
			Pecent cover (%)	
Poa supina	15.6	30.0	41.0	3.8
Lolium perenne	38.5	50.1	30.5	4.6

$LSD_{(0.05)}$ for different species withing the same date 14.6

$LSD_{(0.05)}$ for different dates within the same species 8.3