SUMMARY
Ground rubber as a drainage layer medium under greens

DATA
2001-2004. Research site near University Ridge golf course, Madison, Wis.

SOURCE
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MORE INFORMATION
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Recycled rubber as a drainage layer medium under greens

Research has led to the development of an innovative technology to remove toxic compounds in landfills by replacing gravels in the leachate collection system with shredded tires, which have significant capability to adsorb toxic compounds. To see if this research could have possible use on golf course greens, confetti-sized pieces of scrap tires (ground rubber) were placed in 4-inch thick layers between the layers of sand, peat root mix and subgrades commonly used beneath golf greens. The greens were then soaked with water spiked with nitrate. The results showed that fields with a 10-centimeter layer of tire chips released about 58 percent less nitrate than samples without rubber layers (crumb rubber used in the sublayer compared with pea gravel). Nor was pH of infiltrated water altered with the crumb rubber sublayer addition. In addition, the health of the plots suggests the rubber layers did not alter the turfgrass quality or growth in terms of quality, color or density of turfgrass among three configurations (see Table 1). While the research focused on nitrates, because many golf greens are built near groundwater level or wetlands, it is believed ground rubber would also adsorb a range of pesticides and fertilizers as demonstrated in laboratory-scale experiments. The layer of ground rubber under the greens and fairways in golf courses would also lengthen the playing time due to less freezing and a longer growth period because ground rubber has eight times better insulation value than gravel. Further benefits could include less compaction due to the resilient property of ground tires and easier construction due to the light weight of ground tires in comparison to gravels. Since ground rubber is 1/3 to 1/2 times the weight of soil, it could be used as backfill material for greens constructed in soft foundations and the construction cost is cheaper, although the cost of the material may be higher than for gravels. The research indicates that in areas where the sub-grade soils are porous this technology could prevent groundwater from potential contamination. An added environmental benefit could be a useful market for the 280 million scrap tires generated annually in the United States. While the research was not directed at a means to dispose of scrap tires, but rather to make golf courses environmentally safer and friendlier, the researcher estimates that a rubber layer under the greens for just one 18-hole golf course could require up to 72,000 scrap tires and over 1 million tires if also installed in fairways and drainage systems. In addition to this, ground rubber-based products are already being used on golf courses as a topdressing to improve traffic tolerance and as a soil amendment to improve porosity. GCN

Table 1

Average Turfgrass Quality, Color, and Density for Three Configurations

Treatment	Quality		Color		Density	
	range[d]				0-100%	
	16-Jul	28-Sep	16-Jul	28-Sep	16-Jul	28-Sep
USGA[a]	4.8	6.0	6.0	6.0	93.3	100.0
Rubber Intermediate Layer[b]	5.5	5.7	6.0	5.7	93.3	100.0
Rubber Drainage Layer[c]	5.2	6.0	5.7	6.2	96.7	100.0
Least significant difference ($P < 0.05$)	ns[e]	ns	ns	ns	ns	ns

[a]United States Golf Association sand-based golf course putting green profile.
[b]Fine-ground rubber produced by Tire Grinder, Aurora, IL.
[c]Coarse-ground rubber produced by Tire Grinders, Aurora, IL.
[d]Turf quality and color were rated visually on a one (poor) to nine (best) scale (six acceptable).
[e]ns = not significant.