THE EFFECTS OF DIFFERENT SOCCER SHOE SOLES ON TURFGRASS

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Introduction

High use of athletic fields, particularly at the grade school level has created an ongoing challenge for field managers to maintain an acceptable playing surface. Heavy traffic applied to the turfgrass during game and practice situations decreases turfgrass density and overall quality. This causes the playing surface to become uneven. For instance, when a turfgrass area is worn down to bare soil, the soil becomes unstable and develops ruts; thus, increasing the opportunity for a player to lose their footing. The lack of a consistent playing surface increases the potential for player injury to occur; therefore, making the field unsafe. The implementation of any component that demonstrates the potential for preserving turfgrass density is desirable. Improving the type of spikes used on the soles of soccer shoes is one component that has the potential to limit the rate of wear applied to the turfgrass area. The objective of this study was to compare different types of spikes for the soles of soccer shoes, and their effect on turfgrass density. A second analysis compared the performance or stability of the different soles themselves. A total of four different spikes were compared. All four shoe soles were tested using Lanzera soccer shoes (PO Box 442, Tingsboro, MA., 01879). The first shoe sole tested was a traditional thirteen stud molded soccer cleat. The molded soccer shoe had thirteen spikes. It is the most common cleat used for games and practices. The length of the studs in the molded cleat consists of 10, 12, and 15 mm studs. The 10 mm spikes are in the forefront of the shoe, the 12 mm studs are in the center, and the 15 mm studs are in the heel. The second shoe sole tested was a traditional six stud screw-in type soccer cleat. The six stud soccer cleat has four 15 mm spikes in the forefront, and two 18 mm spikes in the heel. This cleat is typically used in games and practices where the field conditions are very wet, and normal footing is an issue. The next two shoe soles tested were experimental studs. The first experimental sole was the molded TX sole. This shoe was similar to the traditional molded soccer cleat has 10, 12, and 15 mm spikes which are part of the actual shoe sole itself. However, these spikes differ from the traditional spikes in that they are not the traditional round spike. The molded TX cleats are designed to improve traction during acceleration and stopping. This was done by elongating the surface of the stud from front to back, while maintaining the same width at the traditional stud. The final shoe sole tested was the Flat Spike. The Flat Spike is a stud that is designed so as not to not penetrate the turfgrass surface, but to use the actual blades of turfgrass for traction and footing. The Flat Spikes have circular 24 mm in diameter studs which are serrated to have four wing type edges for traction. When they are folded down they are 9 mm in length. The primary intention of these spikes is to perform on top or within the turfgrass canopy. This would be best suited for younger children who are unable to penetrate the ground surface to gain traction.

Materials and Methods

A study to compare four different soccer shoe soles on turfgrass was conducted at the Hancock Turfgrass Research Center on the campus of Michigan State University in August 1998. Four different shoe soles were compared in a randomized complete block design with three replications on an established Poa pratensis (Kentucky bluegrass) and Lolium perenne (perennial ryegrass) turf stand. The four shoe soles tested were traditional molded cleats, traditional screw-in cleats, molded TX cleats, and a Flat Spike cleat in a screw-in type sole. Testing consisted of kicking soccer balls on a designated area of the turfgrass, with the different types of soccer shoes. A total of 100 kicks were applied to each plot by ten different people (4 females » 114 lbs. per person, and 6 males » 174 lbs. per person) There were ten kicks per person, per plot. Turfgrass analysis for density and shear strength was evaluated prior to and after the kicking traffic was applied in order to assess the damage caused by each shoe type. All 100 kicks were done with the right foot of each person, and the turfgrass was assessed for density and shear strength where the left foot was planted prior to the right foot making contact with the soccer ball. This was the area of greatest wear applied to the turf during the approach to kick the soccer balls. Percent turfgrass cover was determined on a visual estimate bases, using a 0 to 100% scale. Shear strength was measured using the Eijelkamp Shear Vane in Newton meters (Nm).

Results

Results in Figure 1.0 show the traditional screw-in spikes had significantly less turf density after 100 soccer kicks were applied (63% cover); where, there was no significant difference between the Flat Spikes, traditional molded spike, and the molded TX spike (97, 95, and 94% cover, respectively). However, the molded TX spike had significantly less turfgrass density after the 100 kicks were applied compared to the original 100% turfgrass cover prior to the kicking traffic was applied.

Interpreting Figure 1.1 correctly, the effect of individual shoes prior to and after the soccer kicks were applied need to be compared. These results indicate that the molded TX spikes reduced the shear strength the least (3.3 Nm) after 100 soccer kicks were applied to the turfgrass. However, the other three spikes decreased turfgrass shear strength, with the traditional molded spikes causing the least significant decrease followed by the FlatSpikes, and then the screw-in spikes (4.3, 6.8 and 12.5 Nm respectively). The screw-in spikes showed the greatest change in turfgrass shear strength after the soccer kicks were applied, and this could be directly attributed to the large decrease in turfgrass density which occurred as a result of the soccer kicks (fig. 1.0). The significant changes in turfgrass shear strength for the FlatSpikes is likely a result of the actual spikes weakening the turfgrass canopy as the wings of the spikes gripped the turfgrass, when the person kicking the ball would plant their foot as they kicked the ball. It appears the FlatSpikes performed as they were intended to, because the actual strength of the turfgrass was weakened; while the turfgrass density did not change significantly.

Figure 2.0 shows the significance of individual ratings for the performance of the different shoe soles tested. Results are averages of the ten different people who tested the shoes and how they felt the shoes performed. The screw-in spikes had significantly higher ratings then the other three spikes, with the traditional molded spikes having a significantly higher rating than the molded TX and FlatSpike. The performance of the shoe is related to the traction provided as a result of the specific sole type, and the higher the rating the greater the traction. While the screw-in spikes and traditional molded spike had relatively high ratings, the molded TX and FlatSpikes were still considered more than adequate in terms of traction.

Conclusion

From this experiment, conclusions can be made that the use of alternative spikes, such as the FlatSpikes, have demonstrated potential to sustain greater turfgrass densities. However, it should be noted that the testing for this experiment was applied by men and women between the ages of 19 and 50 years of age, and no children were represented in the experiment. With this in mind, and the greater potential for the use of FlatSpikes with young children and/or teenagers, warrants the need for continued research in this area.

Figure 1.0 The effect of different shoe soles for soccer cleats on turfgrass density, August 1998, East Lansing, MI. 48824

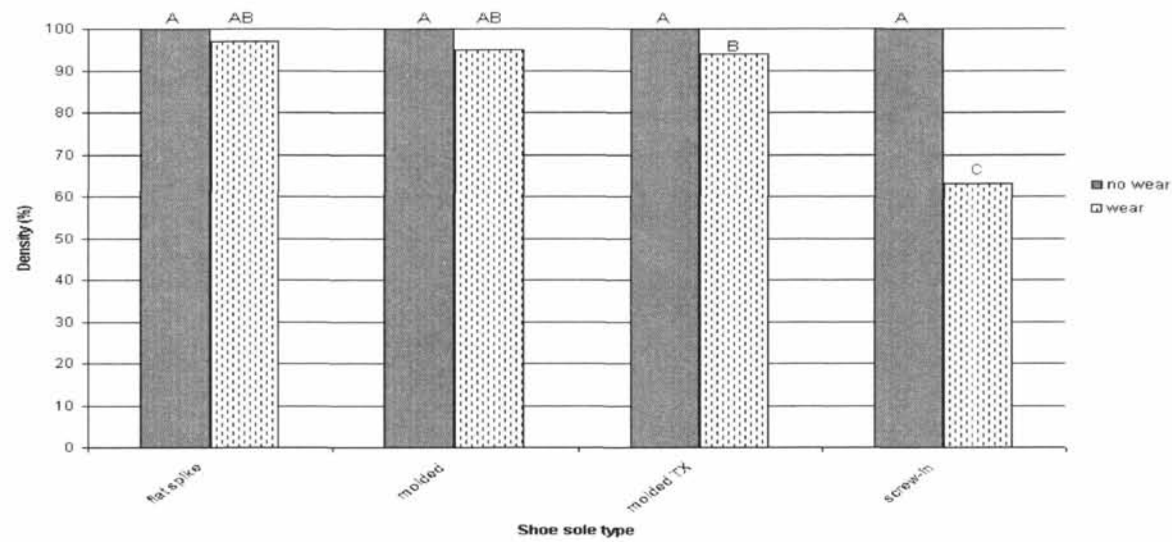

Figure 1.1 The effect of different shoe soles for soccer cleats on loss of tufgrass shear strength, August 1998, East Lansing, MI. 48824

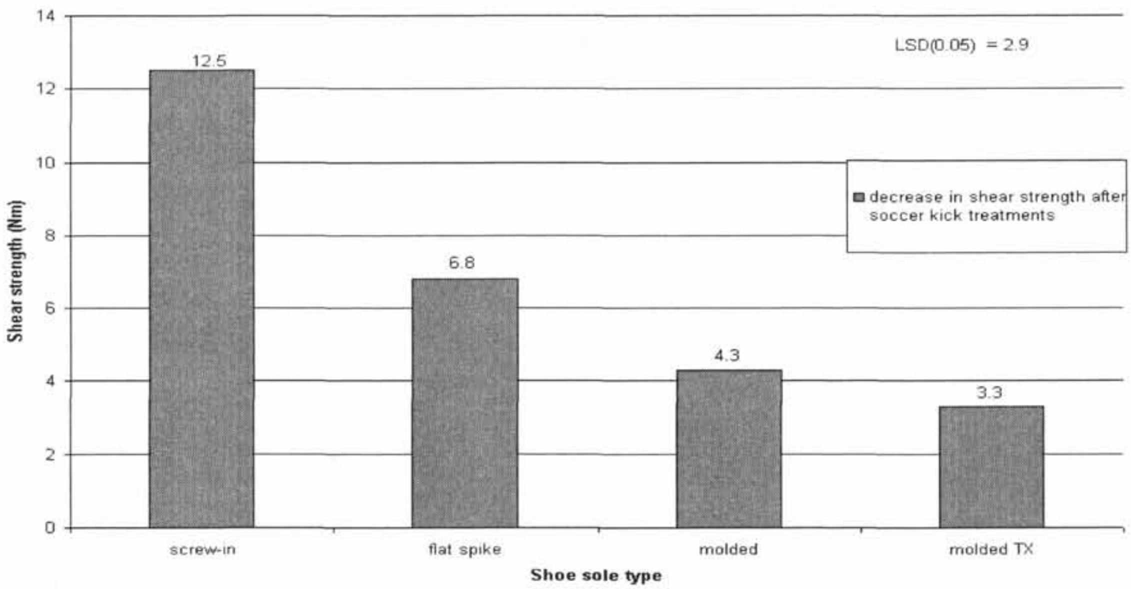

Figure 2.0 Comparison of shoe soles for soccer cleats on traction performance, August 1998, East Lansing, MI. 48824