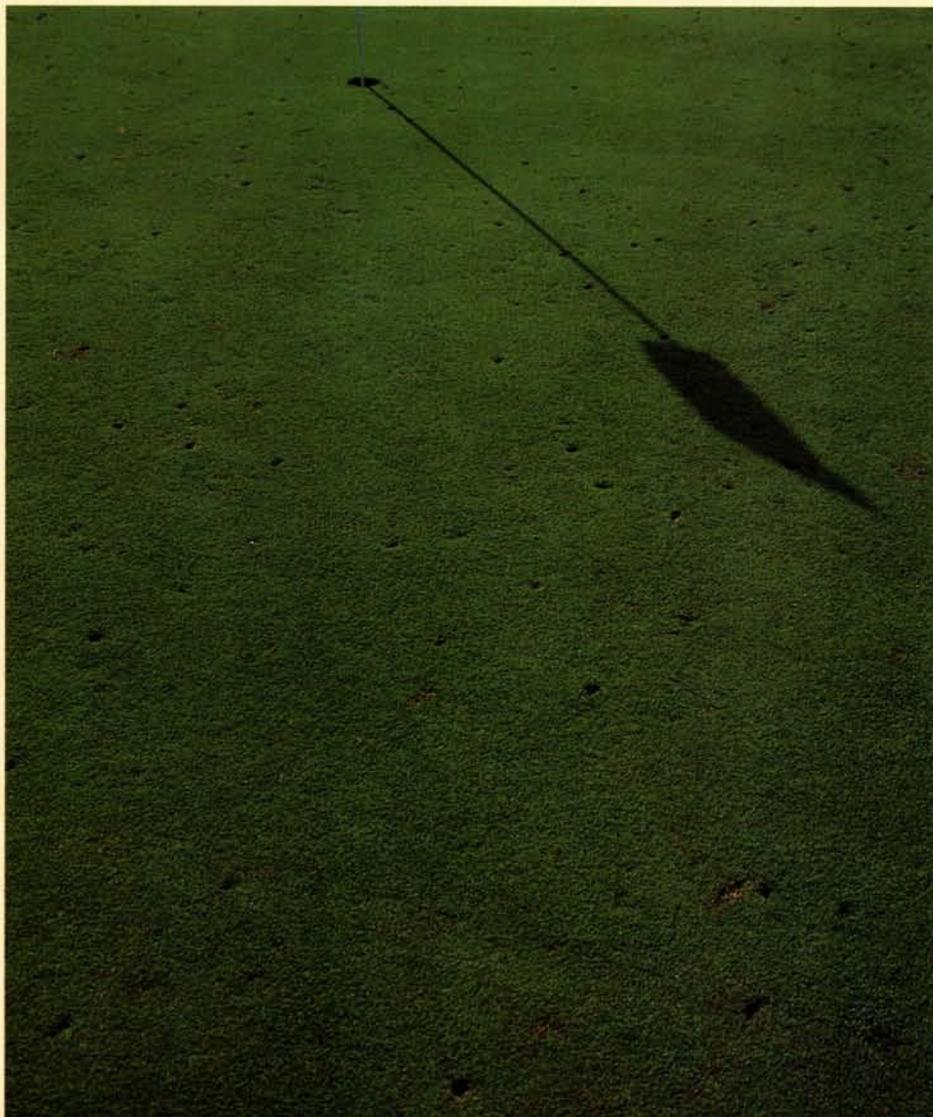


Research *You Can Use*

Ball Mark Recovery as Influenced by Growth Regulators and Bio-Stimulants

Combinations of growth regulators and bio-stimulants may enhance turfgrass recovery.

BY THOMAS L. WATSCHKE, JEFFERY BORGER, AND JAMES BROSNAN



Ball marks on putting greens have long been the bane of golf course superintendents and golfers alike. Ball marks have a negative impact on ball roll, creating erratic putting conditions. They also serve as encroachment hot spots for annual bluegrass and other weeds, such as goosegrass. Golfers often are unaware that a ball mark has been produced by the shot they launched at the green and are not always diligent about checking for them. If they do discover that a mark has been made, the repair is not necessarily accomplished properly.

Many putting greens are now maintained with low nitrogen fertility, which slows the turf growth rate and helps provide faster putting conditions that are associated with high-quality putting greens. Unfortunately, with less fertilization, damage to greens, including ball marks, does not heal as rapidly as most superintendents desire. This has become more of a problem in recent years as putting green quality has greatly improved; ball marks are even more noticeable. Any maintenance program that enhances recovery from any damage without negatively affecting playing conditions is beneficial.

An experiment supported by a grant from the USGA Green Section and Nutramax Laboratories was conducted during the 2001 season at the Valentine Turfgrass Research Center at The Pennsylvania State University. The project assessed whether a growth regulator (Primo), urea, a bio-stimulant (Macrosorb Foliar), and/or combinations thereof could enhance ball mark recovery under very low nitrogen fertility conditions.

The treatments included:

- Primo Maxx alone at the labeled rate for greens.

Ball marks distract from the smoothness of the putting green surface. Research at Penn State University investigated the impact of growth regulators and fertilizer rates on ball mark recovery.

Table 1

Percent reduction of ball marks in creeping bentgrass/*Poa annua* putting greens in 2001

Treatment	Form	Rate (oz./1,000 sq. ft.)	Percent Reduction																	
			8-21	8-22	8-23	8-24	8-25	8-26	8-27	8-28	8-30	9-04	9-07	9-11	9-14	9-18	9-21	9-25	9-27	10-02
Primo Maxx	IMEC	0.125	3.1a ¹	7.9a	12.6a	6.1a	6.8a	8.2b	13.2ab	14.3ab	12.6b	11.9c	23.9b	24.0d	29.4bc	45.8b	44.7b	53.9bc	57.2b	54.4b
Macrosorb Foliar	L	2																		
Primo Maxx	IMEC	0.125	2.9a	12.1a	10.4a	7.4a	8.9a	13.6a	15.6ab	18.6ab	20.4ab	19.6b	30.0b	32.2bc	30.4bc	49.2ab	57.8ab	63.2abc	67.2ab	69.4ab
Urea	46G	0.15 lb. ai/A																		
Check			1.1a	11.5a	10.7a	10.1a	10.8a	11.5ab	17.6ab	20.0a	27.1a	30.1a	36.3a	40.7a	48.8a	54.4ab	66.9a	76.0a	81.8a	78.5a
Primo Maxx	IMEC	0.125																		
Check			4.2a	9.9a	13.8a	9.2a	7.2a	11.7ab	14.2ab	16.1ab	19.9ab	19.4b	29.2b	28.3cd	40.6abc	63.8a	62.5ab	71.1ab	73.5ab	69.7ab
Macrosorb Foliar	L	2																		
Check			1.5a	8.9a	10.3a	7.1a	3.9a	6.9b	11.4b	12.2b	18.6ab	17.4b	25.3b	28.6cd	27.5c	41.1b	46.9ab	53.2c	58.1b	58.1b
Urea	46G	0.15 lb. ai/A																		
Check			1.4a	13.9a	10.4a	10.0a	8.9a	14.2a	18.2a	20.3a	26.9a	27.9a	37.9a	38.9ab	45.6ab	48.9ab	58.2ab	64.6abc	71.7ab	69.7ab

¹Means followed by same letter do not significantly differ (P = .05 Duncan's New MRT)

- Primo in combination with Macrosorb Foliar (at 2 ounces per 1,000 square feet).
- Primo in combination with urea (at 0.15 pound of actual nitrogen per 1,000 square feet).
- Macrosorb Foliar alone (2 ounces per 1,000 square feet).
- Urea alone (0.15 pound of actual nitrogen per 1,000 square feet).
- Untreated check plot.

Six ball marks were produced on each plot using a golf ball (cut in half) mounted on the base of a 2-by-4, which was then placed on the surface of the turf and pounded with a mallet until the golf ball half was buried into the surface. The vegetative material was removed from within the ball marks. The simulated ball marks were filled with topdressing to mimic a reasonably repaired ball mark. The resulting ball mark was initially 1.6 inches (40 millimeters) in diameter. Recovery rate was measured on several dates following the production of the hole. The site was maintained like a putting green throughout the experiment.

The results of this experiment were somewhat inconsistent with past research. Previous research has shown that Primo can improve the rate of divot recovery in creeping bentgrass fairways. This recovery is the result of an increased rate of lateral spread by the creeping bentgrass stolons. This

enhanced recovery was accomplished without additional nitrogen application. Macrosorb Foliar has provided improved recovery from mechanical damage.

In this experiment, turf treated with Primo and Macrosorb Foliar, separately, tended to recover from ball marks faster than untreated turf. However, when turf was treated with a combination of Primo and Macrosorb Foliar, the rate of recovery from the ball mark damage was slightly slower (although not statistically so) than untreated turf. Since Macrosorb Foliar is known to facilitate the absorption of a number of chemicals, it is suspected that enhanced uptake and movement of the applied Primo may have occurred with this combination, thereby reducing the turf growth rate. Urea, alone, did not increase the rate of healing compared to untreated turf.

It is possible that the recovery rate from ball mark damage can be enhanced by the application of growth regulators or bio-stimulants without providing increases in nitrogen fertility that may reduce green speed. While the data in this experiment were not statistically different, trends were apparent. Further research needs to be conducted to assess whether reduced rates of

Primo in combination with Macrosorb Foliar can bring about the positive response seen from Primo applications alone. The results achieved with the same applications on a site with higher nitrogen fertility also need to be examined.

DR. THOMAS WATSCHKE, *professor of turfgrass science at Pennsylvania State University, has recently begun researching bio-stimulants and their effects on turfgrass management. He acknowledges that there is still a great deal more to learn about these products. JEFFERY BORGER is a research staff assistant, and JAMES BROSNAN is a graduate assistant.*

Table 2

Quality ratings taken on August 15, 2001, of creeping bentgrass where 0 = Worst, 7 = Acceptable, and 10 = Best

Treatment	Form	Rate (oz./1,000 sq. ft.)	Quality
Primo Maxx	IMEC	0.125	5.7
Macrosorb Foliar	L	2	
Primo Maxx	IMEC	0.125	7.3
Urea	46G	0.15 lb. ai/A	
Check			
Primo Maxx	IMEC	0.125	7.3
Check			7.7
Macrosorb Foliar	L	2	
Check			5.7
Urea	46G	0.15 lb. ai/A	
Check			8.0