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Optimization of Application Timing and Frequency of Microbial Inoculants for Turfgrass Disease Control

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Abstract

Considerable information is now available concerning the use of microbial inoculants for the control of turfgrass diseases. However, despite positive experimental results, few microbial inoculants have been highly effective in field studies or in commercial use on golf courses. A number of studies have shown that microbial agents perform most effectively when populations can be maintained at high levels, usually at populations exceeding 10^7 cells/g soil. However, applications made during the daytime hours may limit population development due to UV exposure or to desiccation. The limited number of success stories of biological control on golf courses have been from sites where applications of biological control organisms were applied during the overnight hours. Technology is now available for golf course superintendents to culture microbial inoculants on site at the golf course and apply inoculants directly through the irrigation system at any time of the day or night. It is also now feasible for superintendents to make applications on a daily basis. This study was designed to evaluate the impacts of application scheduling on the disease control efficacy of introduced microbial inoculants. Intuitively, daily applications made during the evening hours should greatly enhance activity of microbial inoculants over conventional weekly applications or daily daytime applications since the overnight hours should provide more suitable conditions for microbial growth and activity and reduce mortality due to UV exposure and desiccation. Furthermore, applications would be made at the times when pathogens are most active. Our results clearly show the potential for improving upon disease control efficacy of microbial inoculants by adjusting application schedules; moving away from traditional daytime applications on a two-week schedule to nighttime applications on a daily schedule. Our results have specifically shown that daily nighttime applications of various inoculants are superior to daytime applications or weekly applications. This response was also apparently independent of population level.

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