CUTT

Program Spotlight

Research from 1999 to 2001 found that Junction provides consistent moss control. Field research from 2001-2002 provided added evidence regarding Junction's effectiveness, allowing us to more clearly define application parameters.

Cornell Researchers Tackle Moss Control

Bryum argenteum, silvery thread moss, continues to be a significant pest problem on golf courses throughout the United States. Superintendent surveys conducted by Cornell University researchers indicated that close mowing, low soil potassium levels and surface organic matter accumulation correlate highly with increased moss invasion. Additionally, observations suggest that the lack of metal-based fungicides, particularly mercury (Hg), have led to persistent moss invasion.

Postemergence control programs have been reported with variable success. Recently, anecdotal evidence indicates spot treating with Ultra Dawn dish detergent can reduce moss populations but it appears to require consistent follow-up. Here at Cornell we built upon observations from Oregon State University to develop consistent postemergence moss control programs with copper hydroxide based materials such as Kocide and Junction.

Research from 1999 to 2001 found that four to seven applications of 5 ounces of Junction applied between October and December at two-week intervals in 2 gallons of water per 1000 square feet provides consistent moss control. Further research explored the prevention of moss establishment under controlled environmental conditions with multiple low rate (1 ounce) applications of Junction. Questions remained regarding the influence of less than 2 gallons of spray volume, pH of the spray solution and field testing of the prevention program.

Field research from 2001-2002 provided added evidence regarding Junction's effectiveness, allowing us to more clearly define application parameters. A spray volume study looked at Spring vs. Fall applications of 5 ounces of Junction in 0.5, 1.0, 2.0 or 4.0 gallons of water per 1000 square feet. Again, Spring applications are less effective than Fall (see Figure 1). Also 2 gallon spray volume is most effective, providing 40% control, while the 1 gallon spray volume provided almost 30% control.

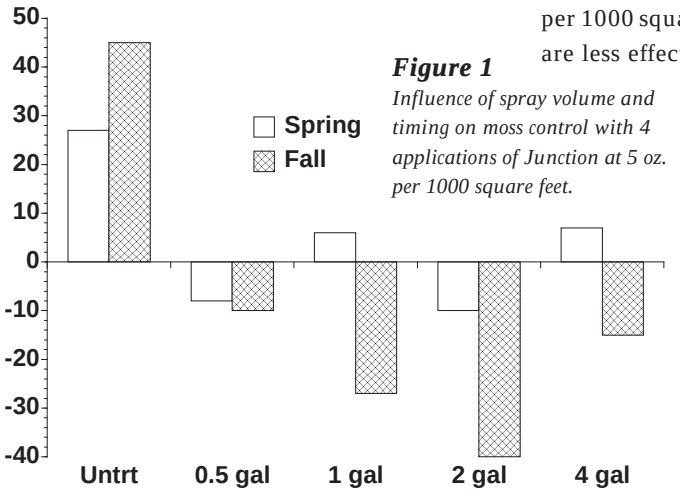
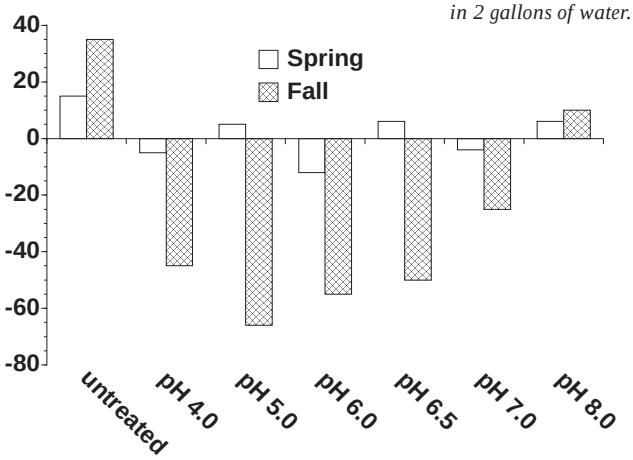


Figure 1
Influence of spray volume and timing on moss control with 4 applications of Junction at 5 oz. per 1000 square feet.

Figure 2
Influence of spray solution pH and timing on moss control with 4 applications of Junction at 5 ounces per 1000 square feet and applied in 2 gallons of water.



A Second Study

Another study looked at similar application rates of Junction (5 ounces) at 2 gallons spray volume in solutions of pH 4.0, 5.0, 6.0, 6.5, 7.0 and 8.0. Fall applications of spray solutions at or below 6.5 provided excellent moss control (see Figure 2). Also, a 0.5 unit increase from 6.5 to 7.0 reduces moss control almost 50%.

Interestingly, as spray solution pH decreased bentgrass injury (yellowing) increased. We determined from tissue samples that iron uptake is reduced as compared to untreated tissue iron levels. A follow up application of iron sulfate seemed to reduce the yellowing and increase iron tissue levels, but more work is needed to determine the role of iron and injury.

The final 2001 study field tested the prevention program identified in the growth chamber. Weekly applications of 0.25, 0.5, 1.0, 1.5 or 2.0 ounces of Junction at the 2 gallon spray volume were made to an area without moss. Similar to growth chamber findings the weekly 1 ounce application completely prevented moss establishment (see Figure 3). Plots treated with rates above 1 ounce developed the yellowing observed in the spray pH experiment. Again these were alleviated with applications of iron.

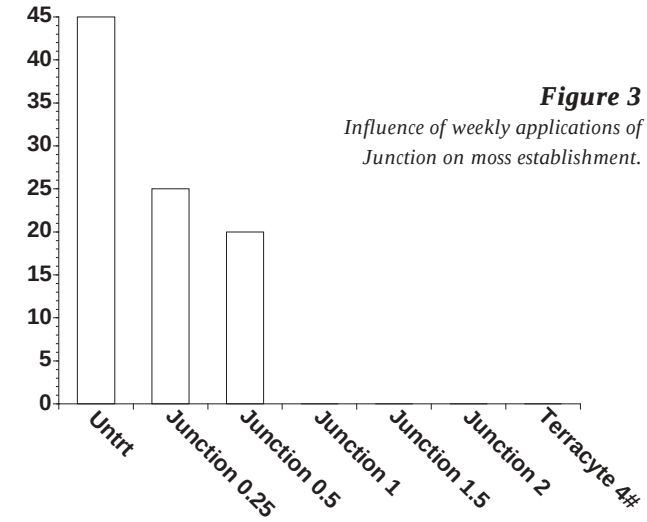


Figure 3
Influence of weekly applications of Junction on moss establishment.

A second series of experiments evaluated Terracyte, a sodium perchloride and lime based product for moss control. Spring applications were slightly less effective than Fall treatments for moss control (see Figure 4). This is consistent with observations of Junction efficacy on moss. Apparently moss begins an acclimation period in response to day-length and temperature. This acclimation either enhances susceptibility or reduces the recuperative ability of the moss.

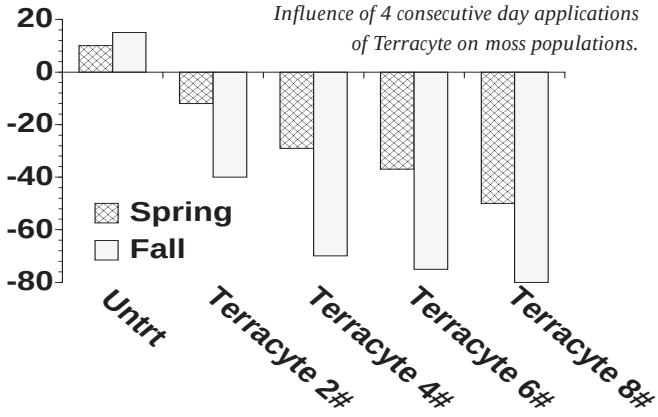


Figure 4
Influence of 4 consecutive day applications of Terracyte on moss populations.

This has been exceptionally productive research, building on initial observations. Follow up research more thoroughly refined application parameters and should result in excellent moss control programs. Financial support from Tri-State Research Foundation and Metropolitan Golf Course Superintendent Association, supplemented by Griffen LLC and the Hudson Valley Superintendents, helped make it possible. We are grateful for this support and look forward to further interaction with these outstanding organizations.

Frank S. Rossi

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Organic Weed Control

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repeated applications may be necessary. The highest concentration of acetic acid (20%) gave better control than lower concentrations. Commercial formulations and the 20% acetic acid treatment provided better control than pelargonic acid in most cases in this study.

Glyphosate was the most effective herbicide, continuing to show excellent control of virtually all weed species at week 13. Acetic acid is quite costly compared to pelargonic acid or glyphosate, especially when three applications are needed to achieve good control. However, some pesticide applicators may opt to use acetic acid despite higher costs if legislation encourages the use of nontraditional pesticides, and acetic acid is seen as an environmentally-friendly alternative. Possible ways to improve the performance of acetic acid and thereby reduce cost per square foot should be examined. Although the plots where this study was conducted were irrigated, overall droughty conditions during the summer of 2001 may have influenced herbicide performance, making it desirable to repeat this work under conditions of "normal" rainfall and earlier in the year. Plots with more consistent weed species populations would also allow a meaningful statistical analysis to be generated.

David Chinery and Leslie Weston

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