TURFGRASS TRENDS

OVERSEEDED RYEGRASS REMOVAL

Removal of Overseeded Ryegrass Best in Heat of Summer

By Travis Gannon and Dr. Fred Yelverton

On golf courses, overseeding of bermudagrass fairways, tees and approaches continues to be common practice because it allows for an actively growing and aesthetically pleasing turf all year long. This is of particular importance at golf clubs that rely on resort play. Although overseeding is aesthetically pleasing and provides an actively growing playing surface when bermudagrass is otherwise dormant, overseeding can be a maintenance and agronomic nightmare. Overseeding bermudagrass increases maintenance costs and poses agronomic issues that can threaten the health of the underlying bermudagrass.

Bermudagrass is a warm-season perennial turfgrass species commonly used on golf course fairways, tees and approaches. However, bermudagrass is shade intolerant. In low-light environments, bermudagrass develops narrow and elongated leaves, thin and upright stems, elongated internodes and weak rhizomes (Duble, 1996).

In the spring when temperatures begin to warm, ryegrass is very robust and actively growing. Unfortunately, this coincides with bermudagrass breaking dormancy and resuming active growth. During this time, overseeded perennial ryegrass is very successful in shading out the bermudagrass base. It is for this reason that in most turfgrass environments, it is essential for ryegrass to be chemically removed in order for bermudagrass to resume active growth and recover prior to overseeding in the early fall. Thinning of the bermudagrass base is exacerbated when overseeded perennial ryegrass is not removed and allowed to persist year after year.

Research trials were initiated at North Carolina State University to evaluate herbicide application timing for control of perennial ryegrass in overseeded areas to assist during transition in spring. Trials were initiated on overseeded golf course fairways on April 17, 2003. Herbicide applications began April 17 and occurred every two weeks thereafter (April 17, April 28, May 15 and June 2). Evaluated sulfonylurea herbicides included trifloxysulfuron (Monument), rimsulfuron (TranX-it), metsulfuron (Manor or Blade) and foramsulfuron (Revolver) at 0.3 ounces, 1 ounces, 0.5 ounces and 17.4 fluid ounces per acre, respectively. Pronamide (Kerb) was also included for comparison. All sulfonylurea herbicides, excluding Revolver, included a non-ionic surfactant at 0.25 percent volume by volume.

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TABLE 1

Effect of application timings on herbicide efficacy for ryegrass control during transition.

Herbicide (per acre)	Application Date	Percent Ryegrass Control May 29	June 18	July 01
Manor (0.5 ounces)	April 17	39	40	61
	April 28	56	45	86
	May 15	34	23	45
	June 02	-	61	91
Monument (0.3 ounces)	April 17	13	7	38
	April 28	56	36	78
	May 15	54	20	38
	June 02	-	46	93
Revolver (17.4 fluid ounces)	April 17	0	18	0
	April 28	85	94	96
	May 15	73	48	41
	June 02	-	54	95
TranXit (1 ounce)	April 17	26	4	16
	April 28	68	41	93
	May 15	68	49	58
	June 02	-	45	95
Kerb (1 pound actual ingredient)	April 17	30	61	36
	April 28	0	16	0
	May 15	13	36	8
	June 02	-	14	39
LSD (P=0.05)	-	7.2	23.1	30.9

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QUICK TIP

You may not want to think about it now, but winter is right around the corner. Make preparations now for snow mold control. Gray snow mold occurs where there is snow cover for extended periods of time. Pink snow mold can thrive with or without snow cover. Both can appear together in the same area of turf. Several products from Bayer Environmental Science are registered for snow mold control, including 26GT®, Bayleton®, Compass® and ProStar® fungicides. Years of research have demonstrated their ability to provide effective, long-lasting control.

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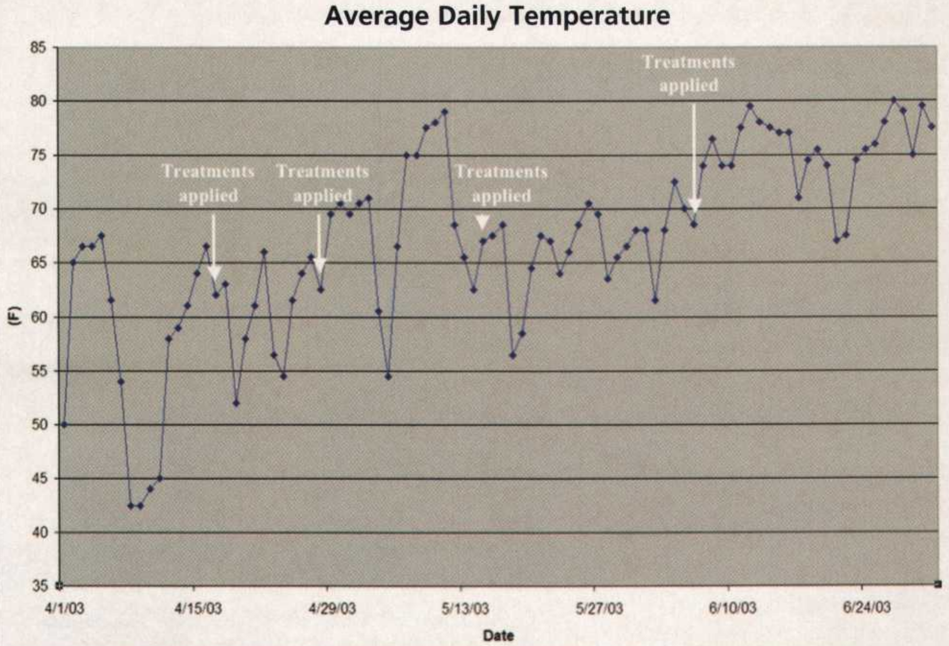
These data indicate sulfonylurea herbicides are great transition aids to remove overseeded perennial ryegrass from bermudagrass. However, we observed varying levels of perennial ryegrass control with different application timings. Manor, Monument, Revolver or TranXit applied April 17 resulted in less-than-optimum perennial ryegrass control July 1 with control ranging from 0 to 61 percent (Table 1).

However, when applied April 28, all sulfonylurea herbicides provided good to excellent perennial ryegrass control ranging from 78 percent to 96 percent control. When applications were made May 15, poor perennial ryegrass control (38 percent to 58 percent) was obtained. Conversely, all evaluated sulfonylurea herbicides applied June 2 provided excellent perennial ryegrass control (91 percent to 95 percent) by July 1. Additionally, Kerb treatments did not provide acceptable ryegrass control by July 1 with control varying from 0 percent to 40 percent.

A common question pertaining to the use of sulfonylurea herbicides for transition from perennial ryegrass to bermudagrass is: "Why are results variable?" Our experience with sulfonylurea herbicides suggests obtained results are largely dependent on the temperature at time of application and shortly thereafter (within one week). Willis et al. (2007) reported similar results with research conducted at Virginia Tech.

We noted poor results within our research trial most notably with herbicide applications on May 15. Although air temperature at application on May 15 was 71 degrees F (daily average 67 degrees), we experienced a cooling trend after application with average daily temperatures decreasing 11 degrees to 56 degrees within three days of application. Hence, reduced perennial ryegrass control compared to other application timings (Table 2).

TABLE 2



Early applications typically result in less-than-optimum perennial ryegrass control with sulfonylurea herbicides.

With that said, applications earlier in the growing season typically result in less than optimum perennial ryegrass control with sulfonylurea herbicides. Reduced perennial ryegrass control — and other weeds for that matter — under relatively cool conditions are likely due in part to the relatively short half-life of sulfonylurea herbicides in soil. Under cool ambient conditions characteristic of early applications, ryegrass plants might not be actively growing and might not absorb the herbicide.

Because the half-life of sulfonylurea herbicides in soil is relatively short, they do not persist. When active ryegrass resumes growth, lethal amounts of the herbicide are no longer present resulting in less than optimum ryegrass control.

Data from this research as well as other trials conducted at North Carolina State University confirms sulfonylurea herbicides (Manor, Monument, Revolver and TranXit) are a great transition aid to control perennial ryegrass provided they are utilized as a late-season transition aid.

Additionally, Monument, Revolver and TranXit provide postemergence control of annual bluegrass. When using sulfonylurea herbicides, extreme caution must be used around other cool-season grasses, including bentgrass. Sulfonylurea herbicides are water-soluble, hence if they are applied upslope of susceptible species, then one must be mindful of the possibility of lateral movement.

Sulfonylurea herbicides are subject to tracking with foot and equipment traffic. Therefore, it is suggested to apply sulfonylurea herbicides after foot and equipment traffic have left for the day followed by a light irrigation the following morning (and perhaps an additional morning or two) to remove suspended herbicide from the leaf surfaces prior to traffic.

Travis Gannon and Dr. Fred Yelverton are weed science specialists in the Department of Crop Science at North Carolina State University.

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Kelp Helps Root Mass in Turf

By Tim Butler, Kevin Frank and Alan Hunter

Kelp, better known as seaweed, has been used as a fertilizer on turf for many years. It is also the most universally recognized natural biostimulant and is the most widely used biostimulant in both agriculture and turfgrass management (Hattori, 1999). It contains many important plant growth regulators, such as auxins, cytokinins and gibberellins. It also contains micronutrients to enhance a plant's ability to resist pest and disease attack (Hattori, 1999).

Blunden (1991) reported that seaweed also contains betaines, substances that behave like cytokinins in most species of marine algae used in the manufacture of seaweed extracts.

Limited research has been carried out on seaweed extract application using a foliar nutrient program, which is commonly practiced within the turfgrass industry. The objectives of this research were to study the effects of pure seaweed extract on turfgrass growth, nutrition and stress tolerance.

FIGURE 1

Turfgrass Dry Weight

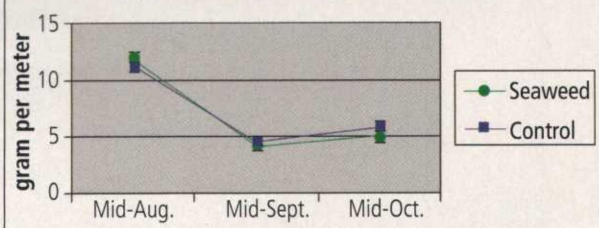
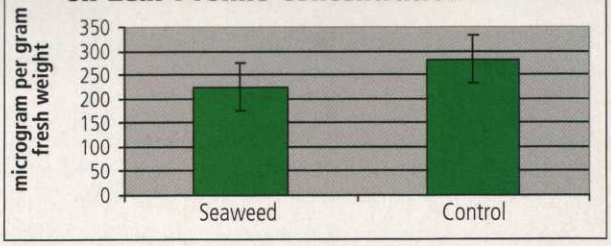


FIGURE 2

Influence of Biostimulant Application on Leaf Proline Concentration



Materials and methods

The research was conducted on a USGA golf green from July 2005 to October 2005 at University College Dublin, Ireland. In July, an experiment was initiated using a seaweed extract biostimulant (supplied by Maxicrop) applied biweekly at 2 milliliters (ml) per square meter onto treatment plots measuring 1.5 square feet. Foliar fertilizer was applied at either the recommended nutrient rates of 37, 2.61 and 40.67 kilos [nitrogen (N), phosphorous oxide and potassium oxide] per hectare respectively (for a quick conversion from kilos per hectare to pounds per acre, multiply by 0.9 or at two-thirds the recommended rate).

The foliar fertilizer program used was from a recommended nutrient program for a USGA golf green in Ireland. The nutrients were applied using a hand-held sprayer. The seaweed extract was mixed with water to give a seaweed application volume of 50 milliliters per square meter at each biostimulant application. Control treatments were also used, which only received the two separate nutrient rates. The experiment was set up as a completely randomized design with four replications.

The green was mowed daily at a height ranging between 0.145 inches and 0.156 inches. Irrigation was applied as needed.

Clippings dry weight, tissue and rootzone nitrate nitrogen, phosphorus, potassium and grass color were determined monthly from mid-August until mid-October. Leaf proline (Bates et al., 1973), soil organic matter (ASTM D 2974-87) and root mass (Doak et al., 2005) were measured in October. The results were analyzed as a factorial experiment (nutrient rate and biostimulant) using SAS, PROC MIXED as repeated measures ANOVA (SAS Institute, Cary, N.C.).

Results

The seaweed extract significantly enhanced grass dry weight compared to the control treatment on the first measurement date, while the opposite occurred on the last measurement date (Figure 1).

On the second measurement date, no significant difference in grass dry weight was detected between biostimulant treatments. The use of biostimulants appeared to have a limited impact on grass growth, particularly as

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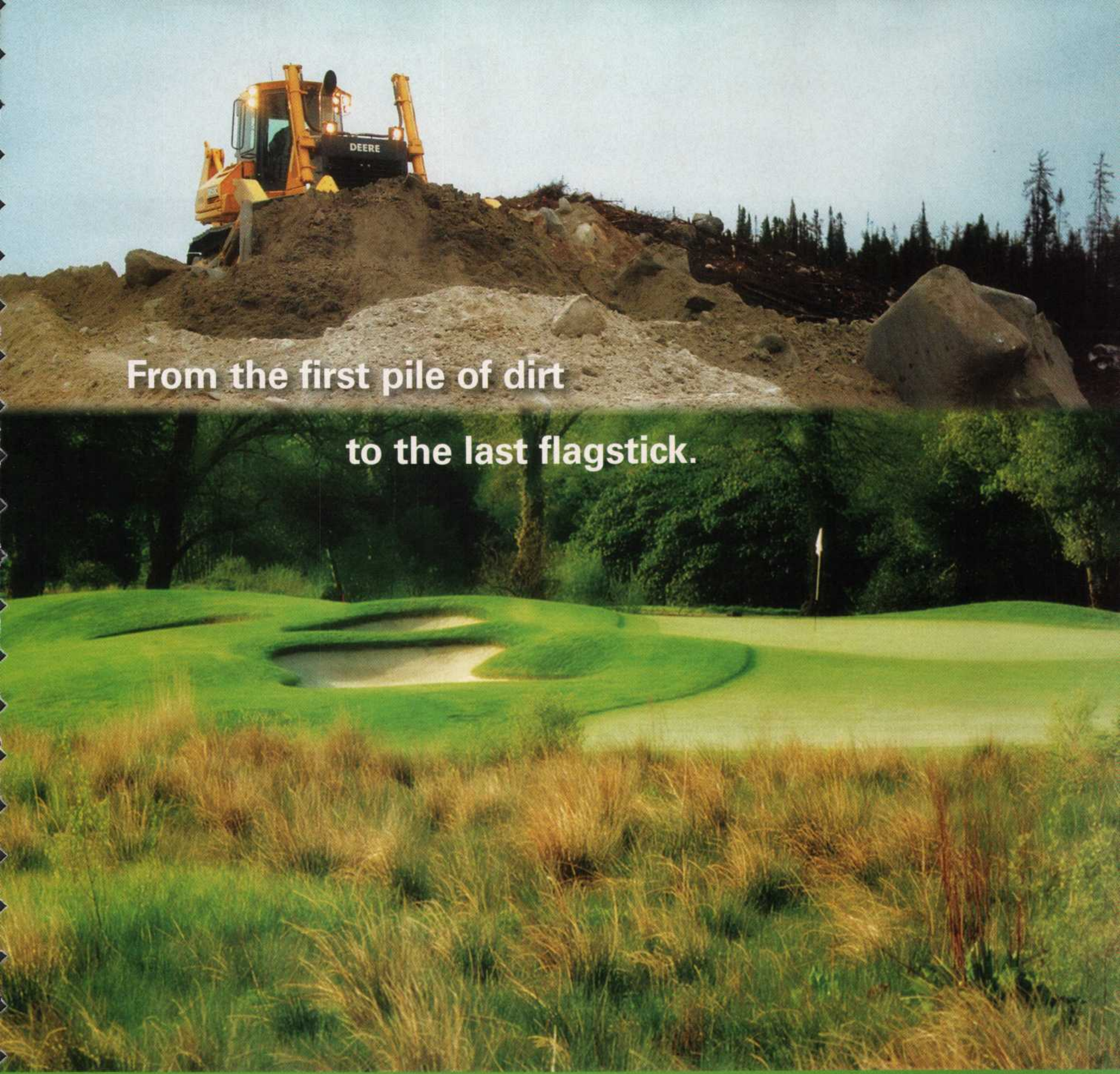

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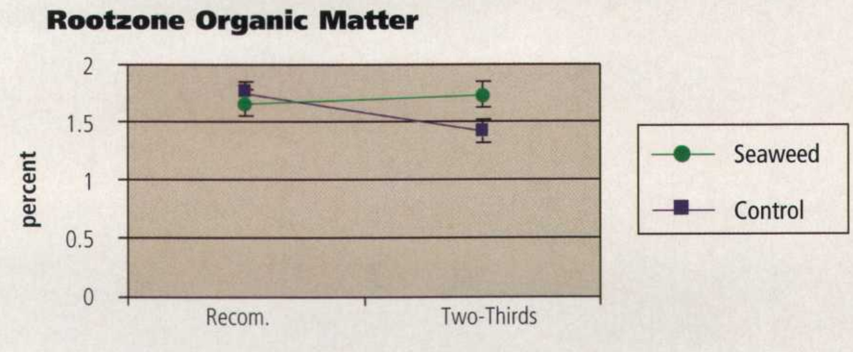
FIGURE 3



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QUICK TIP

Turfgrasses grown in the transition zone must tolerate the varying temperatures that accompany each of the four seasons. Most importantly, they must survive the transition from one season to the next. Preparing your course for these transitions requires adjustments in your fertility programs, which vary from season to season. We all know the importance of potassium in early fall applications, but nitrogen plays a significant role in a plant's ability to uptake this potassium. The fertilizer type that is applied is also important. A late fall fertilizer application with a release dependent mostly on temperature may not be sufficient in providing the plant with adequate nutrients to store carbohydrates.

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temperatures decline in the autumn.

Tissue nitrogen was significantly higher on both the first and second measurement dates compared to the last measurement date for both seaweed and control treatments. The seaweed significantly enhanced leaf tissue nitrogen compared to the control in August only. It is probable that as ambient and rootzone temperatures decreased during late summer/early fall, the beneficial effect of seaweed extract on nitrogen uptake decreased.

The seaweed treatment significantly elevated leaf tissue phosphorus levels compared to the control treatment on the first measurement date, but the opposite occurred on the second one. On the final measurement date, no significant difference in leaf tissue phosphorus occurred. Leaf tissue phosphorus concentration was significantly lower on the first measurement date compared to the last two dates for both seaweed and control treatments.

The seaweed extract decreased tissue potassium concentrations compared to the control in August with no significant differences in leaf tissue potassium being found on subsequent measurement dates. On the first measurement date, leaf tissue potassium was lower than the following two measurement dates for the seaweed treatment.

The seaweed significantly enhanced the availability of rootzone nitrate nitrogen compared to the control at both nutrient rates. For both the control and the seaweed treatments, available rootzone nitrate nitrogen concentrations significantly increased as nutrient input increased. It is possible that the seaweed extract increased microbial activity, resulting in increased nitrate nitrogen availability. The results indicate that seaweed extracts are useful in increasing rootzone nitrate nitrogen availability. However, this increase might not be translated into increased tissue N concentrations.

The seaweed treatment gave significantly lower rootzone potassium concentrations compared to the control on the first two measurement dates, although no significant difference in rootzone potassium concentration was found between treatments on the last measurement date. This may imply that the seaweed limited the available potassium supply to the plant.

The seaweed significantly reduced leaf proline concentration compared to the control (Figure 2).

Proline is a measure of stress levels within a plant and proline concentration increases as stress levels increase, suggesting that seaweed extract application may be useful in increasing stress tolerance in turfgrass, such as in drought situations. Quaternary ammonium compounds (such as betaines) are thought to play a pivotal role in cytoplasmic adjustment in response to osmotic stress and in agreement with Rhodes and Hanson (1993). It is possible that these were elevated in seaweed extract-treated plants.

The seaweed significantly increased rootzone organic matter compared to the control treatment at the two-thirds nutrient rate only

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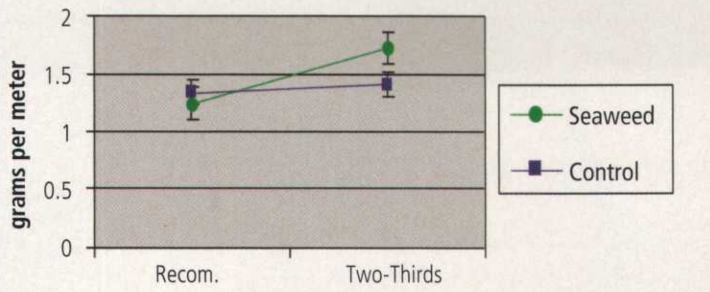
FIGURE 4

Turfgrass Root Mass



Tim Butler (tim.butler@ucd.ie) recently earned his Ph.D. in sports turf science from University College Dublin, Ireland. During his doctorate studies, he spent one year at Michigan State University. Alan Hunter, Ph.D., is a senior lecturer in the School of Biology and Environmental Science at University College Dublin, Ireland. Dr. Kevin Frank is an associate professor in the Department of Crop and Soil Science at Michigan State University.

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(Figure 3). At the recommended nutrient rate, no significant difference in soil organic matter accumulation was found between the biostimulant treatments. No significant differences in organic matter was found between the two-thirds and the recommended nutrient rates for the seaweed extract treatment. But for the control treatment, organic matter was higher at the recommended nutrient rate compared to the two-thirds recommended nutrient rate.

This experiment was fertilized using a foliar fertilizer. It may be possible the seaweed extract may have enhanced plant health at the two-thirds nutrient rate by supplying minerals and nutrients that the plant did not uptake at the recommended nutrient rate because the plant had adequate nutrient supply.

The seaweed extract increased root mass compared to the control, at only the two-thirds nutrient rate, implying that the two-thirds nutrient rate may be the best rate at which seaweed can positively impact root growth (Figure 4). At the recommended rate, nutrient concentrations might be excessive, and the benefits of the seaweed extract either were lost or at best were masked. Further research is required to verify these opinions, particularly in relation to the nutrient rate that appears to maximize seaweed extract benefits.

Similar research using seaweed extracts as well as studies on the influence of microbial inoculants and biostimulants on turfgrass growth and physiology is being carried out at University College Dublin.

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QUICK TIP

In preparation for the fall, some superintendents may overseed warm-season turf with cool-season grasses to improve appearance and playability of the golf course. Prior to overseeding, apply a plant growth regulator (PGR) to your course to suppress turf growth in order to give seedlings a quick start. For more information on preparing your turf for the fall, contact your local John Deere Golf & Turf One Source™ distributor or sales representative.

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The News on Dew Is Good and Bad

BY KARL DANNEBERGER

What's in dew? If I were to ask my sons this question, the answer would be caffeine. But for turf, it's the moisture that appears overnight on the turf leaf blade in the absence of rain or irrigation.

Dew forms when the leaf blade cools below the dew point (temperature at which moisture changes from a vapor to a liquid). Clear, cool nights with light wind are favorable for dew formation. Under these conditions, the radiative cooling from the leaf causes water condensation on the leaf. Besides the condensation of water vapor on the leaf blade, distillation or water from nearby leaves or soil contribute to dew. Water from condensation of water vapor and distillation are not distinguishable.

A third component of dew is guttation. Plant exudates or guttation appear through hydathodes or cuts in the leaf. Plant exudates are high in organic compounds like sugar and amino acids; water from condensation lacks these carbon compounds. Guttation droplets are distinguishable from water condensation because of their larger droplet size.

Dew forms at a theoretical maximum of about 0.08 mm per hour with a normal nightly accumulation of 0.3 mm to 0.5 mm (Garratt & Segal, 1988). Of the dew formed, approximately 33 percent is because of plant exudates or guttation as measured on a creeping bentgrass golf course fairway (Williams, et. al., 1998). Dew once removed early in the morning can re-accumulate with a higher proportion, 46 percent to 77 percent, comprised of plant exudates.

Agronomically, dew is important both positively and negatively. The presence of dew often is a sign of whether turf needs water. If dew is present, generally there is moisture present in the soil. However, in turf situations where dew is absent, this can indicate inadequate soil moisture, and watering during the day might be required.

Negatively, dew and associated wetting periods have been reported to influence disease severity. The duration of how long a leaf is wet, referred to as the wetting period, has influenced the severity of anthracnose (Danneberger, 1984).

CULTURAL PRACTICES CAN MITIGATE DISEASE PRESSURE AND SEVERITY AMID DAMP MORNINGS

Regarding dollar spot, reducing the dew period through early morning poling or mowing has reduced dollar spot severity (Williams, 1996). Although early-morning mowing increases the potential of wounding and thus more infection points, no difference in dollar spot specifically between mowing in the evening versus the morning has been cited (Williams, 1996). It appears the reduction in the duration of the dew period from an early-morning mowing is more significant than the wounding that might occur.

However, the impact of re-accumulation of dew following mowing or poling could be a factor in disease development due to the larger proportion of the dew being comprised of guttation water. The increased proportion of guttation water following initial removal can be qualitatively determined by striking a golf ball across a putting green following mowing or whipping. The ball picks up moisture and feels "sticky" if allowed to dry. The stickiness is due to the sugar from the guttation water. Often overlooked by golf course superintendents, early-morning golfers often attribute this stickiness to application of fertilizers or pesticides.

Research at Michigan State University has found that rolling after an early-morning mowing decreases dollar spot severity. The reason might be due to the fact that the greater proportion of plant exudates comprise the re-accumulated dew providing nutritional energy source for the fungus, and thus causing disease. Knocking off the re-accumulated dew by rolling reduces the sugars available and the dew period. It might make sense to lightly irrigate the putting green after mowing to dilute the re-accumulating dew or pole to enhance drying.

Karl Danneberger, Ph.D., is Golfdom's science editor and an Ohio State University turfgrass professor.