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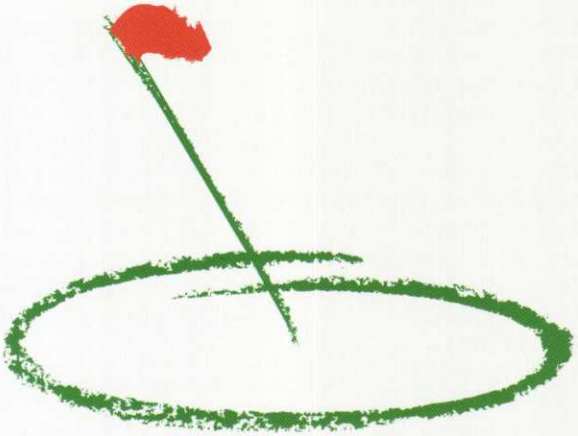

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Spray Solution pH

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By John Doyle
Simplot Partners

Every time you load your sprayer with pesticides, fertilizer and/or auxiliary products, you make a substantial investment in product, time and performance towards the management of your turf. Are you doing everything possible to maximize the return on your investment? The answer is no if you have not considered measuring and adjusting the pH of your spray solution.

Many, if not most pesticides and fertilizers, maintain the highest solubility and availability when prepared in acidic pH solutions. Yet the water you use to fill your spray tank, either domestic water supply or well water, is probably well above 7.0 pH and quite alkaline. This is especially the case when using domestic water supplies as the pH climbs quite high throughout the summer months due to increased treatment levels of chlorine to keep microbial levels in check. It has been noted that pH of 9 and above was detected from a number of municipal sources throughout the U.S. Even if your water supply has a pH within the acceptable range, the materials that you add to your tank may also dramatically impact the pH of your spray solution.

The problem with high pH levels is that hydrolysis can occur with certain pesticides and render them ineffective (See Table 1). This occurs when chemical reactions begin to take place with many pesticides once the pH moves above 7.0. The result of these reactions can negatively affect the active ingredient's effectiveness. Many examples have been provided for insecticides but there is some evidence that the same is true for fungicides and herbicides. There are only a few pesticides that actually perform better at a higher spray solution pH. Sulfonylurea urea herbicides are a good example. As the pH becomes more acidic, the stability of these materials decrease. In the case of tank mixing sulfonylurea urea herbicides, a spray solution pH of 7 allows for stability of the sulfonylureas, yet provides the ability to add materials that must avoid alkaline conditions. To be sure as to the pH that a pesticide requires, always refer to the label.

In addition to pesticide activity, there are some compelling examples of the impact of pH spray solution on nutrient availability. Generally, spray solutions in the 4-7 range maintain to greatest availability of nutrients for uptake by plants. Not only does an acidic spray solution show an increase in nutrient uptake by the plant, but there are also studies that show an increase in nutrient utilization as a result of lowering the internal plant tissue pH. An increase in iron utilization was demonstrated in studies in which citric acid or sulfuric acid alone (no nutrients) was applied to the plant.

Table 1. Spray Solutions pH Effects On Pesticide Half-life

Pesticide Material	Spray Solution pH	Half-life At Specified pH Values
Acephate (Orthene)	3	65 days
	9	16 days
Carbaryl (Sevin)	6	125 days
	7	27 days
	8	2-3 days
	9	1-3 days
Chlorpyrifos (Dursban)	5	60 days
	7	35 days
	8	22 days
	10	7 days
Trichlorfon (Dylox)	6	4 days
	7	6 hours
	8	1 hour

So what is the best way to check and adjust your spray solution pH? The first step is to use a good quality portable pH meter and do an initial test of the water going into the spray tank. If the pH is out of range (above 7.0) then add a spray solution acidifier/buffer. There are numerous good quality spray solution buffers on the market that will perform to adjust the pH downward and hold it there as other materials are added. Follow the directions on the label of the acidifier/buffer to properly adjust your spray solution. Once your solution is in the proper range, begin adding the materials that you plan to apply. Always follow the proper mixing order, especially when you have materials of differing formulation types. A good way to remember the mixing order is to follow the "W-A-L-E" approach.

Fill the spray tank half full of water and get the agitation going until the water in the tank is rolling. Test and adjust, if necessary, the pH.

Now begin the W-A-L-E sequence:

1. Add wettable powders and water dispersible granules first. (W)
2. Agitate until the Ws are uniformly dispersed, meanwhile adding water until the tank is 90% full. (A)
3. Add flowable liquids. (L)
4. Emulsifiable concentrates go in last. (E)
5. Now you can add any liquids (true solutions) such as liquid fertilizers and surfactants.

Now top off the tank, continue agitation and the pesticides are properly mixed. Check the pH one last time and adjust as necessary. This will ensure the maximum longevity in response.

It is better to mix liquids with liquids or wettable powders with wettable powders, rather than a liquid with a wettable powder. Small quantities of wettable powders often mix easier if slurry is made first.

There is a lot of work that needs to be done to determine the extent of the effects that spray solution pH has on many fungicides, herbicides and fertilizers that are available in the marketplace. Still there is plenty of evidence that monitoring and adjusting your spray solution pH when necessary can provide the opportunity to get much more out of your investment. One way to begin assessing the impact of correcting spray solution pH is by recording pH in a notebook along with the longevity and degree of performance that you get from the corresponding application. In the end you may find that a minor investment in time could return substantial performance increases in your spray programs.

MGCSA July 13 Board Meeting Highlights

The following reports were given at the July 13, 2004 Minnesota Golf Course Superintendents' Association Board Meeting at Waseca Lakeside Club.

MGCSA Business Office: Scott Turtinen reported dues are approaching budget, but still a little under. *Hole Notes* advertising is in very good shape. Discussion whether the MGCSA should give the University of Minnesota the remaining $50,000 commitment this year since funds with the brokerage firm are gaining very little interest. Motion by Jack MacKenzie, CGCS, passed to move research money $42,000 into a 1-year CD so it is available for next year's commitment to the University. $25,000 (was) given to the University at Field days on July 29.

Turtinen reported the net proceeds from various 2004 MGCSA events. The Scholarship scramble netted $2,287; Sponsorship dollars totalled $13,117; Turf Tourney netted $12,172 and the BASF Tourney totalled $6,200.

Promotional brochures supplied by GCSAA will be sent to 200 clubs that are not represented in our association.

President's Report: Panuska reported that the MGCSA should help promote the smaller clubs more. The Board make-up is good in this regard.

Arrangements: 2005 tentative schedule: The Spring Mixer in May will be held at Northlinks; the Scholarship Scramble in June will take place at Town & Country Club; The MGCSA Championship in August will be held at Midland Hills; The Harold Stodola Research Scramble will take place at Minneapolis Golf Club, and the October Fall Mixer will take place at Monticello Country Club.

Conference & Education: James Bade has the golf track set for the January 5-7, 2005 Minnesota Green Expo.

Fundraising: Discussion on how to allocate $19,000 raised through fundraising. BASF raised $6,200; some will go to the University of Minnesota and some to the general fund. Sponsorship raised $13,000. There was discussion on different plans. A motion passed to have the October meeting a free meeting for Superintendents (class a-b-c-d-students) and charge $20 for Affiliate members, the $20 would go towards prize money.

Industrial Relations: A vendor wanting to sponsor a meeting should go through the MGCSA Office so it can get proper GCSAA credit. Fees needed to be paid to GCSAA would be paid to the MGCSA. This is the correct protocol. Vendor's could then advertise the event via the MGCSA e-mail list.

Legislative Update: Brian Horgan applied for money from the Legislative Resources, (Lottery money). Eckholm contacted our lobbyist in support of Horgan's request but it came to no avail.

Membership: New members were approved *(See Page 18)*.

MTGF: Income split from the Green Expo between the MTGF and MNLA will remain the same. There will be no more guarantee of a minimum amount that the MTGF had before.

(Continued on Page 36)

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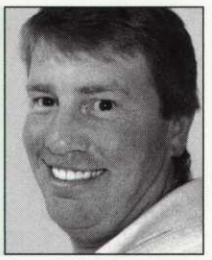

Paul Diegnau, CGCS, Keller Golf Course

Keller Golf Course is an 18-hole public golf course located on the east side of St. Paul. It is owned and operated by Ramsey County. It was designed by Paul N. Coates, a Ramsey County engineer, who designed several other golf courses in the Twin Cities and throughout Minnesota. Keller was a regular stop on the PGA tour, hosting the St. Paul Open from 1930 -1968, in addition to the PGA Championship in 1932 and 1954. Other notable tournaments include the Western Open and the USGA Amateur Public Links Championship. The LPGA also used Keller GC as a regular tour stop from 1973-1980 with the Patty Berg Classic.

Years in the Business

I have 22 years in the industry, all as superintendent at Parkview GC, River Falls GC and Keller GC. I was never an assistant, so not only did I jump into the fire feet first, I received a turf degree from the school of hard knocks. I actually have a B.S. in biology from the University of Minnesota.

Why did you enter the turf management industry?

I am no different than 90% of my colleagues: I love the game of golf, being outside and working with Mother Nature. My original intent was to work for the DNR in wildlife or fisheries management upon graduation. I soon realized that this was not going to happen and I responded to an ad for golf course work. The rest is history.

Who was your professional mentor and why?

Tom Haugen, former golf course owner and superintendent, golf course architect, and once upon a time, sales rep for Wilbur-Ellis. He took me under his wing and taught me a lot about the golf industry and golf course maintenance.

What has been the highest point in your career?

Fledging 100 bluebirds for the 2004 season, shattering our previous mark by some 35 birds.

What has been your lowest point?

Several years ago I reluctantly came to the realization that government is really an inefficient, ineffective, bureaucratic machine and, realistically speaking, there is little I can do to change it.

Are your greatest challenges political, agronomic or managerial?

Definitely managerial as in personnel management. Trying to keep 15 individuals all on the same page and working side-by-side in harmony, day in and day out is always very challenging. I am always challenged when attempting to communicate with the non-English speaking members of our staff (I need to improve my Spanish). Throw in the fact that five full-time staff are union employees and that can make things even more challenging.

"I am no different than 90% of my colleagues: I love the game of golf, being outside and working with Mother Nature."

What is the most difficult disease to manage on your course?

We primarily deal with summer patch, anthracnose and dollar spot. We find that disease intensity for these three pathogens tends to vary dramatically from year to year. We spray curatively only when we absolutely have to or are sure an outbreak is imminent. We try to engage in as many IPM practices as possible and we set liberal disease thresholds.

Is it hard to find good help in your area of the state?

In my nine years here at Keller GC, I have experienced both ends of the spectrum. The first five years I had to beg, borrow, and steal to find quality individuals willing to work. The past four seasons my staff has been stabilized with "retirees" and Hispanic workers. We currently have a great group of people working on the grounds at Keller.

Do you have a dog on your crew?

Yes, for the past two seasons I have been bringing my dog, Kelli, with me to the course on a regular basis. She is a six-year-old Springer Spaniel/Lab mix that has an affinity for water and chasing squirrels, fox and rabbits. Unfortunately, early this spring she ruptured the cruciate ligament in her right knee while running on the golf course. After an expensive surgery and twelve weeks of rehabilitation she returned the golf course and proceeded to rupture her other knee. Needless to say, she is currently in rehabilitation following her second surgery and probably won't return until next year.

Where will our industry be in ten years?

Technology will continue to innovate the procedures and processes we use to maintain our golf courses on a daily basis. There will probably be fewer golf courses due to decreased demand and/or "Joe Public Golfer's" inability to pay the ever increasing green fee.

Where would you like to be in ten years?

Hopefully, still in this industry and excited to go to work every morning.

What is your perspective of our state association and what would you change?

I believe MGCSA is doing a fine job. As far as change, I would like to see more member participation, less dilution of our association, both local and national (we seem to be losing our identity as our own entity), and attain greater political clout at state and national levels.

Name your foursome, who would you play with?

Freddie Couples *(just to watch that swing)*, Charlize Theron *(just to watch her swing)*, and David Feherty *(to keep things light)*.

Marking the Other Golf Course Hazard – Your Trees

By Brian C. Nettz, CGCS
Certified Arborist

On July 15, 2004 William Harrell was out on the golf course enjoying life and the company of a friend while playing at their country club in North Carolina. The wind was strong that day. In fact it was strong enough to have blown over a 35-foot tree onto the golf cart that was occupied by William and his partner. Tragically, a day's enjoyment and William's life were crushed under the weight of the tree, which had severe root-rot underground. This sad story was published as a blurb in the August 6 issue of Golfweek's SuperNEWS. Many would argue that it was an act of God. The reality is that the article probably does not detail a probable investigation into the contributing factors of the root-rot, and whether there was any negligence on the part of the club to remove the hazard.

In addition to the lateral and direct hazards that we mark on the golf course, it is important to remember and look up in order to assess tree hazards. Improper marking of a water hazard will get you a lecture from the Green Committee Chair, the GM, or the irate golfer that just lost his $ 50 bet. Improper marking or failure to mark a reasonably foreseeable tree hazard will get you subpoenaed and stuck in deposition and litigation purgatory. In today's litigious society, it is the responsibility of the superintendent as his/her employer's fiduciary to mitigate potential lawsuits.

You cannot eliminate tree hazards entirely. In theory every tree could be categorized as a hazard. What you want to accomplish is to take effective measures to reduce the failure potential of a tree. Identification and correction of structural defects significantly reduces the failure potential. Species, growth habit, soil conditions, history and environment are all factors as well.

There are three components in assessing tree hazards. First is the probability of failure. A large tree with an extreme structural defect, such as severe internal rot, could be a hazard. Second is the environment that may contribute to failure. A large tree with this internal rot in a wind corridor could be more hazardous than inside a large grove of trees. Third is a target. A large tree with severe internal rot in a wind corridor over the eighth tee is a severe hazard. If the same tree were off in the distant grove of trees 100 yards off the fairway, it would not be a hazard because there is no target. A hazard, by definition, must have the ability to harm people and/or property.

Not a Hazard

Evaluating tree hazards begins by developing a systematic process of evaluation and sticking with it. On a golf course, I stick with the areas of highest target value/density. If you have large trees at the end of their life-cycle like we have here, your annual tree hazard budget could run in to the many tens of thousands of dollars. Concentrate on tees, greens, bunkers, parking lots, roads, buildings, and neighbors. Any areas around tees and greens where golf carts park should be included. It is not a highly technical process to do an evaluation, but it does take some time and some effort. The International Society of Arboriculture has a systematic, standardized booklet explaining hazard identification and it also provides sample forms that can be used.

One should begin the process by examining the tree from a distance. Get a look at the tree as a whole. Then you should proceed to check the trunk and crown area of the tree. Lastly you need to examine the canopy of the tree.

Things to look for from a distance primarily are lean, location/environment, crown dieback, and branches that stick out further than the rest of the crown. Trees with severe lean are better off removed. If a period of saturated soil conditions arrives, its eventual fall-over will occur. Trees may lean due to growth form and environment. They naturally produce reaction wood to offset the different weight distribution associated with natural leaning. But a severe lean, as seen in the picture, is cause for concern and action. While you are examining the tree from a distance, you will also notice the environmental factors that act upon the tree. You should note the prevailing wind, location in relation to other trees, distance from roads and buildings and general vigor.

Closer examination is needed for the trunk and the root collar. At this stage of the game we want to see the taper of the trunk, the amount of internal decay and other important structural features. Also look for codominant stems, or trees with two major trunk portions. Ideally trees that have codominant stems should have the weaker of the two stems cut back, or subordinated, when the tree is juvenile. Codominant stems have included bark where the two stems grow against each

(Continued on Page 28)

Trees –

(Continued from Page 27)

other and this is a weak wood formation that will eventually end in failure. The failure potential of codominant stems can be lessened with the use of cables. Cables should be placed fl the distance from the crotch to the end of the stems and secured with special hardware. Check for internal decay. Signs of decay are holes, animal shelters, beehives, fruiting bodies and conks. If the decay is greater than 30-35% of the trunk's solid wood, removal is recommended. If there is a cavity in the tree that is greater than 25% of the total amount of wood, remove it. If the tree is leaning, look for signs of soil heaving or cracking where the trunk and soil meet. Trees with heaving soil require immediate removal. Proper trunk taper is also important. Good trunk structure has a nice taper from the root crown to the top. Long, slender trunks with no taper are candidates for blow-over in strong wind. Be especially aware of this if your course has "edge trees." Edge trees where trees were once in the middle of a grove and now are on the edge. Because the trees that were on the edge sheltered the ones inside, the inside trees tend to grow long and slender. Exposure to wind creates taper, and trees sheltered from wind have no taper. These trees are weak. They are prime candidates for blowing over. This is typical of courses that were carved out of large tree stands. Winds can be funneled by fairways, and the wind picks up speed as it moves into the open areas.

When you examine the tree scaffold be on the watch for

Condominant Stems

branches that rub other branches. Rubbing will eventually create decay and cause a failure. Check the branches where they attach to the trunk and parent branches (branch collar). Remove any branches that are larger in diameter than the parent stem. Remove any branches that stick out noticeably further from the trunk than the majority. Cut off any branches that are already

(Continued on Page 34)

2003-2004 Snow Mold Control Evaluation

Giants Ridge Golf Resort (Creeping Bentgrass Fairway)

By S. W. Abler, G. Jung[1], B.P. Horgan[2]
[1]Department of Plant Pathology, University of Wisconsin Madison
[2]Department of Horticulture, University of Minnesota

Introduction

In the absence of a turfgrass pathologist at the University of Minnesota, plant pathologists at the University of Wisconsin have been evaluating fungicides for the control of Typhula blight (Typhula ishikariensis) or snow mold. In addition to their sites throughout Wisconsin, Dr. Jung evaluated 75 various products and combinations to determine their effectiveness in controlling snow mold at Giants Ridge Golf Resort in Biwabik, MN.

Experimental Methods

This evaluation was conducted on creeping bentgrass maintained under golf course fairway management conditions, at 0.5-inch cutting height. Individual plots, 3 ft x 10 ft, were arranged in a randomized complete block design with three replications. The experimental area was not inoculated; all disease development was of natural occurrence. Treatments were applied with a CO2-powered boom sprayer, using XR TeeJet 8005 VS nozzles, at 30 psi, in water equivalent to 2 gal per 1000 sq ft. Granular applications were applied using a shaker jar. Early applications were made on October 23, 2003, mid-application on November 8, 2003, and late applications on November 16, 2002. Percent speckled snow mold and quality were rated on April 15, 2004. Data obtained were subjected to analysis of variance and LSD was used to determine significant differences between treatment means.

(Continued on Page 32)

Table 1. Percent snow mold ratings from plots in Biwabik, MN taken April 15, 2004

Trt No.	Treatment Name		Form	Rate	Appl. Timing	% Snow mold Apr-15-04		Quality** Apr-15-04	
1	Untreated Control					51.67	a	2.3	j
2	Chipco 26 GT	2	SC	4 FL OZ/1000 FT2	Late	0.33	n	7	A
	Daconil WeatherStik	6	F	5.5 FL OZ/1000 FT2	Late				
	Turfcide 400	40	F	6 FL OZ/1000 FT2	Late				
3	Compass	50	WG	0.25 OZ/1000 FT2	Late	3.67	j-n	5.7	a-e
	Daconil WeatherStik	6	F	5.5 FL OZ/1000 FT2	Late				
	Turfcide 400	40	F	6 FL OZ/1000 FT2	Late				
4	Compass	50	WG	0.25 OZ/1000 FT2	Late	5	i-n	5	c-g
	Turfcide 400	40	F	6 FL OZ/1000 FT2	Late				
5	Compass	50	WG	0.25 OZ/1000 FT2	Late	7.5	i-n	5.3	b-f
	Daconil WeatherStik	6	F	5.5 FL OZ/1000 FT2	Late				
6	Chipco 26 GT	2	SC	4 FL OZ/1000 FT2	Late	0	n	6.3	abc
	Bayleton	50	WG	1 OZ/1000 FT2	Late				
	Turfcide 400	40	F	6 FL OZ/1000 FT2	Late				
7	Bayleton	50	WG	1 OZ/1000 FT2	Late	0.33	n	6	a-d
	Turfcide 400	40	F	6 FL OZ/1000 FT2	Late				
8	Bayleton	50	WG	1 OZ/1000 FT2	Late	4.5	i-n	5.3	b-f
	Daconil WeatherStik	6	F	5.5 FL OZ/1000 FT2	Late				
9	Signature	80	WG	4 OZ/1000 FT2	Late	0.83	n	6.7	ab
	Chipco 26 GT	2	SC	4 FL OZ/1000 FT2	Late				
	Daconil WeatherStik	6	F	5.5 FL OZ/1000 FT2	Late				
10	Insignia	20	WG	0.9 OZ/1000 FT2	Both	15.83	e-n	4.7	d-h
11	Insignia	20	WG	0.9 OZ/1000 FT2	Both	1.17	n	6	a-d
	Iprodione Pro	2	SE	4 FL OZ/1000 FT2	Both				
12	Banner MAXX	1.3	ME	2 OZ/1000 FT2	Late	10	g-n	4.7	d-h
13	Medallion	50	WP	0.33 OZ/1000 FT2	Late	11.67	f-n	4.3	e-i
14	Medallion	50	WP	0.5 OZ/1000 FT2	Late	7	i-n	5.3	b-f
15	Medallion	50	WP	0.5 OZ/1000 FT2	Late	11.17	g-n	4.7	d-h
	Turfcide 400	40	F	6 FL OZ/1000 FT2	Late				
16	Daconil Ultrex	82.5	WG	3.2 OZ/1000 FT2	Late	31.67	b-e	3	ij
17	Heritage	50	WG	0.4 OZ/1000 FT2	Late	35	a-d	3.3	hij
18	A14036B	3.6	SE	9.3 OZ/1000 FT2	Late	0	n	6.3	abc
19	A14036B	3.6	SE	4.7 OZ/1000 FT2	Late	0.83	n	6.3	abc
20	A14036B	3.6	SE	14 OZ/1000 FT2	Late	0.33	n	5.7	a-e
21	Banner MAXX	1.3	ME	2 OZ/1000 FT2	Late	3.33	k-n	5.7	a-e
	Medallion	50	WP	0.5 OZ/1000 FT2	Late				
22	Banner MAXX	1.3	ME	3 OZ/1000 FT2	Both	0.33	n	6	a-d
	Medallion	50	WP	0.5 OZ/1000 FT2	Late				
23	Daconil WeatherStik	6	F	5.5 OZ/1000 FT2	Late	0	n	6.7	ab
	Medallion	50	WP	0.5 OZ/1000 FT2	Late				
24	A13972A	95	ME	2 OZ/1000 FT2	Late	18.33	d-m	3.7	g-j
25	AND3118 (chlorothalonil)	5	G	15.1 LB/1000 FT2	Early	7	i-n	5.3	b-f
	AND3224 (PCNB)	15.4	G	6.36 LB/1000 FT2	Late				
	AND3238 (iprodione)	1.3	G	7.21 LB/1000 FT2	Early				
26	AND3118 (chlorothalonil)	5	G	15.1 LB/1000 FT2	Three	0	n	6	a-d
	AND3237 (triadimefon)	1	G	12.5 LB/1000 FT2	Three				
	AND3238 (iprodione)	1.3	G	7.21 LB/1000 FT2	Three				
27	AND3131 (chloroneb)	6.26	G	5.95 LB/1000 FT2	Late	6.17	i-n	5	c-g
	AND3224 (PCNB)	15.4	G	6.36 LB/1000 FT2	Mid				
28	AND3131 (chloroneb)	6.26	G	5.95 LB/1000 FT2	Late	13.33	f-n	4.3	e-i
	AND3226 (PCNB)	15	G	6.36 LB/1000 FT2	Mid				
29	AND3099 topsin/chloroneb	4.9	G	5.76 LB/1000 FT2	Early	8.67	h-n	5.3	b-f
	AND3118 (chlorothalonil)	5	G	15.1 LB/1000 FT2	Early				
	AND3224 (PCNB)	15.4	G	6.36 LB/1000 FT2	Late				

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