The Effects of pH on Fungicide Effectiveness

By Dr. Houston B. Couch

The pH of the spray solution can have a significant effect on the performance of certain fungicides. Therefore, it is important to monitor the pH of the spray solution.

With the benzimidazole fungicides (Tersan 1991, Fungo 50, Cleary 3336), the parent compound is not toxic to fungi. It is after you have applied the spray to the plants that these materials break down into a fungicidal compound. The process of decomposition to the fungicidal breakdown product is more rapid when the spray preparation is in the acid range.

A pH range of 7.5 to 8.5 is common in untreated water throughout North America. The pH of water treated for urban use often falls between 9.0 and 9.5.

The active ingredients of some pesticide formulations undergo hydrolysis to non-toxic compounds when the spray preparation is alkaline. Hydrolysis is an irreversible chemical reaction in which the hydroxyl ions in the water interact with the pesticide in such a manner as to break it down into a non-toxic compound.

Even in instances in which the active ingredient component of a fungicide formulation is stable under alkaline conditions, there is still the possibility that in this pH range, the general makeup of the total formulation may become altered.

Of the various pesticide groups, insecticides are more prone to alkaline hydrolysis than fungicides. The organophosphates, carbamates, and synthetic pyrethroids are particularly sensitive to breakdown when the spray solution is alkaline.

Fungicide Research

In recent years, field research has been conducted to determine the effect of acid and alkaline pH levels of spray tank preparations. Seven standard turfgrass fungicides were tested on their ability to control Sclerotinia dollar spot of 'Penneagle' bentgrass. Disease control among the various pH treatments was compared on the basis of initial reduction in disease incidence and how long the control lasted.

The fungicides tested in these trials were Vorlan, Dyrene, Rubigan, Daconil 2787, Chipco 26019, Banner and Bayleton. Additives were used to adjust the individual tank preparations to pH 3.5, 6.5 and 9.5 respectively. A portion of each spray preparation was applied to the grass immediately, and the remainder stored for 24 hours at 71 degrees F and then used. The results of these studies showed the following.

❑ The initial preparations of Chipco 26019, Vorlan, Banner and Bayleton are tank stable in the pH 3.5 to 9.5 range. Also, storage for 24 hours at these pH levels apparently does not alter the disease control effectiveness of this group of fungicides.

❑ Dyrene is alkaline sensitive. At pH 9.5, the effectiveness of the initial tank preparation drops rapidly. However, if the spray preparation is in an acid range (pH 3.5 to 6.5) and if you use it at the time it is made up, there will not be a reduction in disease control potential. If you allow Daconil 2787 to stand for 20 hours before you apply it, regardless of the pH of the preparation, it will lose a significant amount of its fungicidal properties.

❑ The pH of the spray preparation does not have an immediate effect on the disease control potential of Dyrene. However, if these preparations are held for 20 hours before use, a major drop in their disease control effectiveness can occur at both acid and alkaline pH levels.

❑ If you use Rubigan at the time you prepare it, its disease control potential will not be affected by pH. Also, spray preparations of this material that are stored for 24 hours at pHs from 6.5 to 9.5 will retain their initial disease control effectiveness. However, if you allow Rubigan to stand for 24 hours at pH 3.5, it can lose a significant amount of its potential for disease control.

Monitoring pH

A properly ordered pesticide operation is one that includes monitoring the pH levels of the spray preparations. Know the degree of pH stability of the active ingredient and the formulation as a whole for each pesticide being used in the spray program.

Determining and recording the pH should be a standard procedure for every spray preparation. Owning a pH meter is not a luxury. It is a must for you to carry out the pesticide spray program properly.

On a weekly basis, check the pH of the water you are using to prepare the spray. This information will enable the operator to assess the water's potential for hydrolyzing the various spray materials.

However, the most important pH reading is the one made on the pesticide preparation itself. The reason for this is that some formulations of pesticides contain buffering agents that offset the alkalinity that exists in water in some areas. For example, Dyrene and Daconil 2787 contain buffers. Base your decision on whether or not to acidify the preparation on the pH reading of the spray mixture, not the pH of the water alone.

If it does prove to be necessary to acidify the spray preparation, a commercially prepared adjuvant for that purpose, such as Spray-Aide (Miller Chemical Co., Hanover, PA) is preferred over the use of muriatic acid. ❑

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Grooming Baseball Fields: Tips and Techniques

By W. R. (Bill) Chestnut

Ball field grooming needs to provide a safe and acceptable play area that also looks good to stadium management and the ballgame viewers. Providing an infield that yields consistent bounces while still staying within a limited budget is a constant challenge.

Often, the infield area is a specially combined media mix, installed when the field was constructed. The outfield area tends to be natural soil that was in place before construction began. These two field areas may have different drainage and water retention patterns, and require strikingly different maintenance procedures.

Skinned areas should be maintained for firmness, footing uniformity, and resilience.

The composite soil make-up of the skinned areas varies from 80-percent calcined clay and 20-percent sand to 80-percent sand and 20-percent calcined clay. Other variations include agricultural lime for baseline areas and blue clay for the pitcher's mound. Prior to the beginning of play each year, you must bring these skinned areas up to standards, which usually requires adding more material.

Typically, your maintenance routine would include daily light waterings on the skinned surface to maintain softness and scarifying to enhance resilience. Fill, roll, or tamp low spots or infirm areas as necessary. If the soil surface is too wet for play, you can scarify the field to accelerate drying or apply additional calcined clay products to further accelerate the drying process.

The baselines are often worked early in the morning to take advantage of the moisture from the dew. If moisture is insufficient, you can lightly water the area to achieve the desired consistency.

Maintenance Methods

One method of working the baseline area is to use a hand rake. Some groundskeepers prefer to rake lengthwise to avoid kicking clay onto the grass. Rake lightly, just scratching the surface enough to fill in any holes. After raking, you can firm the baseline with a turf roller, especially in the areas of heaviest wear—between home and first and first and second bases.

Most groundskeepers use some sort of drag for grooming. Field drags may be old boards or nail drags made of railroad ties with approximately 1,000 nails in them. Use these on the skinned areas of the field and around the mound.

Keep field finishers or drags away from the adjacent turf to ensure that a lip does not form in the grass. Remove any soil that is kicked onto the grass. A stiff bristle broom, flat shovel, high pressure hose or leaf rake will do the job.

When you use a broom or leaf rake, the soil is pulled inward toward the baseline. Some field managers prefer a shovel to a broom because they feel the broom tends to push the clay back into the grass. If you use a hose and nozzle to blow the clay off the grass edge, be careful to keep from forming lumps and ridges in the grass.

To avoid creating a lip, make a grass edge cleaning procedure part of daily field care. If necessary, repeat the procedure after pre-game batting and infield practice.

Some field managers will remove the lip by aerating over the problem area, and then rolling it out. If an extensive field lip has been created, you may need more drastic measures. To renovate such areas, use a sod cutter to cut the sod back along the baselines. Remove the sod and excess dirt. Use a level to replace the sod at the proper height. You can use the same procedure on the area around the pitcher's mound.

When conditions are especially hot and dry, it may be beneficial to attach brooms to the back of the traditional nail drag. This allows the nails to dig in well and the broom to smooth and finish the clay in the same step. This method seems to help counteract the compaction a heavy tractor pulling the drag can cause. You can follow with a second dragging with a screen drag to create the same cushion effect.

When standing water remains on the skinned areas, you can pull a long hose over the area to remove it. Do this as early in the day as possible. If necessary, work a calcined clay conditioner into the baseline pathes to absorb excess water that the hose can not remove.

Later in the day, dragging and turf-rolling will firm the surface. A second dragging will put on the finish. You can improve skinned areas that harden quickly and stay wet for long periods by

incorporating a soil conditioner into the top two inches of clay. When rain is threatening, some groundskeepers prefer not to open up the clay by dragging until about an hour prior to practice.

Put the final finish on the skinned surfaces before each game. For the final finish, hand rake with a specially constructed drag or field finisher. Apply the finish in a spiraling motion, starting at first base working toward third base, in a clockwise or counterclockwise motion. Reverse the patterns each time to prevent uneven spots.

Using Riding Bunker Rakes

When personnel hours are at a premium, riding sand rakes, such as the John Deere 1200 Bunker and Field Rake, can speed the process. Riding sand rakes enable the user to groom and put a finish on ball fields in considerably less time than raking by hand. The operator can even attach a small gang drive reel mower and mow the field.

Using the field rake, scarify the skinned areas 1/2-inch deep with the narrow scarifier attachment. The conditioner rake also should be in the down position to loosen the soil surface and accelerate drying. You can fill in any low spots by using the 60-inch-wide aluminum blade.

Avoid the grassy areas of the field when dragging, scarifying and finishing to avoid creating a lip at the grass edge. You can pull an aerator behind the rake to aerate and relieve the lip. If the field does not dry sufficiently, use the conditioner rake to apply the final finish. When the field is dry, use the rear-mounted field finisher for this final step. Apply the final finish in a spiraling motion just as you would using self-built drags.

Checking the Grade

Grade conditions may have gradually altered over the years, affecting drainage. Use a scraper blade for changing the grade of an area or when you renovate a field. You can accomplish additional field care projects quickly and easily by using the a field rake.

During the playing season, check field dimensions every two to three weeks, depending on growing conditions. Stretch a string along the baselines and diamond to provide a straight edge. You can use a power edger or sod cutter to recut sharp lines.

Early in the season when there is more grass to remove, you can use a hoe to dig out grassy clumps and the fill in low areas with clay. Keeping the clay and grass flush with each other will allow the ball to roll true. In the off-season, you can use glyphosate after the edging procedure to spot treat grass clumps.

John Deere 1200 Bunker and Field Rake at work on the warning track of Wrigley Field.

The Pitcher's Mound

The pitcher's mound is usually constructed of a firmer clay than the rest of the field. Keeping the mound completely flat around the rubber allows the pitcher to step from the rubber and remain on level ground. You can maintain the mound edges at an approximate 45-degree angle down to the infield.

You can bury mats underneath the clay of both the pitcher's mound and home plate to help prevent players from causing extensive damage to the field by digging deep holes. With the flat side of an aluminum rake, you can fill in the batter's boxes and catcher's holes.

After each period of play, sweep loose dirt from the foot holes in the mound and batter's boxes, lightly wet the depressions, add fresh material and tamp down. If problem areas require more than one layer of material, wet and tamp each layer as you apply it. Maintain bullpens in the same manner. Where possible, wet down and cover the mounds until the next practice or game.

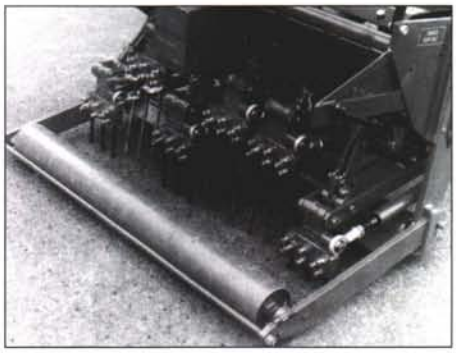
Ideally, ball fields will be equipped with irrigation systems. With or without automated irrigation, adjust watering to weather conditions and field use. Keeping turf moist enough for proper growth while keeping the baselines dry is a continuing problem. Highly used areas, such as the grass around home plate, need additional water to combat stress. ❑

W. R. (Bill) Chestnut is Marketing Coordinator for the Golf & Turf Products Divison of John Deere.

ROOKIES

PRODUCT UPDATE

DEEP-TINED AERATOR



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The unit has a working width of 48 inches. Like other Verti-Drain machines, it has a recommended operating speed of .5 mph.

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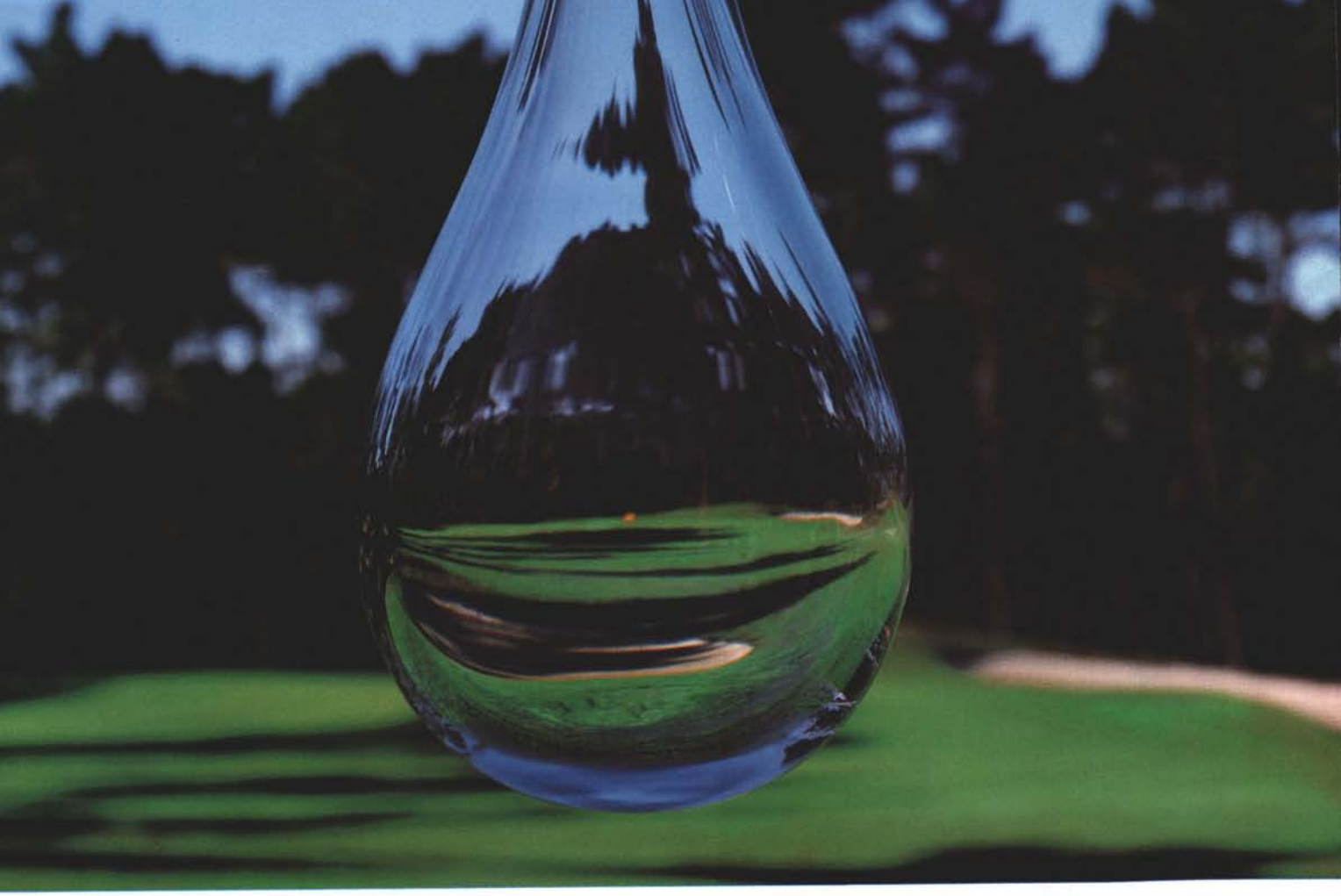

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