Phosphite Technology: Fertilizer or Fungicide?

The most successful spray program I've implemented at Cantigny since 1996 has been Aliette Signature and Daconil Ultrex on greens every two weeks through June, July and August. Due to the overwhelming success of the Signature program on greens, I wanted to expand that type of program to my fairway turf. Obviously, for 56 acres of fairways, that would prove to be cost-prohibitive.

During periods of high stress . . . the roots of the turf plants excrete enzymes that actually stimulate disease pathogens like pythium. The obvious key is to prevent the plant from reaching this level of stress, therefore reducing its susceptibility to disease. I first considered an alternative to the Signature program when some of my trusted sales representatives introduced me to phosphite fertilizers. These phosphite fertilizers with an analysis of 0-28-26 were touted as *Aliette Signature in a liquid form without the aluminum tris.* I was originally skeptical, but mostly curious as to how a fertilizer could mimic this fungicide. My fairway soil tests showed that I was very low in phosphorus and potassium, so I decided to design a program incorporating 0-28-26 on a biweekly basis. Since I needed phosphorus and potassium anyway, if I happened to receive some fungicidal activity as well, that would be a bonus. All the while I was ready to spray a knock-down pythium product at a moment's notice.

At the June 2001 MAGCS meeting at Point O' Woods Golf and Country Club in Michigan, Dr. Joe Vargas gave an educational seminar, speaking on phosphite fertilizers and Chipco Signature. Most interesting to me was the response of turfgrass plants to these products. According to Dr. Vargas, the application of Signature creates a fungicidal response within the plant in several ways. These are:

- Increasing production of "phytoalexins," or the natural fungicides within the plant.
- Slowing the respiration of the plant, which assists in getting through stressful periods.
- Stimulating the accumulation of carbohydrates within the plant.
- Increasing the thickness of cell walls.

All of these plant responses have been proven effective in warding off pythium infections and summer bentgrass decline. The key to this program's success is, in my opinion, limiting the stress of the turfgrass plant. During periods of high stress, Dr. Vargas noted that the roots of the turf plants excrete enzymes that actually stimulate disease pathogens like pythium. The obvious key is to prevent the plant from reaching this level of stress, therefore reducing its susceptibility to disease.

When designing my 2002 fairway program, I set out to mimic the (continued on page 12)

Phosphite Technology: Fertilizer or Fungicide? (continued from page 11)

Signature program as closely as possible. I decided to use Phosguard 0-28-26 phosphoric acid, or "phosphite technology fertilizer," in an attempt to stimulate a similar response in the turfgrass plants as achieved with Chipco Signature. The key to this program, however, is repeated applications on a regular basis. The following (see shaded box below) is an illustration of my 2002 fairway program and rates of products used. Included are the outbreaks of active pythium on untreated check plots on tees.

It is exciting to note that during this year, there was not a single outbreak of pythium on any fairway even when disease was active on the indicator areas. It was my strategy from very early on to purposely not treat all of my key indicator areas for pythium. This was to provide myself with check plots to confirm the presence of active pythium. I was very successful in growing disease in all of my key indicator plots on June 26 and July 22, which proved to me the presence of pythium. It is important to note that

on every occasion since 1995, when I had disease on my indicator areas I also had disease on most problem areas on fairways. My confidence in the phosphite fertilizer was building throughout the season as my fairway turf remained disease-free through high-stress periods. However, it was poor judgment on my part not to tank mix Compass with my Bayleton application on July 25. I had an outbreak of brown patch due to high disease pressure through July 31, which forced me to spray a curative application of Compass. The debate was on, and due to the upcoming Illinois Amateur Championship, an application of Banol was added with the Compass to insure clean fairways for the tournament.

After the growing season, I was able to take a good look at the results of my spray program as they correlated to disease pressure and reported disease activity. This was easily analyzed due to the fact that Cantigny is a weather reporting station for the Interactive Turf Program through the CDGA and University of Illinois. On a regular basis, Cantigny and other golf courses download site-specific weather data as well as disease activity to Lee Miller of the CDGA. Lee then compiles the data and plugs it into several diseasepredicting models and determines the threat of disease activity. The adjacent graph illustrates the model's predicted activity; the actual reported activity from several sites; and the impact of application of the phosphite fertilizers on Cantigny fairways in 2002.

Overall, I felt I achieved good disease control with the 0-28-26 fertilizer after repeated applications throughout the season. From my observation, it appeared the 0-28-26 mimicked the results of the Signature program. It's important to note that there are many phosphite fertilizer products on the market at this time. Some of the products are labeled as:

- Chicagoland Turf's 0-28-26 with micros.
- Phosguard 0-28-26.
- Nutri Grow PK from Cleary's.

1.) May 21

- Primo @ 0.15 oz./M
- Curalan @ 1.0 oz./M
- Liquid Iron @ 3.0 oz./M
- 2.) June 13
 - Primo @ 0.15 oz./M
 - 26 GT @ 3.0 oz./M
 - 0-28-26 @ 4.0 oz./M
 - Sprint 330 @ 2.0 oz./M

June 26

Pythium active on tee check plots. All fairways free of disease.

- 3.) June 27
 - Primo @ 0.15 oz./M
 - 26 GT @ 4.0 oz./M
 - 0-28-26 @ 4.0 oz./M

2002 FAIRWAY PROGRAM

- 4.) July 11
 - Primo @ 0.15 oz./M
 - 26 GT @ 4.0 oz./M
 - 0-28-26 @ 4.0 oz./M

July 22

Pythium active on Youth Links tees. All fairways free of disease.

5.) July 25

- Primo @ 0.15 oz./M
- Bayleton @ 0.5 oz./M
- 0-28-26 @ 4.0 oz./M
- Turf Tech II Bio @ 4.0 oz./Ac

July 31

Brown patch active on fairways.

6.) July 31 and August 1

- Banol @ 1.0 oz./M
- Compass @ 0.2 oz./M

7.) August 8

- Primo @ 0.1875 oz./M
- Banner Maxx @ 0.65 oz./M
- Daconil Ultrex @ 3.75 oz./M
- Liquid Iron @ 2.0 oz./M

August 12-15

Illinois State Amateur Championship.

- August 21, sprayed problem fairways; August 27, finished open fairways
 - Primo @ 0.25 oz./M
 - Curalan @ 1.0 oz./M
 - 0-28-26 @ 4.0 oz./M
 - Turf Tech II Bio @ 4.0 oz./Ac

Graph A Pythium 2002 Reported/Predicted Activity and Treatments



The phosphite fertilizer program implemented on fairways at Cantigny appears to be a complete success. I plan to use phosphite fertilizers as my primary defense against pythium in fairways for 2003.

These are foliar nutrient fertilizers and NOT fungicides! Products similar in chemistry that ARE labeled as fungicides for the prevention of pythium are:

- Riverdale's Magellan.
- JH Biotech's Fosphite.

The most obvious reason for using the phosphite fertilizers for pythium prevention as opposed to Signature is cost. Refer to Table 1 for cost comparisons.

The phosphite fertilizer program implemented on fairways at Cantigny appears to be a complete success. Fairways stood up to stressful periods and maintained health and vigor throughout the season. I plan to use phosphite fertilizers as my primary defense against pythium in fairways for 2003. I have a very positive outlook on what the future will bring with the use of phosphite fertilizers incorporated into our entire turf-care program.



TABLE 1				
COST COMPARISON FOR 56 ACRES OF FAIRWAYS				
	NUMBER OF APPLICATIONS	PRICE PER ACRE	PRICE PER APP.	TOTAL PRICE
Signature	5	\$190	\$10,640	\$53,200
Phosphite Fertilizer	5	\$68	\$3,808	\$19,040
Magellan Fungicide	5	\$163	\$9,128	\$45,640
Banol 6E	1	\$156	\$8,736	\$8,736
Subdue Maxx	1	\$162	\$9,072	\$9,072
Listed prices are approximations.				





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FEATURE ARTIC Fred Opperman Retired

Sweat, Tears and Smiles: **Mission to Mexico** with Habitat for Humanity



Fred is wearing the red bandana.

For many years, I have enjoyed working with wood and doing construction projects either on the job or remodeling our various houses. Since I have retired, that interest has been intensified tenfold. At our home here in Bozeman, there was also an outbuilding, 24' x 38'; and within the back third of it, I built a woodworking shop. Of course, any new project was just an excuse to buy another tool, or so the saying goes.



This is a typical home HfH is trying to replace.



Little Mielda in front of her mother's kitchen.

By September 1999, I started to work for Habitat for Humanity ("HfH") of Gallatin Valley. Since then, I have worked on 19 homes, which translates to 17 families (two homes still not completed at present) that have moved out of substandard housing into a brand new home with new appliances. The security and smiles that brings to those many faces is wonderful to see. Those families are now building equity in their new homes and, most important, into their lives.

This winter has been a slow time for our local chapter, with only two homes almost finished, and no families having the required 500 hours of sweat equity at the present to move in. So we slow down to be able to give them the opportunity to put in more hours themselves and less hours for the volunteers like myself.

With this being the case, I was somewhat free. The president of our local Habitat chapter has been going to Las Varas, Mexico, for the past two years to work on what is called a Global Village Project, part of HfH International. He suggested that I sign up with his group and head south to central Mexico. I took him up on it, and off we went, a group of nine: three other couples from Bozeman, a man from Deerfield, IL, and the daughter of the president, who lives in Los Angeles.

Las Varas, a town of about 2,000 people, is about two hours north of Puerto Vallarta and about six miles east of the Pacific Ocean. There is a Habitat for Humanity chapter there, and they have been building or remodeling four to seven homes per year. In Mexico, the homeowner must also own the land for Habitat to help. That is the way it is in many foreign countries, where title of land is hard to come by. Here in the states, the local chapter buys the land and put up the homes.

Habitat builds simple, decent housing. We offer a hand up, not a hand out. All of the families must put in 500 sweat equity hours, have lived in our area for one year, have a steady job and have a modest down payment. In the states, a two-bedroom home will be about 900 square feet, a three-bedroom will go about 1,050 square feet and a four-bedroom runs about 1,150 square (continued on page 18)

feet. In Mexico, the home will be 400 to 500 square feet and have two-three rooms, a living room and maybe two bedrooms; the bathroom may or may not be in the house. The kitchen is almost always outside under a roof and will be open on two to three sides. The homes there are all constructed of brick. The bricks we saw in Las Varas were being made on the outskirts of town. The soil is all red clay in that area and is dug up, mixed with water and a little straw, and laid out in forms to dry in the sun. The bricks are then stacked up to make a kiln of sorts and baked for "x" number of hours.

Our job in Las Varas was to provide the labor. And we labored, in the 80° to 90°+ heat and humidity. It was a shock on the system to come from Montana, where it was winter and low humidity, to the central Mexican coast. While working on the HfH homes in Las Varas, we did not work with any 20th century or later tools, unless you count the plastic buckets we used to haul cement and dirt. The tools were very basic: shovel, pick, stone chisel, small mallet and a spud bar. As stated, we were to provide the labor. Our jobs were to supply the paid bricklayer or mason with the mortar or cement for what he was doing.



Mason building the roof/ceiling, using bricks in an arch form. Notice bow-type braces to support the bricks while the mortar dries.

Roofs are usually a shed-type roof, higher in the front and sloping to the rear. In this area, they use a unique system (at least to me) of "I" (eye) beams spaced about four feet apart running from front to back. Between the beams, bricks are laid that form an arch. A simple, expandable, metal bowlike form is used when laying the bricks. The bricklayer uses three of these forms and just keeps moving the furthest one away to move forward for the next row. This makes for a very strong roof and a very attractive ceiling in the rooms below.



My "techos," showing the bedroom and the arched ceiling of bricks.

We worked on two different houses while there. For the first house, we were mixing and supplying the cement for the roof and for the floors. In the second house, we were somewhat remodeling. This house was built 30 years ago of only brick with no reinforcing concrete corners or foundations. The roof had already been removed, but we had to chip away up to eight courses of bricks down to the tops of the doors and windows. The corners of the house had to be chipped and broken away, and some corners of the interior walls also had to be broken away and dug underneath for a foundation of cement to be poured extending under the present walls.

The second house was going to be raised about five feet, thus concrete reinforcement was needed in the corners and over the doors and windows to support the added weight. Wire/rod cages with rebar inserted inside were put into the corners and over the doors and windows, forms were installed around them and cement poured into the forms. All of the mortar and cement were mixed by hand on the ground and hauled to where it was needed in the five-gallon plastic buckets. A couple of those days, we mixed five to six yards of cement or more.



"The Pit" after two-anda-half days of hard work. (L to R) Front row: Dick Rohn, Jessica & Ann Drenk. Second row: Joyce Grover, Fred Opperman, Stephen Guggenheim. Third row: Dean Drenk, Amanda Cater & Dick Grover.

We spent the most time at the second house, for we also had to dig "The Pit." This was a 1.5 x 1.5 x 2 meter (about 5' x 5' and 6'8" deep) pit for the waste water and sewer from the house. It is not a septic tank and leach field. It is just a pit that will have a concrete pad poured over the top to seal it. Most of the small towns have no sewage disposal lines or systems. The pits are used or the sewage just flows openly away from the house across the ground. This pit took us three days to dig and was hard, hot work. The first day, we could shovel it out of the hole, but by the second day, we had to fill buckets and hand it up to be dumped in various places.



L to R: Joyce Grover, Dona Modesta and Jessica Drenk, in the pit passing a bucket of dirt to be dumped.

I need to add that the women and members of the families labored just as hard or harder than us. The men of the household were off to their jobs and helped only on January 6, the twelfth day of Christmas or "The Kings' Day." On this day, the two families got together and put on a typical Mexican meal for us after work. They served us tamales, sweet bread/cake, chocolate cake, hot chocolate and watermelon. They also had a piñata, and the children and some of our group had their turns at it. The Mexican families were so appreciative of our help and support. Everyday they would have some fresh fruit or other food or drink to pass around when we were working.

The towns have a central water system going to the homes, but I noticed that all of the residents seem to buy bottled water from the vendors that were constantly driving up and down the streets. The water that came out of the tap was used mostly for bathing or for their gardens. Everyone seemed to have propane to cook with, along with an area for a natural wood fire for cooking. No natural gas. Very minimal electricity to most homes and many still with no service. Also no garbage pickup and very few telephones.

We worked in Las Varas but stayed in Chacala, a small fishing village of about 300, six miles west on the Pacific coast. Seven of our group staved in a very nice B & B, and all of our meals were eaten there. The other single man and I stayed about three blocks away in what is called a "techos," a small house that HfH and the Mexican government started as a way for families to improve their housing and income. They build a two-story house; the homeowner lives on the first floor, and the second floor is rented out, and contains a bedroom, bathroom and shower. The deck has a roof that protects you from the weather and serves as a relaxing dining-and-kitchen area. Provided was a refrigerator, hot plate, dishes, pots and pans and utensils. It was quite nice and very clean, up on a hill with good views of the ocean, which was about a block away.



The library (biblioteca) and primary school in Chacala, Mexico.

We had a schedule of working two days for HfH, then having a day off. On the days off and on some other days after work, most of us also did some work on the biblioteca, or library, in Chacala. That is when we discovered how poor the electrical system is in Mexico. An old gradeschool building had only one 15-amp service to run all the lights, the various outlets and five computers! We also discovered that the electrical systems were not grounded when we were washing down the walls in preparation to paint. One lady got a mild tingle or shock when the water ran past a switch. We decided it would be a good idea to buy a ground rod and ground the system for them. We also installed new gates at the library, which required more chipping away of bricks and concrete plus mixing new cement and forms to attach the new 6' x 6' gates.

Chacala had been hit extremely hard by Hurricane Kenna on October 24, 2002, with Force IV winds of 135 mph and three 20- to 25-foot tidal waves hitting within a 35-minute period. Fortunately, the town had a 30minute warning, and everyone escaped to higher ground with no loss of life. Homes and businesses along the beach, however, were not so fortunate, and fishermen lost 30 boats, including all gear and nets. The library was spared from the ravages of the hurricane and served as the disaster relief center for days following the storm.

Even though we didn't finish a home that anyone could move into, we took steps in the direction of providing a better home and family life for those two families. One little girl cried as we were leaving, for she had become quite attached to one of the women in our group. It was a good feeling to help these families who are trying to improve their lives. They have so little, yet they all seem to be happy and so involved with one another.

The morning of the last day before we left, we hired a guide and hiked through various fruit plantations and jungle to Altavista, an area that has more than 2,000 petroglyphs etched on all sizes of rocks and boulders that pre-date the Mayan civilization.



A couple of the petroglyphs at Altavista, Mexico.

In the afternoon, we sat in on a meeting at the library in Chacala to hear 11 "scholarship students" relate what they would like to do with their lives. A translator was present for us and for them as we, in turn, described what we did in our own lives and the jobs we held in order to show the opportunities available to them with an education. Since government financial support ends with the sixth grade, education beyond that point is funded by the families, private donors or groups such as the U.S. Rotary Clubs. Those 11 students were being sponsored by Montana Rotary Clubs.



Our job in Las Varas was to provide the labor. And we labored, in the 80° to 90°+ heat and humidity. It was a shock on the system to come from Montana, where it was winter and low humidity, to the central Mexican coast.

