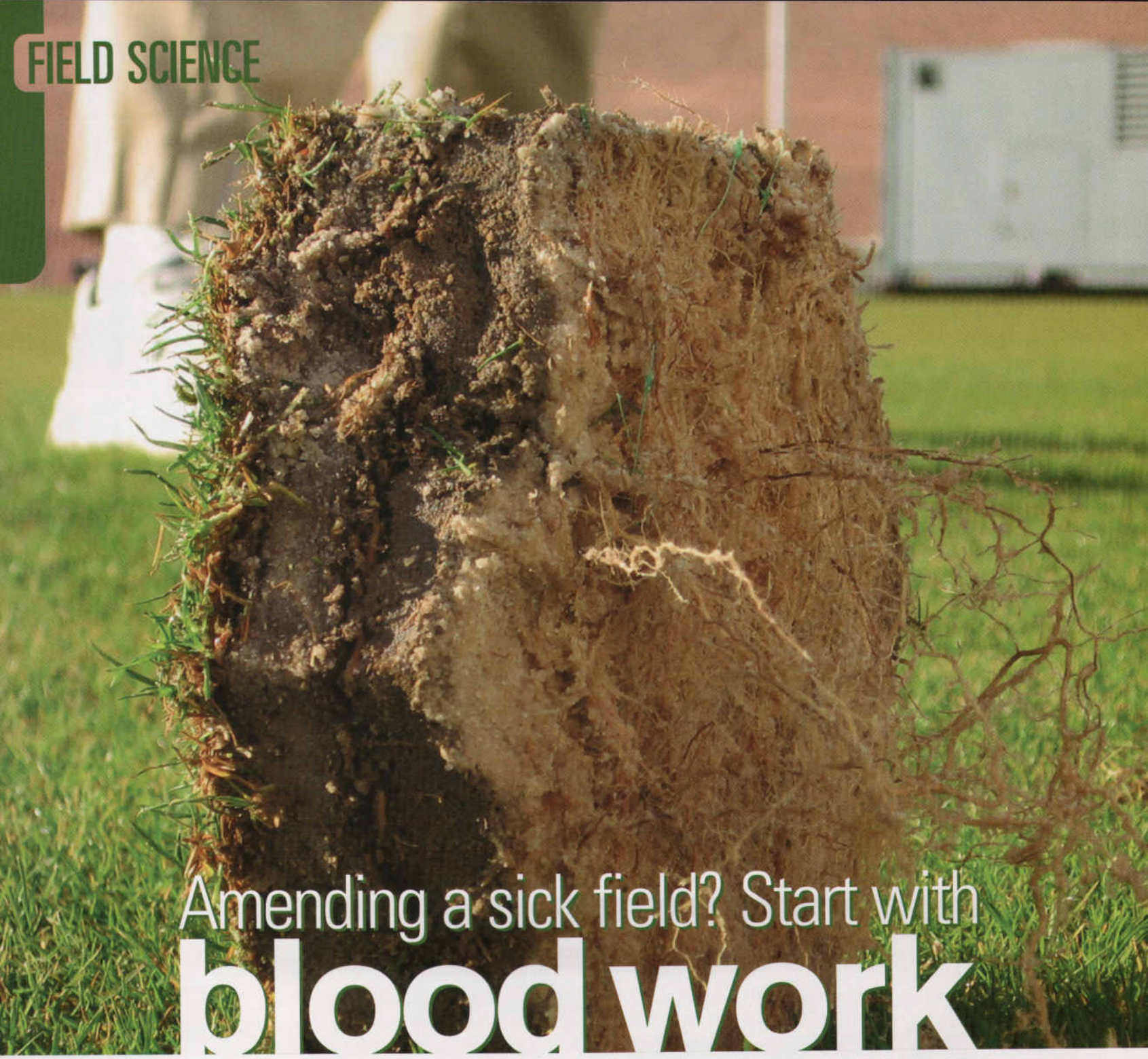

Amending a sick field? Start with bloodwork

By Joel Simmons

As with any sick patient understanding what is wrong and getting a complete diagnosis is essential if real health is going to be achieved. This axiom works not only with human health but also soil and plant health and at no time in recent history have we seen the cost of health care or plant care skyrocket like we are seeing today.

The never ending increase in basic fertility costs has put a tremendous strain on every turf manager's budget, and is forcing unparalleled changes in the way our industry goes to business. At the same time demands for quality, environmental pressures and use are all up. These demands are forcing us all to find ways to reduce inputs while trying to maintain our jobs, the quality of our fields, and the safety the public expects.

Many of these demands are sending turf managers back to school to rethink old practices and tune up their knowledge of the basics; one of the most important is the basic soil test.

For more than 25 years I have studied soil tests. This year more than

10,000 will go across my desk from turf sites all over the world. Many of these sites have been evaluated yearly for as many as 15 years. Soil testing data is powerful research information and it has allowed many turf grass managers to discover ways in which to renovate a tired field without going to costly extremes.

Today, more than ever, understanding what your soil needs is not only prudent but is becoming a necessity. Soil testing, however, is still a mystery to most of us as it was to me as a young County Extension Agent coming out of college. I would look at the hundreds of soil tests and feel nothing but frustration in my lack of understanding. I see that same frustration in the eyes of many turf grass managers because soil testing can be confusing, but it is our basic blood work and by understanding what is wrong we can make significant changes in the way the soil works and in the way the plant responds.

By getting the soil right we can help to open the soil physically, allowing more air and water to move through the soil profile, this improves drainage, creates checks and balances for pathogens, better mobilizes nutrients, improves recovery and reduces fertility inputs.

Amending a field must start with a complete soil test but unfortunately many of the tests available today are not very complete and simply add to the confusion. Many tests are given away for free and are free for a reason—because they are little more than pH readings. This lack of data makes it very difficult to amend a field appropriately.

A quality soil test will list the CEC showing how much nutrient the soil can hold, a clay soil being much bigger than sand based soils. It will also list all the basic anions (negatively charged elements) and cations (positively charged elements) and ideally show the desired levels of calcium, magnesium and potassium the three nutrients that make up 85% of the soils base saturation. A complete base saturation (the percentage of the cations on the soil colloid) should be listed that will include calcium, magnesium, potassium, sodium, trace elements and hydrogen.

Too many soil tests show a partial percentage list of these important cations but will average the shortened list and still come up with what appears to be a complete percentage. Remember percentage refers to 100%; base saturation numbers should always add up to 100%, if they are more or less you know you are not dealing with a complete base saturation. Or, if one of the six cations is not listed you are not dealing with a complete base saturation.

In this magazine's May 2005 issue, we chronicled the experiences of Bob Studholm, from the Fairfax County (VA) Parks Authority. When Bob started testing all 275 of his fields with Logan Labs from Ohio he focused on balancing his soils; subsequently he noticed his soils draining better, recovering better and his cost of fertility went down significantly. Bob worked at bringing his calcium levels between 60% and 70%, magnesium between 12% and 17% the level of potassium close to 5%, and he always tried to maintain hydrogen levels at 10% because on his complete soil test, 10% hydrogen would always give him a

pH of 6.3. That number is generally recognized as the "ideal" pH because it is the point at which there is maximum potential mobility of both the macro and micro nutrients.

Three-legged stool

The focus of any good soils program should always include a chemical, a physical and a biological approach. This is the old "three legged stool" diagram that can be found in any good soil science book, all three need to be equal or the stool falls over. Chemistry affects physics which in turn affects biology and it is ultimately soil biology that makes everything in the soil work.

With a better environment for biology, which can be established with good soil testing, we can build better levels of humus in the soil. Turfgrass managers are quickly realizing that as they build a carbon based program they are reducing inputs and saving their budgets. All of this starts with chemistry (the soil test) which is our first limiting factor. In fact a good soil test may actually be only 50% fertility the rest being physics and biology. So then why do we spend so much of time with only pH and the basic three nutrients?

On recent work done on a soccer field we found the soil to be very imbalanced. The calcium base saturation was 45% and the magnesium base saturation was also in the 40% range. This left very little room of other cations such as hydrogen and in fact the percentage of hydrogen was 0% which meant the pH was above 7.0.

Since the base saturation percentages always add up to 100% we knew that by adding calcium in the form of high calcium limestone (dolomitic lime would have added unwanted magnesium) we would knock the magnesium off the soil colloid and open the soil up just enough to get air and water through the soil profile. This also allowed some hydrogen (acidity) to take hold on the soil colloid lowering the soil pH a phenomenon that we

have documented hundreds of times on sports fields all across the country. This soil showed a high CEC so it took a few years but just as Bob Studholm reported on his fields, we again saw the field open up and drainage improve. The most important nutrient in turf has always been oxygen and the best way to get oxygen into the root-zone is to amend the soil appropriately based on good soil testing and following the advice of that blood work.

When amending a field or building next year's program the best investment that you can make is to be sure you know exactly what your soil is telling you and the only way to do that is to sample the soil with a quality soil testing laboratory. The soil report will tell you how to amend you soils for maximum performance, for maximum recovery and for a reduction of inputs.

There are numbers of good consultants in our industry who understand how to read a complete base saturation soil test and can be of great assistance in helping you discover what direction to take your program for maximum performance. When followed through with properly, I have never seen an investment in good soil testing not pay for itself many times over. ■

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Prevent turf disease with manganese

Since the 1980s it has been known that applications of manganese can decrease the severity of diseases caused by the fungus *Gaeumannomyces*. Though the original research was done on diseases of wheat, PACE Turf has applied those findings to turfgrass diseases, such as take-all patch and decline, with good results.

Larry Stowell, Ph.D., PACE Turf's agronomist and plant pathologist, says that to achieve disease suppression of take-all patch, he recommends that soils contain a minimum of 30 ppm (parts per million) manganese (when analyzed using Melich III extraction). Iron should be present at three times the level of manganese. "At least 90 ppm iron is desired if you are targeting 30 ppm manganese," Stowell says. "Products that are effective in delivering manganese are Granusol Mn (a granular 31% manganese product) and manganese sulfate (which can be applied as a granular or as a spray, 30% manganese). To maintain soil manganese levels at a minimum of 30 ppm, apply either product at 100-200 lbs/acre watered in following application. The 100 lb/acre rate will increase soil manganese by about 15 ppm. Quarterly applications at this rate (equivalent to 2.3 lb/1000 sq ft) may be necessary in some locations to keep the manganese at 30 ppm in the soil, but be careful—too much manganese can also be a problem."

PACE Turf's other lead turf researcher, Wendy Gelernter, Ph.D., says, "Please keep in mind that manganese (Mn) is a whole different animal than magnesium (Mg), with which it is frequently confused."

How does manganese damage the disease-causing fungal organism? Gelernter says, "Ian Thompson and his colleagues at Purdue University are working with take-all of wheat (which is closely related to take-all patch and decline diseases). They've found that the fungus causes some of its damage by converting manganese, an essential plant nutrient, into a form that the plant cannot use. When extra manganese is applied to turf in the form of Granusol manganese or manganese sulfate, the plant gets another chance to grab some of this important mineral before the fungus gobbles it up."

The Purdue researchers also made a finding that has great potential in turf management: the fungus that causes gray leaf spot, *Magnaporthe grisea*, may disable manganese in the same way as the take-all fungus does. Stowell says, "If this proves to be correct, then it may be possible to prevent some gray leaf spot damage through preventive applications of manganese, as well."

For more specific information on manganese requirements, see PACE Turf's soil management guidelines at www.paceturf.org. Additional turf management topics are available to members of PACE Turf. Free trial memberships are also available at the website.

PACE Turf is a membership organization that provides research, education and information services to the turf management community. Founded in 1993 by Wendy Gelernter, Ph.D. and Larry Stowell, Ph.D., the PACE Turf mission is to generate and share independent and objective agronomic information among turf professionals so they may develop management programs that are effective, practical and scientifically sound. ■