

Department of Plant Science

Center for Turfgrass Science

## Chapter 1a: Origins of the Program — The People Who Made It Happen - Faculty

In 1928, Joseph Valentine, T.L. Gustin, and James Bolton paid a call to Ralph Hetzel, president of The Pennsylvania State College, to ask for research in turfgrass.

No one dreamed that this visit would be the genesis of one of the finest turfgrass management programs in the country. Today, the program's success is due to the dedication, hard work, and vision of several significant individuals, including turfgrass scientists, golf course superintendents, teachers, and inventors. Each has a story to tell.

### Faculty

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#### H. Burton Musser

In the late 1920s, Penn State agronomist H. Burton Musser was working as a forage breeder when Joseph Valentine and others approached Penn State president Ralph Hetzel with a request for turfgrass research. Agronomy department head Frank "Pappy" Gardner asked several faculty members whether they would be interested in a turfgrass program, and the program subsequently found its home in agronomy. In response to Gardner's request, Musser supplemented his research on hybrid corn with turfgrass research. He went on to establish himself as a premiere turfgrass researcher and played a major role in the development of Penn State's turfgrass management program.

Musser taught his first undergraduate course in turfgrass management in 1932. He worked on turfgrass half-time until 1946, when he accepted a full-time turf research and teaching appointment, becoming the first full-time turfgrass faculty member at Penn State. "He told me that Valentine would harass him to become full-time turf before then," says Joseph M. Duich, professor emeritus of turfgrass science. "In the 1930s, when Musser was still doing plant breeding, Valentine used to say, 'Forget that. Work on turfgrass.'"

Musser earned his B.A. in agronomy from Penn State in 1917. Before joining the Penn State faculty he was employed by the USDA. From 1922 to 1927, Musser was an extension agronomist for Penn State, then switched to research in 1927. He served in the U.S. Air Force from 1942 to 1945, applying his turfgrass expertise to the construction of grass runways. Musser returned to Penn State to continue research until his retirement in 1959.

During his Penn State tenure, Musser was involved in the development of several grass varieties, including Penncross bentgrass and Pennlawn fescue. He also collaborated with Fred Grau in research on Penngift crownvetch, and he developed Pennscott red clover, used for erosion control and known for its high yields.

"Pennscoth clover was a big breakthrough in forage breeding and one of Burt Musser's important accomplishments," says Duich. "We used to have severe problems with red clover, which was susceptible to disease. Musser became acquainted with a man by the name of Scott, who had a feed mill outside of Lancaster. Scott also had a cleaning mill, and Musser would pull out samples of seed from all the fields that Scott cleaned seed for. That's where he got his breeding material. He worked with thousands of plants."

In addition to conducting research, Musser served as mentor and advisor to numerous students, Duich among them. "Burt saw me through my undergraduate work, which I completed in 1952, and he supervised my Ph.D. thesis, which I completed in 1957," he says. "He was not only my advisor, he was my good friend and coon-hunting buddy."

Musser also helped guide the academic careers of other Penn State turfgrass faculty, including Jack Harper and Donald Waddington, professors emeritus of soil science. He served as Harper's advisor in the 1950s, and his undergraduate course spurred Waddington's interest in turfgrass.

In collaboration with the USGA and an editorial board consisting of several other turfgrass specialists, Musser wrote a book entitled *Turf Management*, which was published by McGraw Hill in 1950, with a revised edition published in 1962. "Dr. Musser's book covered turfgrass management on a broader scale than did previous texts, and it was arguably the most comprehensive book on the subject to that date, unquestionably so in the United States," says Jim Snow, national director of the USGA Green Section. "It quickly became the standard text for university turfgrass courses, a position it held until the mid-1970s."

After Musser's death in 1968, a group of his friends—including Joseph Duich, Fred Grau, Warren Bidwell, Eb Steiniger, and A.W. Wilson—gathered to discuss a suitable memorial. This group became the founders of the Musser International Turfgrass Foundation, a nonprofit organization that raises money to support excellence in turfgrass research through graduate student awards.

"The purpose of the Musser Foundation was to set up a self-perpetuating fund that would reward graduate studies in turfgrass," says Frank Dobie, superintendent and general manager of the Sharon Golf Club in Ohio and president of the Foundation. "But you can't give away money unless you have some, and we had a struggle raising money in the beginning. Around 1970, after we'd acquired some seed money, I remember sitting down with Fred Grau—the Foundation's first president—at a Penn State turf conference to brainstorm about how we could raise more. We hit on the idea of golf tournaments, and I volunteered to have one here at Sharon to get us started. As I recall, Fred instantly put me on the board of directors and appointed me fundraising chairman! I called friends around the country, and we ended up having tournaments all over the country. They were very successful."

Each year, the Musser Foundation presents the Award of Excellence—a plaque and about \$20,000—to the most outstanding Ph.D. candidate in his or her last year of graduate study in turfgrass management. Applications are sent to all turfgrass programs in the United States and Canada, and rigorous academic standards narrow the selection down to four or five candidates. The Foundation's grant committee evaluates each application independently, and the chair determines the best score. Mark Welterlen was the first Penn State student to receive the Award of Excellence. Penn State student Andy McNitt, now assistant professor of soil science/turfgrass at Penn State, received the Award of Excellence in 1998.

“For all our early fund raising difficulties, today we have assets of about \$700,000,” says Duich, vice president of the Musser Foundation. “We have a board of directors from all over the country. There's no other foundation like it, and it's an important way in which we're perpetuating Burt Musser's legacy.”

“Burt Musser not only directed his energy toward research, but he used it to train and educate the next generation,” adds Dobie. “This Foundation that bears his name is dedicated to continue supporting the next generation of leaders. Burt didn't care about fame—he cared about promoting excellence in those who choose this profession for their life's work.”

## **Joseph M. Duich**

Joseph M. Duich, professor emeritus of turfgrass science, remembers his tuition bill when he came to The Pennsylvania State College on the G.I. Bill in 1949: \$90 per semester. Many things have changed since then—including college tuition costs—but Duich's dedication to his work and to the turfgrass industry has remained constant.

Duich received both his B.S. in turfgrass management (1952) and his Ph.D. in plant breeding (1957) from Penn State. With H.B. Musser as his advisor, Duich focused his doctoral research on turfgrass breeding, particularly Merion bluegrass. “I like to say that my dissertation was on the sex life of Merion bluegrass, but Merion bluegrass is actually asexual,” Duich says. “It can develop seed without being fertilized.”

After Merion Golf Club superintendent Joseph Valentine discovered a patch of creeping, low-growing grass—which was eventually developed into Merion Kentucky bluegrass—he sent it to the USDA turf gardens in Arlington, the present site of the Pentagon, for further study. When Pentagon construction began, all of the plants at Arlington were moved to the new USDA research site in Beltsville, Maryland. In that process, the Merion bluegrass plants were accidentally destroyed. “Only a little bit of seed was left,” says Duich, “and the USDA sent it to Penn State around 1950. We went on to produce breeder seed for about 80 million pounds of Merion bluegrass.”

Duich joined the Penn State faculty in 1955. During his academic career he taught almost 6,000 graduate, undergraduate, and two-year turfgrass students. He is well known for developing Penn State's two-year golf turf technical program, which began in 1957. The two-year program, designed for individuals wanting to become golf course superintendents, included courses in turfgrass management, plant pathology, irrigation, fertilization, seeding, and botany, as well as English, speech, personnel management, and social etiquette.

“You did not have to be a college graduate to get into this program,” says Duich. “But some experience on a golf course, beyond being a caddy, was required to enroll. We also required a recommendation by a golf course superintendent.” Enrollment was limited, with three to four applicants for each available slot.

Along with Fred Snyder, then director of short courses, Duich led the two-year program into international prominence. In 1984, the program was recognized with the prestigious Reynolds Industries National Award for Excellence in Agricultural Technology. “We were the only two-year program in the country to ever win that award,” says Duich.

“Penn State's true claims to fame have been Penncross bentgrass, developed by Burt Musser and Joe Duich, and the two-year program,” according to the late George Hamilton, who served as director of the two-year program

from 1992 until 2004. "Those two things have put Penn State on the map."

Duich was also instrumental in developing Penn State's Joseph Valentine Research Center. "We had small research plots here and there around campus, then in 1959 we planted the first grass at the Valentine site," he says. "We started from scratch, first looking at a university map to find where the water lines were. Two technicians, Russ Smith and Herb Zimmers, and I ended up doing the developing and expanding. It was a lot of work!" Duich also developed the turfgrass breeding nursery, which grew out of the Valentine Center and is the site for small-scale breeding research.

Duich's research has spanned almost all areas of turfgrass management, including breeding, diseases, breeder seed production, roadside development, soil modification, fertilization, weed control, and species competition. He worked with his advisor, H.B. Musser, on the development of Penncross bentgrass, which was released in 1954. Today Penncross is the most widely used bentgrass on golf courses around the world. "Penncross had its first commercial production in 1956, then we really started cranking it out in the 1960s," he says. Originally for putting greens, Penncross is now a popular grass for fairways as well.

Among other Penn turf varieties that Duich helped develop are Pennfine perennial ryegrass, Pennstar Kentucky bluegrass, Pennlawn creeping fine fescue, and Penneagle creeping bentgrass, a popular fairway grass. Duich has also released seven bentgrasses since his retirement in 1991. "These new ones are not high volume—they are strictly for putting greens," he says. "But they've been very successful, particularly in the South. What's different about them is that you can cut them real close, to about a tenth of an inch."

With the release of so many new turfgrass varieties came royalty monies, and Duich generously donated all of his turfgrass patent royalties to Penn State. "When I came on as agronomy department head in 1986, Duich's grasses were bringing in about \$100,000 a year in royalty income," says Al Turgeon, professor of turfgrass science. "That's what he ran his program on. That was his budget to hire people, cover equipment costs, operate the facilities."

In 1990, the bentgrass seed market exploded as golf courses moved beyond using bentgrasses for greens and tees and began using these grasses to overseed fairways. "The royalty income doubled and tripled," says Turgeon. "The money was accumulating, and I called Joe and said, This is absurd. We're bringing money in much faster than we can effectively use it." Turgeon and Duich consequently set up the Joseph M. Duich Turfgrass Endowment as a permanent income-generating resource. Today the endowment's principal stands at about \$2.4 million, generating about \$120,000 a year in interest. "This makes it possible for us to run the turf plots solely on interest from the endowment," says Turgeon. "It's been a wonderful asset to our program, and we have Joe Duich to thank."

While Duich is recognized internationally for his research, perhaps he is just as well known for his excellence as a teacher and his personal interest in his students. "Joe was a magnificent teacher," says Pat, his wife of more than fifty years. "I remember when I went to my first convention with him. It was in New Orleans, and we couldn't walk down the street without being stopped by former students. It was Dr. Duich this, Dr. Duich that. They all told him what a difference he had made in their lives."

Says colleague and plant pathologist Herb Cole, "Joe was a demanding taskmaster. His premise was that

managing a golf course is an unforgiving profession. It's a profession of detail, and you pay for every mistake. There's no room for slackers. And Joe drilled that into his students."

For many students, Duich's reputation as an intimidating professor was cause for initial concern. "I was scared of Dr. Duich before I even got to Penn State," says John Pollok, a 1987 graduate of the two-year program, now director of agronomy at Robinson Ranch in Santa Clarita, California, and president of Penn State's Turfgrass Alumni Club. "On the first day of class, he drew a circle on the chalkboard and cut it into a pie. He said, 'To succeed in this business, ten percent depends on your ability to grow grass, and ninety percent depends on your ability to communicate.' I was there looking for the secret of how they grew the grass, so that shocked me. But I took it to heart, and it has held true. Dr. Duich wanted us to think on our feet, and he taught me that golf course management is more of an art than a science."

Stanley Zontek, another of Duich's students, knows him as both former professor and friend. "When I think of Dr. Duich in the classroom, here's what I remember: He would smoke Pall Malls in the classroom, and he'd never exhale. He would inhale and just keep talking, and we were all thinking, Is he going to exhale?"

"As undergraduates, we held our professors in high esteem," continues Zontek, a 1970 Penn State graduate and director of the USGA Green Section, Mid-Atlantic Region. "You didn't just pop into Dr. Duich's office and say, 'Hey, Joe.' After I'd known him for a while and felt we were becoming friends, I asked him, 'When should I call you Dr. Duich and when should I call you Joe?' He said, 'When we're in a public forum, call me Dr. Duich. When we're just working or having a beer, call me Joe.' I'm still in touch with him every couple of months. And every time he calls me, the first fifteen minutes he's asking, How's so-and-so, how's his wife, etc. It's not about the work or the careers—it's about his students and their families. As intimidating and professorial as he may have been, Dr. Duich has always been concerned about his people."

"If you look at the history of the program and ask what really made a difference," says Cole, "it was two people: Burt Musser, who started the whole thing, and Joe Duich, who had a lifelong commitment to making it work. Joe was out there 24/7. If grass needed mowing, he'd be out mowing. If it got dry on the weekends, Joe would set up the sprinklers. He did whatever it took. We need examples of people who do things right, and Joe Duich is one of them."

### **Fred V. Grau**

At Fred V. Grau's wedding in 1938, the guests didn't shower the happy couple with handfuls of rice. Instead, they threw grass seed. It was an appropriate symbol: Grau, who had joined Penn State's faculty three years earlier as its first extension turf specialist, took great pride in making turfgrass his life's work.

Grau earned his Ph.D. in agronomy from the University of Maryland in 1935. "Of course, it was during the Great Depression," he recalled in a 1986 interview. "There were no jobs and there was very little money, and all I could afford was gas for my Model A Ford, to drive around Maryland and study pastures. In those days, people would strip sod from pastures to put on their lawns. So the lawns were weedy and full of crabgrass. That was one of the main turfgrass problems in the early days."

Despite the times, Grau was fortunate enough to land a job as an agronomy extension specialist at Penn State in 1935. "Penn State's turfgrass program was a primitive one in the beginning," he said. "I'd travel around the

state, and golf course superintendents would tell me what problems they were having with their grass. I'd bring the problems back to Burt Musser, who was the first turfgrass researcher at Penn State, and he would look for solutions."

Perhaps Grau is best known for his discovery of crownvetch, a ground cover that beautifies roadways and prevents erosion nationwide. Just a few years after joining the Penn State faculty, Grau spotted an unusual plant growing outside of Reading. "Robert Gift, on whose farm I discovered the plant, called it 'dot weed' because it was so persistent," Grau recalled later. "Its beautiful pink and white flowers, its ability to grow on poor shale soil and to cover nearly vertical slopes with an erosion-proof mat really attracted my attention. Mr. Gift permitted me to hand-harvest some seed."

After studying the plant at Penn State, Grau and colleagues identified it as crownvetch. Of European origin, crownvetch apparently entered the United States as a contaminant in alfalfa seed that was grown in Europe. It spread to the hillsides and grew well in bad soil. "In fact, the poorer the soil, the better it grows," says Joseph M. Duich, professor emeritus of turfgrass science, who was involved in the later stages of crownvetch research. "While it starts out slowly, it shoots out runners and you don't have to fertilize it."

As a result of the research on crownvetch, Grau began to grow the plant commercially, and the Penngift crownvetch industry was born. Grau and Penn State turfgrass researcher H.B. Musser realized that Penngift crownvetch had great potential as a ground cover for roadsides and highway median strips. They contacted Wes Hottenstein, who was in charge of roadside development in Pennsylvania, and this team initiated research projects with the Pennsylvania Highway Department, which funded the research. Penn State graduate student John Stanford, who received his Ph.D. in agronomy in 1951, focused his work on crownvetch research plots outside of Port Matilda.

"Fred Grau undoubtedly started the crownvetch industry," says Duich. Today Penngift crownvetch is recognized as the official conservation plant of Pennsylvania.

During Grau's Penn State career, he took time out to serve in World War II, but continued working with turfgrass all the same. "Fred Grau and Burt Musser both served in World War II," says Thomas Watschke, professor of turfgrass science. "They both worked with grass air strips, expanding their knowledge about turf, mainly in construction of grass runways. When they returned, they did a lot of highway work, including the crownvetch project. It's interesting that these guys were working on grass air strips and highways, when you think that the formation of Penn State's turfgrass program was largely to serve the golf industry—but they were doing what the country needed at the time."

Grau played a major role in the development and release of several grasses, including Meyer zoysia and U-3 (a Bermudagrass strain), as well as Merion bluegrass. Merion bluegrass is recognized as the first improved Kentucky bluegrass and was discovered by superintendent Joseph Valentine at the Merion Golf Club. In the late 1940s, Grau was serving as executive director of the USGA Green Section, which was conducting turfgrass research in Washington, D.C., at the site where the Pentagon now stands. "When the Pentagon was built, the work moved to the Agricultural Experiment Station in Beltsville, Maryland," Duich explains. "During the move, somebody accidentally plowed up the Merion bluegrass plants, which Fred had been working with. About a teaspoonful of the original seed was here at Penn State, and we resurrected it." Eventually, Merion bluegrass

was released through the USGA and Department of Agriculture and went on to become a standard American fairway grass.

Throughout his career, Grau was active in numerous professional organizations and received many awards, among them the distinguished service award from the GCSAA and the USGA Green Section Award. A turfgrass science award given by the Crop Science Society of America carries Grau's name.

Grau was instrumental in forming the Pennsylvania Turfgrass Council, which was established in 1955. He served as the council's executive director from 1968 to 1975 and as executive secretary from 1976 to 1981. In 1969 Grau was also instrumental in founding the Musser International Turfgrass Foundation, a nonprofit organization that raises funds to support research through graduate student awards. He was a life time member of the American Society of Agronomy.

Those who knew Grau were familiar with his unbridled enthusiasm for the turf industry. He was a staunch believer in turfgrass as a commodity that improves the quality of life. His signature on correspondence was almost always preceded with "Sincerely yours FOR BETTER TURF...." In one letter written to a reporter in the 1980s, Grau even credited Meyer zoysia grass for protecting a friend from serious injury:

In early November, Sam [Matthews, a National Geographic photographer] was on a ladder at the second story window at his home. He fell, hit the ground flat on his back, was not hurt! He landed on his lawn of Meyer zoysia! The turf and the soft soil were like a huge cushion. Two weeks later the Matthews imprint still shows.

The rapport that exists among us in turfgrass is so real that it can be said that at times it assumes form. It is a priceless commodity.

"Talking about turfgrass history releases a flood of memories," Grau said in 1986. "What were the highlights? That's a tough question. I'm proud of Penn State's graduate program in turfgrass, which has given us national and international leaders in the field, Joe Duich and Jack Harper among them. I'm glad I 'discovered' James Watson at the first Texas Turf Conference and sent him to Professor Musser to do graduate work in turfgrass. Jim was the first person to receive a doctorate in turfgrass science. I remember I used to let him use part of my farm near State College for experimental plots."

"A major accomplishment was helping to organize a turf committee in the American Society of Agronomy back in 1946," Grau continued. "That was important because it opened doors to turfgrass programs at other universities. Up until then, 'turf' was a bad word in agriculture. It was considered a rich man's word that evoked images of golf courses and racetracks. When the ASA recognized turfgrass as a legitimate part of agriculture, programs and research projects began to spring up, and the industry grew."

## **Jack Harper**

"You can't know what the problems are or help people solve them unless you get out there and see what's going on." These straightforward words of Jack Harper sum up a key principle of Cooperative Extension: to disseminate research-based information to the public. Harper adhered consistently to this principle throughout his thirty-year career as a Penn State extension turfgrass specialist. One of the last Penn State faculty members to hold a 100 percent extension appointment, Harper devoted his time to traveling the state addressing turf

issues ranging from home lawns to golf courses to athletic fields.

Harper received both his B.S. and Ph.D. in agronomy from Penn State, “with a master's from Rutgers in between.” After earning his Ph.D. in 1952, he worked for the USDA and then for Toro Lawn Equipment as a troubleshooter, covering the United States, Mexico, and Canada.

During his travels for the USDA, Harper was part of what is affectionately known by some as the “traveling road show.” Throughout the 1950s, Penn State extension specialist Fred Grau, agronomists O.J. Noer and Charlie Wilson, and inventor Tom Mascaro, among others, traveled the U.S., Mexico, and Canada to speak at turfgrass conferences. “At that time, only Penn State, Rhode Island, and Rutgers had turf programs,” says Harper. “The folks in Canada were especially appreciative because they didn't have turf specialists up there.”

“So that was what we did all winter. It got to the point where we could give each other's talks—and sometimes we did! Each of us would have three or four talks ready, depending on what the audience wanted. That was the craziest group that ever traveled together. Everybody was playing jokes on everybody else—there was some kind of mischief going on all the time. I was the youngest in the group and got picked on, and I bailed several of those fellows out of trouble more than once. But it was a great bunch of guys.”

When Harper joined Penn State as a turfgrass extension specialist, he continued to travel, visiting Pennsylvania counties four days out of the week. “A great deal of my time was devoted to trouble shooting, just as I did with Toro,” he says. “I would find out what problems people were having, then usually on Friday afternoon or Monday morning I'd sit down with some of the research people and tell them what I was seeing, what they needed to do. In the later years I worked more with athletic fields, in response to increasing concerns about injuries and the debate over natural grass versus artificial turf.”

“When I started in 1958,” he says, “there wasn't a county agent who could tell you how to manage a lawn. I spent a lot of time teaching those agents, and we ended up with a number of county agents who were pretty good turf people. That saved money because I didn't have to go everywhere—they could solve the problems. That's still happening today.”

Harper spent much of his career delivering lectures and seminars to various clientele throughout Pennsylvania, ranging from homeowners to professionals. “At some of these meetings around the state, I often didn't prepare a talk,” he says. “I just went in and said, ‘What do you want to talk about?’ I thought that was more effective than going in there and giving a talk that maybe 10 percent of the people could use.”

Through many years of experience, Harper developed a knowledge and appreciation for his clientele. “I remember there was an Amishman over in Lewistown who had a lawn care service,” he says. “He asked me if I could go over to Belleville and give a talk about turfgrass to a bunch of Amish folks. I said I'd do it, so we set it up. I had a good friend from Lebanon Chemical talk about fertilizers, then I showed some slides. I don't know how many trays of slides I'd shown when one Amishman stood up and said, ‘With all due respect, Dr. Harper, it's our bedtime. Could you come back another time and give us the rest of it?’ It was about nine o'clock in the evening, and they had to ride back home with the horse and buggy and be up early the next morning.”

Although Harper's appointment was full-time extension, he found time for some research as well. With Donald Waddington, professor emeritus of soil science, Harper conducted research projects on athletic field-related

injuries and athletic field construction. Publications resulting from that research have been updated several times and are still in circulation.

Harper wrote several hundred extension publications for homeowners and other clientele, including the turf section of the Agronomy Guide. "As turf grew," he says, "we started putting out a turfgrass guide, and that got to be a forty- or fifty-page publication. The county agents started complaining that people would come in with a question and we'd have to give them the whole book, and these things were getting expensive. So I started writing individual sheets on each subject, and they became very popular." Harper also wrote correspondence courses on turfgrass management for homeowners, as well as the first turfgrass pesticide certification test for the state. He retired in 1988 as a professor emeritus of agronomy.

Harper's hands-on approach benefited extension clientele and students alike. "Jack Harper taught me how to listen to people, how to deal with people, and how to read between the lines when people were asking you questions," says former student "Trey" Rogers, professor of turfgrass science at Michigan State University. "Oftentimes he'd be in his office with a letter from someone, and he'd call me over just to ask what I thought the answer should be. I knew what he was up to—he was trying to teach me. And he was very good at it."

### **Donald V. Waddington**

"I've said this a thousand times: Don Waddington had a vision," says Trey Rogers, former Penn State doctoral student and professor of turfgrass science at Michigan State University. "I didn't necessarily go to Penn State to study turfgrass—I was just in love with the school. Don told me, 'If you really want to make a splash in this world you ought to study athletic fields.' I'm just damn glad I listened to him. Athletic field research would come to the forefront during the '90s and beyond, and it's still emerging today. I have a rewarding career, and I have Don Waddington to thank for much of it."

Donald V. Waddington earned his B.S. from Penn State in 1953, M.S. from Rutgers in 1960, and Ph.D. from the University of Massachusetts in 1964. He returned to Penn State in 1965 as an assistant professor and retired in 1991 as a professor emeritus of soil science. While at Penn State, Waddington's research focused on soil amendments and modification, nutrient availability and uptake, soil test calibration, nitrogen source evaluation, and surface characteristics of athletic fields, including methods to assess impact absorption properties and traction. He and colleague Jack Harper collaborated on studies related to the safety and playability of athletic field surfaces. "Those studies got a lot of mileage," he says. "They were the first of their kind, more comprehensive than anything that had been done before." Waddington has published his research results in scientific journals as well as publications for turfgrass managers. He is co-author of the book *Turfgrass Soil Fertility and Chemical Problems: Assessment and Management*.

Waddington's research earned him the respect of colleagues and students alike. "Don Waddington has integrity and is an excellent researcher," says plant pathologist and colleague Pat Sanders, "and for me that's the highest praise anyone can give a scientist."

Waddington and Harper's athletic field work resulted in a scholarship in their honor, presented by KAFMO, the Keystone Athletic Field Managers Organization. KAFMO, a resource for athletic field managers so that they can provide safe playing fields, awards the Waddington/Harper scholarship each year to turf students in Pennsylvania who have an interest in sports turf. Recipients are chosen based on their transcripts, references,

and the way they articulate their desire to become a sports turf manager.

During Waddington's Penn State tenure he taught more than 1,100 students in two-year turf management, four-year undergraduate, and graduate programs. Courses included soil physical and chemical properties, fertility, and weed control. For two years after retirement he continued to advise graduate students and teach courses in the two-year program.

"I was blessed with good grad students," says Waddington, who is reluctant to talk about himself and quick to praise his students' accomplishments. "Four of my last six grad students worked on surface characterization of athletic fields. Two of them measured hardness, and the other two—current faculty member Andy McNitt was one of them—worked on traction and footing aspects."

Much of Waddington's and his graduate students' work involved collaboration with other departments. For example, Dewey Morehouse, professor of physical education, helped develop PennFoot, a device that measures traction. And Penn State engineers played a role in other athletic field studies.

"It's sort of amazing how some of our discoveries came about," Waddington says. "Trey Rogers, who was my grad student in the 1980s, was playing golf one day and met up with George Gurney, who was an engineering research associate at the Applied Research Lab. They were walking down the first fairway and Trey was telling him about what he was working on—quantifying surface hardness and traction on athletic fields—and how he needed a portable instrument to take measurements. Gurney said, 'I know what you need. You need a portable oscilloscope. Come to my office tomorrow and I'll show you what it is.' Trey didn't know such a thing existed. It was a tool used in the engineering world, but not in the agronomy world. And we had great success with it.

"After we had the oscilloscope, Trey still had to figure out a way to write a computer program that would take the data off of the device and analyze it. Once again, Trey was playing golf, this time with Bill Moyer from ARL. Bill said, 'I can help you with that,' and he helped Trey develop a program. They wrote it up and published it. And all this came about from playing golf."

"We really did a lot of ground-breaking work," says Trey Rogers. "During my time at Penn State, every day was like a brand new discovery. That was the great thing about working with Dr. Waddington—he made everything you learned like it was discovering the lightbulb. I've always felt like I was at Penn State during the glory years. That was a special time when Waddington, Harper, Duich, and Watschke were all there. They were all on my committee, and I learned from each one of them. I'm successful only because I learned to listen, and when I find someone who's going to give good advice, I'll follow that road to the end. And Don Waddington is one of those guys. They just don't come like him anymore."

### **Herbert Cole, Jr.**

Penn State's turfgrass program has benefited greatly from research on turfgrass diseases, and plant pathologist Herbert Cole, Jr., has been at the forefront of that research. Cole completed his doctoral dissertation at Penn State in 1957, then joined the faculty. He worked closely with Houston Couch, Penn State's first turfgrass pathologist, who was hired in 1954 to work on diseases of forage crops and grasses and went on to study turfgrasses. Couch served as Cole's doctoral advisor, and they worked together on forage crop diseases as well

as turfgrass.

For several years Cole worked as a Cooperative Extension plant pathologist. In 1966 he returned to research and teaching in plant pathology, focusing on diseases of turfgrass. For twelve years he taught plant pathology classes in both the two-year technical program and the four-year program and researched turfgrass diseases, collaborating with plant pathologists Pat Sanders and Clifford Warren and turfgrass researcher Joseph Duich. In 1976 Cole received the Pennsylvania Turfgrass Council's turfgrass service award.

Says Cole, "Our major research accomplishment was in fungicide resistance in turfgrasses. We did a lot of product evaluation for industry. For years, people never worried about fungicide resistance, but an awareness began to emerge in the early 1970s. Pathogens are becoming ever more resistant, and newer generations of fungicides have highly specific modes of action. It's an ongoing, constant battle, dealing with fungicide and insecticide resistance."

"This emergence of resistance made people begin to realize that there's just not a magic bullet out there," Cole continues. "There needs to be a better way of managing grass. There's a difference between turfgrass and other crops. In the case of corn, for example, you harvest the crop and haul it away. With turf, we're in the process of constant renewal. The grass grows, it gets cut off, and new grass emerges. And we have a nice-looking lawn or golf course. On golf course greens and fairways, they de-thatch or remove cores or do something to keep renewal process going. In the case of homeowners, many choose to have a lawn care company come in and spray on fertilizer or insecticide. We can't continue to look for chemical fixes. A continuing challenge is to look at turf as a soil/plant ecosystem, and to manage that ecosystem to minimize the constant parade of increasingly expensive inputs."

### **Patricia L. Sanders**

When it comes to turfgrass disease diagnosis and management, the name of Pat Sanders is well known throughout the world. Sanders, who served as plant pathologist for Penn State's turfgrass program since the early 1970s, retired in 1995 as an associate professor of plant pathology. She taught the turfgrass pathology course in the two-year program and earned international recognition for her research in turfgrass resistance to fungicides.

Sanders is particularly well known for her 1993 publication *The Microscope in Turfgrass Disease Diagnosis*, which helps golf course superintendents be their own on-site experts in identifying turf pathogens. "With a little bit of knowledge, the superintendent can often make a diagnosis within a few minutes by examining a few blades of ailing grass under a microscope," she says. "It's really quite easy, much quicker than the distant 'expert,' and, in the long run, probably a lot cheaper. I traveled the country with twenty-three microscopes in my car, doing workshops for golf course superintendents. It was a wonderful effort, and I still get requests for that study."

The turf plots at the Valentine Research Center were the scene of much of Sanders' research. "I did a lot of fungicide testing out at the turf plots, and that's what funded our work because our program had such recognition," she says. "We didn't have to go look for money. People came to us asking us to take their money so they could say their product was tested at Penn State. I think every other university in the country was jealous of our program."

“There were some real quality people in the program when I was there,” she continues. “Don Waddington, Tom Watschke, Joe Duich, and Jack Harper were the ones who made turf great. I have lots of memories—including fighting with Joe! Out at the turf plots one day, I was getting ready to aerify and, for a reason I don't remember now, he didn't want me to. I said, ‘I'm aerifying, Joe. If you want to step in front of this aerifier I'll run right over you!’ But those were good years. I loved my time at Penn State and was quite proud of what I did.”