Here, smaller trees were planted on the left side of the hole but were not needed due to the dense woods already behind them and close to the fairway. This is a case in point of just "sticking" trees anywhere on a golf course when someone donates them.

thought to be axiomatically unfair and undesirable among right-thinking golf course architects.

It goes without saying that the older your course, the more likely it is to be beset with one or more of the above difficulties, and my hunch is that some of them will resonate with most readers. In summary, you can assess the urgency of having a professional evaluation of your tree program by considering the existence and severity of the following.

1. The original design intent has been compromised by the trees currently on the course.

2. The trees are eliminating or greatly reducing the use of the driver as a viable club selection on certain tees.

3. Only one side of many tees is being overused because of tree canopies ahead of the tee.

4. Certain tree canopies fronting fairway bunkers have grown large enough to make standard, direct shots to the green (or second landing areas on par 5s) impractical if not impossible.

5. Approaches to greens are too restricted due to adjacent trees or parts thereof.

6. Turf quality is being jeopardized by limited sunlight and lack of water, air and nutrients.

7. There are more trees on the golf course than grains of sand in your bunkers and the golf experience feels claustrophobic.

Retaining a golf course architect to review your current tree program is one very viable option. His or her expertise aside, the collaboration is invaluable in defusing intra-club tensions about how to achieve the mutually agreed-upon goal: the best course possible.

Devising the appropriate tree plan shouldn't be harder than, say, hitting that 200-acre fairway—but yes, it will almost always generate controversy. But like the one you stripe down the middle, it will feel really good.

A common scenario during club renovation is failure to correctly prioritize a club's tree program, since it typically has implications for all other design options being contemplated.

Mike Bavier, CGCS –N–

Mike Bavier, CGCS (back row, far right) and assistant superintendent Brian Mores (back row, far left) head up the hard-working crew at Inverness.

INVERNESS GOLF CLUB

Mike Bavier and Inverness Golf Club will be our hosts for this month's MAGCS/ITF Combined Golf Day, and the MAGCS college championship. Both Mike and the golf club have long, rich histories. In fact, it's still up for debate as to who came first, Mike or Inverness.

Photo by Jim Trzinski.

A side view of par-3 no. 15.

The history of the golf course begins in 1926, when Meadow Grove Country Club opened as a nine-hole semiprivate golf club. In 1938, the McIntosh Company purchased the golf course and surrounding areas. The surrounding area was developed and is now the village of Inverness. As for the golf course, an additional nine holes were constructed immediately south of the original nine-hole course to create the new 18-hole Inverness Golf Club.

Those attending the October meeting will observe some unusual routing in a couple of areas on the golf course, requiring players to cross over holes to make their way to the next hole. That routing is a result of the two sets of nine holes being built at different times. Another point of interest on the golf course is the chokecherry tree line that served as a border between the farms that originally occupied the land. A number of these trees have been removed over the years but the tree line is still very much evident, running between several holes.

Mike's career began at Olympia Fields Country Club in 1963. After graduating from Penn State University, Mike worked as an assistant superintendent at Olympia Fields until 1964. After completing a short stint in the Marine Air Reserve, he assumed his first head superintendent job at Calumet Country Club in 1965 at the age of 22. Four years later, in October of 1969, Mike moved on to Inverness and has been going strong ever since.

What a difference 36 years can make! When Mike arrived at Inverness, the irrigation system comprised single-row quick couplers on tees and fairways

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and center sod cups on greens. The tree-lined fairways of today were nonexistent. You could practically see from one end of the course to the other, and any trees that had already been planted stood at about eye level.

Some of Mike's professional highlights include serving as MAGCS president in 1975 and as GCSAA president in 1981. Currently, he sits on the board of the Musser Foundation, which awards an annual $25,000 grant to a turfgrass doctoral student in his or her final year of schooling. One of Mike's proudest accomplishments has been promoting past assistants and trainees. He can clearly recall Tom Vieweg, former Cary Country Club superintendent, being his very first assistant at Inverness. Mike can't put a number on how many have followed, but it's pretty safe to say that there have been a lot.

As proud as he is of the employees that have moved on, Mike is just as proud of the ones who have not. The remainder of his staff comes from only three different families and usually consists of about 16 employees. Of those 16, 13 have worked at the club for 15 to 30 years.

When Mike does decide to get away from the course, he's usually traveling overseas. Some of Mike's adventures have taken him to South Africa, New Zealand, Australia, Venezuela, England, Ireland, France, Costa Rica and Scotland (where he is a nonresident member of St. Andrews).

Mike looks forward to welcoming MAGCS to Inverness as another challenging but successful season begins to wind down.

No. 9, a 148-yard par 3.

The 172-yard, par-3 no. 5.

Photo by Jim Trzinski.

No. 6 at Inverness, a 298-yard par 4.

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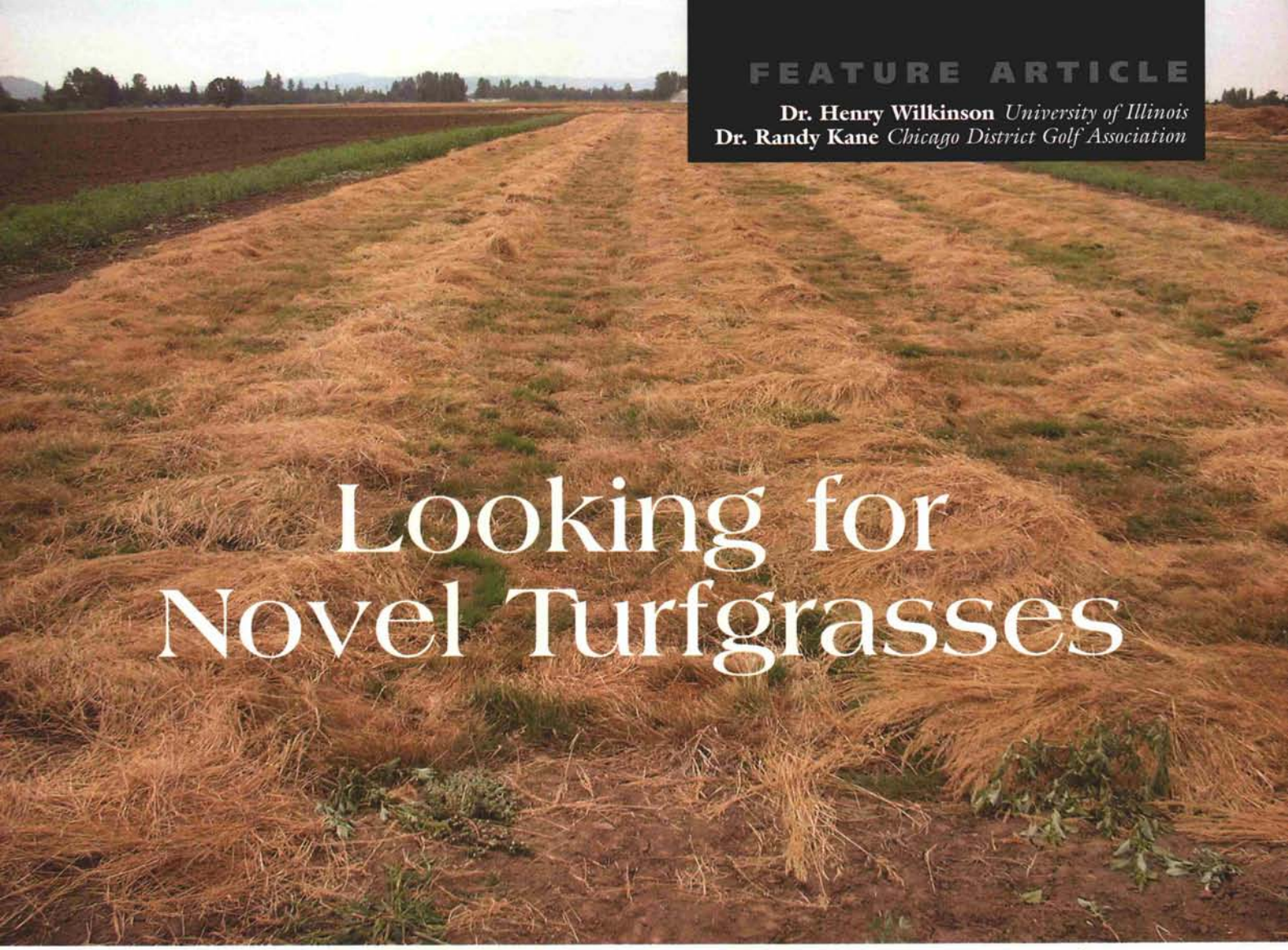
FEATURE ARTICLE

Dr. Henry Wilkinson *University of Illinois*
Dr. Randy Kane *Chicago District Golf Association*

Looking for Novel Turfgrasses



A new bentgrass, from and for Illinois. It was naturally developed and spent an additional 11 years in refinement.

More than 9,000 known grass species grow on this earth, with probably many yet to be discovered. There are more grass species on earth than any other species of plant. While only about 20 species of grasses are used for turf applications, these include hundreds of varieties. As you know, a turfgrass is simply a population of grass plants that are mowed! So why are there only 20 grass species used for turf, when there are more than 9,000 grass plants?

What does it mean to find a "novel turfgrass?" How is it accomplished? What new types of turfgrasses might we expect in the future?

Here are a few of the reasons: most grass plants will not tolerate close mowing; many grasses are only adapted to grow in specific climates; and we have not tried all 9,000 grasses to see if they would make a turf. In this article, we will describe what it means to find a NOVEL TURFGRASS, how it is accomplished, and what new types of turfgrasses might be developed in the future.

What Is A Novel Turfgrass?

To qualify as a novel or new turfgrass variety, it must be distinct in some way from what is currently recorded by the USDA. This sounds simple enough, but "*how different?*" is the real question. Historically, how plants look has been used to determine if they are different. Major differences exist between warm-season and cool-season turfs, many of which you can see, describe and measure, i.e., morphological differences. However, major morphological differences also exist between zoysiagrass, St. Augustinegrass and Bermudagrass, and all of these are warm-season grasses. There are major differences between ryegrass,

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bluegrass and fescues, and these are all cool-season grasses. Grasses that differ in big ways, i.e., they look different, will also have a significant number of genetic or DNA differences between them too. More recently, the importance of DNA as the real determinant of morphology has come into our world. Quite simply put, the reason one grass plant is morphologically different from the next is all due to differences in DNA.

What might surprise you to know is that grass-plant DNA is mostly the same in all of the 9,000 species and only a small fraction (but still a lot of molecules) of the total DNA in a plant actually accounts for the differences among them. The same can be said of all the humans in the world: most of the DNA in all humans is the same, but there are enough differences to account for 6 billion people that mostly look different. To put it into perspective, consider this: the coauthors of this article have 99%-plus of the same DNA, but wow does that little difference add up to be a REAL BIG DIFFERENCE!

Back to turf! There are grass plants that differ by only one gene and yet they will act completely differently. How can this be? Is one gene enough to distinguish one turfgrass from another? This may not seem important to you, but it is if you want to make sure the "new" turfgrass you are buying is really "different" from what was sold last year. Let me give you an example to ponder! If I took Kentucky bluegrass variety 'Merion' and put a new gene into it that did nothing to change the behavior of Merion (therefore, a dummy gene), would it be new? Technically yes, but it would not be different in terms of how it behaved as a turfgrass plant. Simply put, it could be sold as "new" Merion, but it would be no better than the old Merion. A second example: Plant breeders have found genes that give a grass plant resistance to the rust fungus. This means that the grass plant without the rust gene is killed, while the other plant, which differs only by one gene, will not be attacked.

Remember: New or different does not always mean BETTER—but it can!

Is There a Minimum Difference Between an Old and an Improved Grass Plant Before It Can Be Labeled as New?

Presently the rules are not very clear, but the lawyers, not turfgrass breeders, will probably decide what a grass plant must have to be called new! At the present, for a turfgrass variety to be protected by law, much like an invention is by a patent, the variety must be morphologically distinct (still the old system). Grass breeders make and report many different measurements to convince government officials that their "new" grass is really different. However, all this is changing with the advent of GMOs (genetically modified organisms).

Fairway bentgrasses being evaluated at Midwest Golf House in Lemont, IL. These bentgrasses are nearly or already market-ready, but still have to be evaluated for adaptation to Illinois and the various types of management Chicagoland superintendents will apply to them.

So How Do You Really Determine If a "New" Turfgrass Is Really Different *and* Better?

Here are some guidelines:

1. Look beyond the "new" name. A newly named turfgrass variety does not mean it is necessarily better than an older variety!

2. Determine exactly what makes the "new" grass plant different. Consider the following traits: dwarfism, disease resistance or quality. Some fescues are marketed as dwarfs, and they are when allowed to grow unmowed, but not when they are mowed at 2 or 3 inches. Disease resistance can be measured, but it is difficult to do, so be skeptical of major claims of improvement. Quality is a subjective trait and evaluation programs often try and "split hairs" when ranking varieties. Ask yourself, is a new turf rated 8.2/9.0 practically different than an old one rated 7.8/9.0? Remember, statistics are used to test experimental data for differences, but statistics do not address the biological importance of the difference, that is up to people! One of the best ways to evaluate grass varieties is "in your backyard." That is what the trials at the Midwest Golf House offer you!

3. Determine how BIG of a difference there really is between the old and "new" turfgrass! A difference can be very small and have no practical effect on how the grass behaves or be unrelated to *your* need! For example, a grass with an increased level of ergot disease resistance (a horrible disease in seed production fields in the Northwest) would be both new and better to turf-seed producers, but useless to turf managers.

4. Do not focus on just *one trait* of a new grass! When a newly offered grass hits the market, it might have been changed in more than one way, but only marketed for one trait. For example, it might be darker, but more susceptible to leaf rust or summer patch. Be careful when you first look at GMO turfs. They will be different and they will have an easily identifiable trait, e.g., herbicide resistance, but they could also be very susceptible to a disease like dollar spot or brown patch.

5. Focus on the traits of turf that are *important to you* (and your golfers)! Do not get caught by the lure of marketing. Understand and prioritize what are the most important characteristics of the turf you want. For example, if early spring and late fall color are important, then find varieties, new or old, that offer these features. Then take your second-most-desired trait and find the top five or so in that category. When you do this for each of your desired traits, you will end up with a short list to select from. You will be surprised to find that "new" varieties often will fall out of your list. It takes many years to develop and test new varieties of turf, including assessing their performance in the marketplace after they are initially offered.

How Are New Turfgrass Varieties Developed?

A number of different methods can lead to new grass varieties, but common to all of these is the fact that any change in a plant results from a change in the DNA. So how can the DNA of a grass plant be changed?

1. Natural DNA changes. This has been the most important means for developing new turfgrasses. Remember those 9,000 grass species that we mentioned above? They are the work of natural DNA changes. These natural changes occur all of the time, but most go unnoticed. It takes many years and many changes for nature to produce a new and better plant. Scientists and turf managers are still finding new grass varieties growing in nature. These are called *clonal variants* and they are collected from all over the world. Below we will describe a new bentgrass that was found this way.

2. Controlled breeding! We are all familiar with the power of breeding by virtue of corn, rice and soybeans that produce bigger and more nutritious grains. Controlled breeding means that a selected plant is forced to pollinate with another plant. The limiting factor is that the two plants must be biologically compatible. For example, you can cross two ryegrasses, but not ryegrass and bluegrass. Sometimes you can "trick" a plant to cross with a plant with which it would not naturally cross. Breeding allows new grasses to be developed faster than they would be developed in nature and also with a greater degree of control over what characteristics the new plants will have. While it is faster than nature, controlled breeding takes 10 to 15 years and a lot of money to develop and test a new variety.

3. Genetically Modified Organisms (GMOs)! This is a fancy way of saying we have artificially inserted DNA into a plant that "naturally" did not have the gene. GMO technology also avoids some of the problems of incompatibility. Most of us think of GMOs as a "space age" method of creating new plants, but that is not the case. Yes, we do put the new DNA into a plant cell with guns and needles, but that is only the method

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of delivery. In fact, Mother Nature has been genetically modifying grass plants and most other forms of life for billions of years. For example, a virus can live in one plant, "pick up" a piece of the plant DNA, attach to an insect sucking on the plant, and then the plant DNA deposits into another plant where the insect lands and feeds. When the virus delivers the new DNA into the plant and the plant "makes the DNA work," *voila!*, the plant is now a GMO. Ah, you say, the insect will only feed on a certain type of plant! Not so! Most insects test and taste many different plants in order to find just the right one for feeding. In the meantime, they are depositing viruses all over the place. We often wonder about those little mosquitoes that feed on different humans! Not a pretty thought!

The bottom line for evaluating a "new" turfgrass variety is not how it was created, but what its characteristics are as a turfgrass!

In the Coming Decade, What Will the NEW Turfgrasses Be Like and Where Will They Come From?

Here are our picks in order of their predicted availability and timeframe.

1. Herbicide-resistant. These will come mainly from GMOs, but some will emerge with slightly less tolerance through natural selection. The reason is simple; herbicide resistance is controlled by a single gene, hence, the DNA change is small. **(Within five years)**

2. Heat- or cold-tolerant. These will come mainly from GMOs, but again, some will emerge from natural selection. Heat and cold tolerance are controlled by only a few genes, so changing a grass plant will be basic procedure. **(Five to 10 years)**

3. Disease-resistant. This will change slowly and through natural selection for many diseases. The reason is that disease resistance is generally controlled by a number of different genes, most of which we have not identified. For example, summer patch, necrotic ring spot and take-all patch all require multiple genes to confer resistance; this is more likely to have developed during the past billion years, so keep looking for natural clones. On the other hand, look for big, new changes against a disease like rust, which requires only one gene to confer resistance. **(10 to 20 years)**

4. Root-chewing insect-resistant! This is a guess, but we believe that GMO technology could result in grass roots that produce a nasty-tasting chemical in the roots that deters insect feeding. **(Five years)**

Beware! New and better turfgrass varieties will be produced, but this will take time. Beware of "overnight" miracle grasses or grass varieties that are ranked superior, but are actually not realistically better than the industry standards.

Greens, tees and collars are all different when it comes to grass performance. The various grasses that are used for golf courses usually are managed as either greens, tees or fairways. Each grass must be evaluated for the different types of management that will be applied to these specialty uses.