

should create mutations that can be seen in the immediate M-1 generation.

Thus in the winter of 1969-70, with the help of Dr. Jerrel Powell, we began research designed to create mutants in our best triploids, Tifgreen, Tifway, and Tifdwarf. Dormant sprigs (stolons and rhizomes) washed free of soil and cut into one and two node sections were treated with the chemical mutagen EMS and gamma rays from a Cobalt 60 source.

The EMS treatments failed but the proper concentration of gamma rays (7,000 to 9,000 r) produced 158 mutants. These were increased and planted in plots at Tifton, Ga., and Beltsville, Md., where they have been evaluated for several years. Several of the mutants (smaller and slower-growing than Tifdwarf) seem to have no economic use except perhaps in some miniature garden. Other mutants that seemed better than their parents, Tifgreen, Tifway, and Tifdwarf, early in the test period now are recognized as no better if as good. New varieties must be better than those now available, and satisfying this requirement is not easy.

Future

We still have nine mutants that appear to be bet-

ter than their parents in one or more characteristics. Two of these seem to be immune to rootknot nematode. Two seem to be able to tolerate attacks from several nematode species without loss of vigor. One mutant rarely produces seed heads. These nine mutants and their three parents are being increased in the greenhouse this winter. With the help of Dr. A.W. Johnson and Dr. Homer Wells, ARS, USDA, nematologist and plant pathologist, we plan to evaluate these 12 grasses in large replicated plots. We also plan to conduct at least one more greenhouse test to assess their resistance to several different nematodes. The field plots will be subjected to several different kinds of management, with and without the benefit of nematicide treatment.

Will at least one of the nine mutants be better than Tifgreen, Tifway, and Tifdwarf? If we could answer that question, we wouldn't conduct the tests described above. We know they must be better if they are to improve the game of golf. That has been our goal for more than 30 years and will continue to be.

Great Golf Courses of America

—Factors of Play

by JAMES R. GABRIELSEN

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Great golf courses of America is a fascinating subject because of the large number of wonderful golf courses in this country. Which are considered great and why? The longer I thought about that question, the more I came to realize that there is no simple answer.

One of our popular golf magazines conducts a survey among players every other year to pick America's top 100 golf courses. When you look at the first 10 or 20 courses on that list, it's amazing to see the variety in course design, length, and other factors, such as size of greens and number of bunkers. What common blend of characteristics makes those courses stand out above others. Courses like Pebble Beach and Augusta National, Pinehurst and Merion certainly have contrasting styles of architecture and use of terrain, but they are considered by most to be among the best courses in the world.

I want to discuss the factors of play and how they relate to a so-called great golf course. Let me begin by saying that factors of play such as turf, greens, tees and hole locations do not necessarily have to be ideal in order to have what is referred to as a great golf course. Naturally, the tournament player

would want to have conditions to his liking, and very often does, but a great golf course will maintain integrity even when the conditions are not ideal from a player's point of view. However, if you were to ask a group of tournament golfers, be they professional or amateur, what type of playing surface they prefer, you would probably get a rather consistent answer:

1. Fast and true greens.
2. Greens that will hold well.
3. Tees that are level and firm.
4. Fairways closely cut.
5. Hole locations that are challenging but fair.

Now, let's examine these factors a little closer.

Good greens, from a player's point of view, are essential for a great golf course. A fast putting surface is preferable because the player can usually putt most effectively when he can slowly stroke the putt with little physical exertion as opposed to hitting the putt with the blow required of a slower green. Short putts are generally easier on a faster surface because of the light, easy stroke required. The truthness of a green is a characteristic which varies with types of grasses and physical terrain. Lessening the effect of grain adds to the true roll of the ball.

Greens that will hold a shot of varying length is

certainly a factor preferred by the tournament player. For example, several years ago Augusta National Golf Club was criticized by players in the Masters when winds had dried the greens to such a point that very few shots would hold on certain greens, such as 10, 12, and 15. Now, I would be the first to say, "Why shouldn't the players be required to land the ball short sometime and run the ball into the green as is often required in Scotland?" but I haven't seen many balls bounce up the hill in front of No. 10 or bounce over the water hazard in front of 12 and 15. Situations such as these obviously demonstrate that most of the great golf courses of America were not designed so that the ball could be run into the green. Instead, the ball must fly onto the surface after carrying over a greenside bunker or water hazard. The greens, in general, therefore, should hold a well-struck shot.

Now, let's examine tees. This is one portion of a golf course which is often overlooked but, I feel, is extremely important. Closely cut, level tees are characteristic of great American courses. The level aspect is essential for good footing and balance, the close mower cut for a clean strike of the ball. Notice, sometime, how the tees of a great golf course will stand out with these characteristics.

Fairways of the great American courses are made up of a variety of grasses, textures and terrain. Generally, however, they are closely cut to allow the

player to meet the ball with the clubface, striking a clean blow—no grass between club and ball. The so-called "flyer" has probably ruined more positive thinking golfers than any other shot. Surprisingly, some players have a tendency to hit flyers more often than others.

As to type of fairway grass, it makes little difference, provided the turf is relatively firm and the grass cut low. I prefer a good bermudagrass fairway and bentgrass greens. The bermuda seems to enable the player to spin the ball better, and the bent greens tend to have less grain.

Firmness of turf, along with a close mower cut, allows the tournament player to control the ball; and when the player of today's caliber can control the ball on any golf course, he will be putting for a lot of birdies. Softer turf will cut down distance and create control problems when soil sticks to the ball. The word "control" is the key!

Hole locations have often been a point of controversy in major tournaments. From a player's point of view, he expects to see difficult pin placements, but his interpretation of difficult and unfair may differ from those of tournament officials. Basically speaking, I believe that holes should be placed where the shot requires skill as well as judgement but can be stopped close to the cup. In other words, reward well executed shots.

An additional factor of play which is not controllable is the weather. The recent Bing Crosby Tournament at Pebble Beach was played under ideal weather conditions. The winning score was a record. Pebble Beach is a great golf course, but the wind is one of the factors which make it great. When the wind is up, Pebble is one of the great scoring challenges in the United States.

Obviously a player cannot always have the physical characteristics of a golf course to his liking. In most cases, he will have to adjust his playing style to the course conditions. Those who make the best adjustment are more often than not the winners of championships. Club selection and strategy will change with course conditions. Being able to cope with changing conditions, even during a round, often separates the great player from the nearly great.

In discussing the characteristics of good courses, Bob Jones once said:

"The ideal golf course would have to be played with thought as well as mechanical skill. Otherwise, it could not hold a player's interest. The perfect design should place a premium upon sound judgement as well as accurate striking by rewarding the correct placing of each shot. Mere length is its own reward, but length without control ought to be punished."

Control of the ball is what all good golfers are striving for. The great courses in America allow the player to make use of his talent to the degree that he can, yet challenge that talent to reward only the exceptional.

*Perfect fescue fairways of yesteryear—
National Golf Links of America, Southampton, N.Y.*

