ble to invasion. It is apparent, however, that the reason why annual bluegrass occupies turfed areas is not clear. Sprague and Burton conclude that the occupation of turfed areas by annual bluegrass, apparently, does not lie in greater tolerance to conditions of unfavorable nutrient supply, but in the ease of re-establishment of the bluegrass by seed in seasons when unfavorable soil conditions have been temporarily corrected by moderated weather conditions.

From the experimental data on hand, it is possible to conclude that grasses resistant to poa annua invasion may be obtained. Management studies are needed, however, to test this resistance, determine the effect of amount, kind, and time of nitrogen applications on invasion resistance, and to determine interaction effects on southern turf of seeding rates and nitrogen applications.

Reduces Poa Annua in Greens
By A. R. Twombly

Poa Annua and I had our first meeting at the Pelham Country Club in the late spring of 1938. That summer proved to be a hard and unpleasant one for me. The greens there were supposed to be of South German mixed, Seaside & Colonial bents. As the years passed Poa annua had come in to such an extent that all 18 greens were infested and some of them so badly that it was 90 per cent annual bluegrass and ten per cent bents. That spring the greens were beautiful but after a few hot, humid days in the summer those greens presented a discouraging problem. In the early fall just when I had reached the zero point we had a few cool, damp days and the fall crop of poa annua became established and turned the greens into a beautiful sight once more and gave the golfers a fine putting surface.

After that first season I realized the potential danger in our greens becoming entirely Poa annua. The next few years I spent studying the growth and habits of this grass. I found that with the heavy, tight clay soil and the poor drainage we had, compaction was prevalent. This made an ideal condition for Poa annua but it caused the permanent grasses to have a very shallow root system.

To correct this condition I carefully checked all the sprinklers we used to determine the proper size and capacity so each green would receive only the amount of water it could absorb. Local-
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ized dry spots were spiked and hand watered to avoid puddling the remainder of the green. Water was used sparingly in the late summer and early fall to enable the permanent grasses to compete with the fall crop of Annual bluegrass seedlings.

Spiking was a regular procedure during the summer months and in the fall all the greens were aerified. This was done by hand forking until we received our first power aerifying equipment. Four or five heavy applications of top dressing were applied each year after the greens were spiked in an effort to make the compact, shallow turf hold the ball instead of trying to soften the greens with too much water. We followed this procedure until we established a longer root system. Soil tests were taken each year and dolomitic limestone containing twenty-five to thirty per cent magnesium was added until a pH level of approximately 6.5 was reached. Fertilizer high in organic nitrogen was used in the early fall to keep the bents actively growing later in the season.

In the early forties we were troubled with worm casts on our greens caused by the tropical earthworm or better known as the stink worm. Heavy applications of arsenate of lead were used over a period of two years until as much as 30 lbs. per 1,000 sq. ft. had been used on our 14th green. Both Poa annua and the permanent grasses turned yellow and their growth was practically stopped with this treatment. That fall the turf was in such condition that drastic steps had to be taken, so the green was aerified and one lb. of nitrogen per 1,000 sq. ft. was applied.

We aerified the green again in the late fall and left it open during the winter. The following March, April, May and June one lb. of nitrogen per 1,000 sq. ft. was applied each month on this green. Aerification was started as soon as weather conditions permitted.

Organic nitrogen at the rate of one quarter lb. to each 1,000 sq. ft. was used every two weeks throughout that summer, followed by a normal fall fertilizing. All greens that had been treated with arsenate of lead showed a decrease in Poa annua for the first season and in some greens for two seasons, but in the 14th green the permanent grasses were much stronger and spread more rapidly than in the ones that had received just the normal fertilizer procedure. The results in this green were so striking I decided...
to try early spring fertilizers as a partial control of Poa annua.

During the next five years I studied each green individually and experimented on some greens and on parts of others. Each green that had been fertilized early in the spring showed a decline in annual bluegrass and a strengthening of the bents. Some of you may feel that with the early fertilizing Poa annua will grow more luxuriantly and therefore crowd out the bents but from my experience I found just the reverse was true.

Do not worry about the heavy growth of Poa annua for it will soon die out. If the soil conditions are favorable and there is sufficient amount of nitrogen available the bents will make a strong, deep rooted, sturdy turf good for the golfers and hard for the next crop of Poa annua to penetrate.

When I resigned at Pelham last fall to accept the position as Principal Park Supt. at James Baird State Park, Poa annua on the greens had ceased to be a problem at Pelham.

I do not say this is a cureall. I do know that under our soil and climatic conditions the combining of a pH level of about 6.5, frequent aerification (six times last year), careful watering and the fertilizing procedure I described did reduce Poa annua to a great extent. What I did not eliminate I was able to hold throughout the season. If you make conditions more favorable for the growth of the permanent grasses and maintain a program of adequate fertilization to keep the bents strong and vigorously growing, Poa annua will cease to be a problem.

Greenwood Experiments to Improve Its Course

By Johnny Cochran
Pro-supt., Greenwood (Miss.) CC

Our turf experiments at the Greenwood CC started back in 1946, about the time or just before the beginning of the Tifton Experimental Station. There were many things we didn’t know about Bermuda grasses and since there was no Tifton to give you the answers, we set out to try and find them.

Our first experiments were started after we had established a nursery of perhaps 500 sq. ft. of common Bermuda. After a good putting surface had been provided various heights of cutting were used. One half inch, ¾, ⅔ and ⅘ inch cuts were made. Some strips were cut twice daily, every other day, and some every third day. At the end of the season it was found that the strips we started out with and maintained with a daily cut of ⅘ inch in early part of season and later in drier and hotter part of year switched to

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