

Fertilization may involve frequent feedings or the use of fertilizer materials of low solubility which do not leach rapidly. Fortunately all fertilizer materials are now available in slightly soluble forms. The fertility management of the experimental green at UCLA has not been difficult.

In view of the greater depth of rooting which can be expected in sand greens, the frequency of irrigation should be less than that of the typical green in which rooting is limited to about two inches. Two irrigations per week during hot weather have been ample for the experimental sand green at UCLA.

- (1) Davis, R. R.—*The Physical Condition of Putting Green Soils and Other Environmental Factors Affecting the Quality of Greens*, Ph.D. Thesis, Purdue University, 1950.
- (2) Ferguson, M.—*Compaction, Drainage and Aeration*, United States Golf Association Journal and Turf Management 3(2):32-33, 1950.
- (3) Garman, W. L.—*Permeability of Various Grades of Sand and Peat and Mixtures of These With Soil and Vermiculite*, United States Golf Association Journal and Turf Management 5: Number 1, 27-28, 1952.
- (4) Watson, J. R., Jr., Musser, H. B., and Jeffries, C. D.—*Soil Compaction Determinations With a Soil Penetrometer As Compared With the Geiger Counter X-ray Spectrometer*, Agron. Journal 43:255-258, 1951.

OBSERVATIONS ON POA ANNUA

By CHARLES K. HALLOWELL

Mid-Atlantic Director, USGA Green Section

THE discussion of all who have been working with turfgrasses the past two months has been predominated by *Poa annua*, and in some instances this grass has caused comments from golfers.

The population of *Poa annua* in greens has raised numerous questions. It was readily distinguished as its winter dormancy period was changing to spring greenness. Where it was mixed with bents it was noticeable that the bentgrasses started growth prior to the *Poa annua*. It became a real talking point as the late April temperatures approached 80°, due to the rapid development of seedheads. Where *Poa annua* was growing in bunches, bumpy putting surfaces resulted.

There was wide variation on the amount of *Poa annua* in different greens on the same course, the stronger creeping bentgrasses in most instances having less *Poa annua*. The Arlington and Congressional greens at Woodmont Country Club, Bethesda, Md., built in the past 10 years and supervised by Bob Shields, showed only a trace of *Poa annua*. A green on a long-established golf course that was rebuilt two years ago after the soil was sterilized with methyl bromide, then stolonized with Arlington-Congressional bent, showed considerable *Poa annua*. After this observation it was evident that the soil sterilant did not control seed of *Poa annua*.

Was there more *Poa annua* in 1956 than a year ago? That is difficult to determine since there is no measuring stick to show the exact amount of *Poa annua* in greens each year. It was noticeable that wherever the bentgrasses were injured, either by excessive mat, high temperatures, or hurricanes last summer, *Poa annua* had filled in rapidly. There were indications that disturbing the greens in October had given *Poa annua* a chance to get a start.

Practice putting greens where tramping was severe after a heavy rainfall or soon after watering showed more *Poa annua* than a year ago. Greens constructed so that much of the water moved from the sides to the middle show the most *Poa annua* in the area remaining wet the longest. With the bent in the higher portion and the *Poa annua* in the lower portion, the overall result is an uneven putting surface.

A Review of Literature

There are numerous articles in reference to *Poa annua* being objectionable in putting greens.

In the March, 1921, issue of the Bulletin of the Green Section of the United States Golf Association, Drs. C. V. Piper and R. A. Oakley discussed this plant and outlined its characteristics, stating that it can be a detriment to golf greens. Checking further through the bound volumes

of that publication from 1921 to 1931, there are 19 additional articles on some phase of *Poa annua*.

"*Poa Annua—Friend or Foe?*" was the title of an article in the June, 1948, issue of the USGA JOURNAL, written by Fred V. Grau, then Director of the USGA Green Section. Other articles on *Poa annua* by the same writer appeared in the July and September, 1951, issues of the USGA JOURNAL. At that time, in addition to pointing out the strength and weakness of *Poa annua*, Dr. Grau stressed the need for further research.

At the National Turf Conference at Columbus, Ohio, in February, 1952, 18 golf course superintendents and agronomists participated in a panel discussion on "*Poa annua—Friend or Foe?*" Ardyce R. Twombly, Superintendent, James Baird State Park, Pleasant Valley, New York, reported his success in controlling *Poa annua* by heavy fertilization of his greens in early spring and summer. Leon E. Lambert, Superintendent, Oakwood Golf & Country Club, Dodson, Missouri, showed how he was able to maintain *Poa annua* on a green by frequent water and occasional mowing. He admitted he had an abnormal situation due to partial shade and was only waiting until he could correct the condition by rebuilding the green. During that interim, he carried on a painstaking program which he stated was impractical.

Dr. William H. Daniel, Purdue University, at the 1952 Conference, reported having started studies on the use of arsenicals to retard *Poa annua* and not injure the desired bentgrasses. He later further reported in the January-February, 1955, issue of the Golf Course Reporter on his studies of *Poa annua* control with arsenic materials. His conclusion showed that the factors which favor arsenic inhibition in the *Poa annua* plant are as follows:

1. Low phosphorus availability level.
2. Cool weather.
3. Short days for photo-periodic activity.
4. Arsenic application prior to cool fall and cool spring periods.

COMING EVENTS

1956

September 25-26-27

Florida Turf Conference
University of Florida
Gainesville, Fla.

Dr. Gene C. Nutter

September 25:

St. Louis District Golf Assn. Field Day
St. Louis, Mo.

September 26-27:

Northwest Turfgrass Conference
Washington State College
Pullman, Washington

Prof. A. G. Law

September 28-29:

Utah Turfgrass Conference
Utah Copper Golf Course
Magna, Utah

J. W. Richardson

October 1-2:

Rocky Mountain Turfgrass Conference
Colorado A & M College
Fort Collins, Colo.

Prof. G. A. Beach

October 4-5:

New Mexico Turfgrass Conference
New Mexico College of Agriculture & Mechanic
Arts
State College, N. M.

Prof. C. E. Watson

October 15-16:

Southern California Turf Conference
University of California
Los Angeles, Cal.

Dr. Victor Youngner

October 17-18-19:

Central Plains Turfgrass Conference
Kansas State College
Manhattan, Kansas

Prof. Ray A. Keen

November 12-16:

American Society of Agronomy Meetings
Cincinnati, Ohio

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5. Having arsenic carrying soil as the surface area."

Additional research studies on *Poa annua* are being conducted by Dr. Victor B. Youngner and Mr. Arne Hovin, University of California, Los Angeles. The latter is conducting a study on the cytology, genetics and taxonomy of this species for his Ph.D. thesis. The former reports that studies are also being conducted on the ecology and turf management of this species with special reference to the practical value as a winter companion to our common bermuda.

Dr. Youngner states: "We have found that once this grass is established in bermuda turf it will reseed itself year after year and actually make a fine quality dense cover throughout the winter. However, in order to have a uniform cover it appears

to be necessary to mow the bermuda under one-half inch or to remove the thatch in the fall by a light renovation. If this is not done, the stand will be spotty and uneven. Early fall renovation will bring early *Poa annua* seed germination and eliminate a long period of off-color turf. Frequent light watering in the fall also encourages early seed germination. Regular application of nitrogen during the winter are essential for a dense, even turf. We have found that some of the dense new bermuda, such as Tifton 127 and Tifton 123, may not permit the *Poa annua* to establish itself as well as the more open common bermuda." Dr. Youngner adds that some of the selections of *Poa annua* under study have a distinct perennial habit.

Again it is important to point out when fertilizing to supply only sufficient

phosphorus to meet the needs of bentgrass. Then apply arsenate of lead or other forms of arsenic when *Poa annua* seeds and again in the fall of the year when it is normal for *Poa annua* to germinate. Several superintendents have applied arsenate of lead as seedheads appear, but few of them use it during the germination period. The rate of application is from 5 to 10 pounds of arsenate of lead to a thousand square feet.

A new weedicide, butyldichlorophenyl methyl urea, that shows promise to determine its effectiveness regarding *Poa annua*, is being used on trial plots.

Culture practices that encourage bents to crowd out *Poa annua* are always in order. They include reducing soil compaction, eliminating mat conditions and fertilizing with slowly-available nitrogen.

FURTHER COMMENTS CONCERNING POA ANNUA

By DR. MARVIN H. FERGUSON

Southwestern Director and National Research Coordinator, USGA Green Section

Some of the conditions which favor the development of *Poa annua* may be restated here: Cool weather and moisture seem to favor *Poa*; on putting greens it appears to correspond to low-lying, wet areas; it appears to be more serious where soil is compacted; and *Poa* appears worse on putting greens where thatch exists. All of these observations bear out the conclusion that excess water near the surface of the soil contributes to *Poa* infestations.

Using these observations as a basis for our conclusions, several management steps are within the reach of most turf growers.

1. Use a vigorous strain of bent that competes well.
2. Encourage bentgrass to vigorous growth by fertilizing during late spring and early fall, while *Poa* is inactive.
3. Use fertilizer which is low in phosphorus. Only enough phosphorus to sustain bentgrass growth should be used. Lead arsenate treatments are more effective when phosphorus is at a low level.
4. Fall cultivations should be done early so that holes are covered before *Poa*

germination season.

5. Control diseases, insects, weeds, and other agencies which might contribute to a weakened turf.
6. Keep greens dry on the surface during the *Poa* germination season. Many will ask how the surface may be kept dry. There are several possible ways:
 - a. Keep mat and thatch to a minimum. Thatch holds excessive moisture in the surface.
 - b. Try to increase water infiltration, so that it does not lie near the surface. Use a disk spiker to cut through the turf and any accumulated thatch without seriously disturbing the soil. Try using a wetting agent to lower surface tension of the dater, so that it infiltrates and does not lie at the surface.
 - c. Use a sandy topdressing material which will not hold excessive moisture, and which will allow greens to hold a well-played golf shot without being excessively wet.