

erosion problems were checked.

In the conditioning, superintendent Schneider was aided by a green committee under the chairmanship of John Ferring, III which was dedicated to helping him get the job done. One member, Art Feuerbacher, manned the weed control spray rig and assumed the job of eliminating broadleaf weeds on the golf course.

The spectators and the golfers at the Open Championship may not have been overly aware of the excellence of the golf course, nor of the thought and the energy that were expended in

grooming the turf. It is characteristic, and rightly so, that the golfer seldom gives a great deal of thought to the course condition unless it is poor and he finds himself disadvantaged even after playing a fine shot. The condition at Bellerive is such that a golfer seldom finds a bad lie if his shot does not stray.

Thanks to the green committee, the maintenance crew, and especially to Gus Schnatzmeyer and Ernie Schneider, Bellerive represents a remarkable achievement—the result of a very great and talented effort.

## Greens—Some Observations

By **JAMES L. HOLMES**, Mid-Western Agronomist, USGA Green Section

**I**t is becoming increasingly apparent that loss of turf on putting greens is becoming less of a problem yearly, as more technical data is made available and golf course superintendents develop superior maintenance skills. At most clubs in the Mid-West, members can expect adequate putting surfaces at all times during the playing season. We have progressed considerably in construction methods of putting greens including design, soils, technical abilities, and know-how in using the information we have.

As a result of information derived from sound research and continuous observations, reputable and knowledgeable architects and builders now insist upon constructing greens so that adequate surface and sub-surface drainage is assured at all times. This drainage includes both water and air. In order to assure proper drainage, the relationship between capillary, non-capillary and total pore space must be properly determined for each specific soil used. Where greens have been constructed

with drainage principles protected, turf has developed well and observations indicate that it will be possible to maintain adequate putting surfaces at all times with a minimum of headaches. It has been determined that water infiltration rates between 1/2 and 1 inch per hour when the soil is compacted are optimal.

It is important to note that this infiltration rate must be assured even when soils are compacted. This is paramount because putting green compaction is an extremely serious problem and one which has caused the golf course superintendent considerable chagrin.

If one is to be assured of a proper infiltration rate or an infiltration rate which can be effectively controlled, a "perched" or "false" water table relationship is essential. In building to produce this phenomenon, one must be extremely careful that excess water is not held. If so, the infiltration principle is destroyed. Observations indicate that if one does not use the proper per-

centage of sandy materials, it is usually better to use no sand whatsoever; but rather simply to use the soil present and to construct greens so that surface drainage is assured. It has been observed repeatedly that greens built with native soils have produced excellent putting qualities for a number of years. Therefore, if the entire concept of the permeable soil construction is not followed — exactly — one is compelled to suggest that the native soil present on the building site be used.

Overwatering or water-saturated soil continues to be one of the most serious problems in maintaining greens which cannot or do not drain. If all the technical improvements currently known are incorporated when greens are constructed or rebuilt, this serious factor will become less of a problem. When one considers the tremendous amount of work done and equipment used to “aerate” green soils, he immediately becomes aware of the necessity for and lack of drainage—both air and water .

Developments in improved bentgrasses have been extremely slow since the results obtained from selections

made in the “pie green” work sponsored by the Green Section in the late 1930s. At the present time the majority of grasses used for putting greens are still those developed in this testing work. Developments in this field are limited primarily to Penncross bentgrass. However, new selections such as Evansville are being released and it appears it is only a matter of time until superior bents are available.

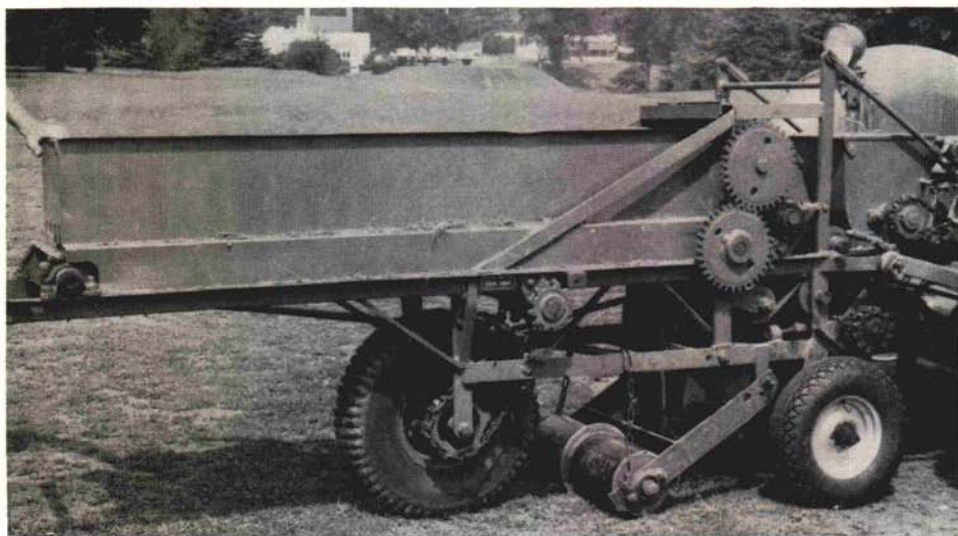
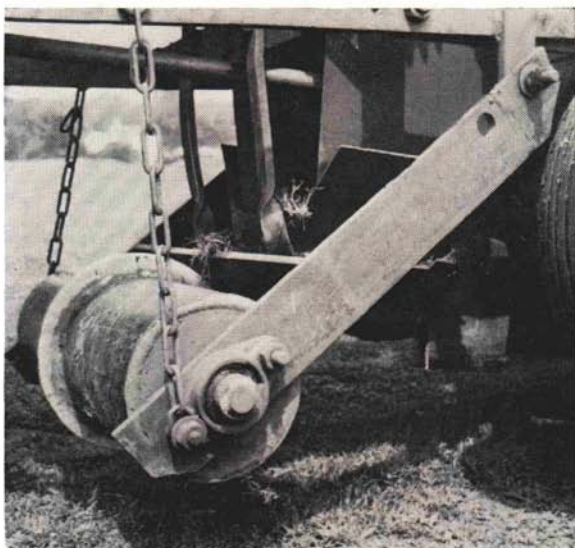
*Poa annua* is the last serious weed problem in putting greens. Of course, there is always the question of whether *Poa annua* is a friend or foe. When one considers the severe damage done to *Poa annua* during the recent winters, this plant must be considered a foe on putting greens in the Mid-West. Presently, work is being accomplished in enzymatic control of various plants. Surely, it is only a matter of time until we can eradicate *Poa annua* without running the chance of seriously damaging desirable bentgrasses.

Many golf course superintendents continue to apply lead arsenate to putting surfaces in an effort to retard *Poa annua* vigor as well as grub and worm-proof the soil. This appears to be excellent practice.

### COMING EVENTS

July 8.....	Michigan Turfgrass Field Day Michigan State University East Lansing, Michigan
July 21.....	Turfgrass Field Day Texas A&M University College Station, Texas
August 12.....	Golf & Utility Turf Field Day Rutgers University New Brunswick, N. J.
August 16-17.....	Midwest Regional Turf Field Day Purdue University Lafayette, Ind.
August 25.....	Golf Course Supts. Field Day Rhode Island Agr. Experiment Station Kingston, R. I.
September 15-16.....	Penn State Turfgrass Field Day Pennsylvania State University University Park, Pa.

*A modification on a mechanical bermudagrass sprig planter made by Marshall Farnham, Bala Golf Club, Philadelphia. Mr. Farnham credits Mr. Lee Dieter, Superintendent of Washington Golf & Country Club, Arlington, Va. for this innovation. A solid steel band is welded to the center of the roller which firmly tamps sprigs into the channel made by the modified plow share.*



## On The Research Front

Editor's Note: These are abstracts of papers prepared for the annual meetings of the American Society of Agronomy and published in "Agronomy Abstracts."

### Soil Warming For Turf Areas

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Investigations were begun in Indiana in 1962 to determine the fundamental requirements for installation and management of electric soil heating cable systems to maintain suitable

growth conditions for turf in heavy-use areas. Bluegrass sod transplanted November 10 remained dormant on unheated soil, while root extension was 3-5 inches by December 31 on heated