GRAU'S Answers to Turf Questions

BY FRED V. GRAU

Water Is Vital

"WATER" is the title of the 1955 USDA Yearbook. This volume belongs in the library of every course supt. It is the most comprehensive treatment of the subject that has been published. Ten years later we will do well to review every aspect of the Yearbook and of the subject wherever we can find it.

It is about time that each of us asks, "What can I do to improve the situation?" Water is life. Life can be beautiful when every person has all the clear pure water he can use for drinking, cooking, bathing and recreation. When green plants have ample water there is no fear of hunger or shortage of materials necessary for living.

Too much water causes death and destruction — witness the recent West Coast floods. Every person needs to look about him to see what *he* can do to retard runoff, control erosion and to cause more rainfall to sink into the soil where it can cause no damage.

Too little water has brought about the destruction and disappearance of entire civilizations. When water fails the fertile land becomes as the desert. In many parts of the U.S. water shortages are causing drastic revisions of normal practices.

A Major Problem

Polluted water is our greatest problem next to overpopulation. Domestic and industrial wastes have ruined many of our finest sources of fresh water. We can not drink polluted water nor use it in cooking. Industries move away from bad water because they can not use it in processing their products. Recreational uses dwindle or are prohibited. There is danger in using polluted water for irrigating crops and turf for fear of spreading diseases.

We read and hear much about getting "fresh water from salt water" by various demineralization methods. Fresh water produced by these methods is more expensive than naturally fresh water, but who is to say that the costs are excessive. Dock strikes, too, are costly but we seem to be willing to pay the cost whether we can afford them or not.

Minimum Assistance

The necessity of water in the production of high quality turf needs no elaboration here. We should ponder the questions, "How can we increase the *efficiency* of the water we use?" and, "Do we need to use so much water?" Turfgrass research one day will be forced to seek those grasses that can produce acceptable playing turf with minimum assistance from irrigation. There are many practices that help to conserve natural rainfall and to extend the supply of soil water.

One is soil cultivation which aids infiltration and deeper penetration of roots. Adequate treatments with soil amendments improve porosity and water holding capacity. Fertilization can be designed to improve turf quality with no increase in water use but a large increase in water-

WATER: Chemical symbol, H_2O or HOH, 88.81 per cent oxygen and 11.19 per cent hydrogen, most abundant liquid on earth, the universal solvent. Heavy water, H_2O_2 or deuterium, is useful in research. Water in nature never is "pure", contains various kinds of foreign matter, dissolved and suspended.

The properties of water arise from the hydrogen bonding and the tetrahedral arrangement of electron pairs around the oxygen atom. Each molecule of water is bonded to four other molecules. Chemical changes such as rusting of iron result in breaking of chemical bonds between H and O atoms. Physical changes, such as evaporation or melting of ice, involve breaking of hydrogen bonds only, leaving H_2O molecules intact.

Cohesion is water sticking to itself; *Adhesion* is water clinging to a surface — both are due to hydrogen bonding; both are major factors in soils and in plant growth.

Every life process depends upon water for fluidity and movement. Water is a lubricant for tissues, a necessity for the disposal of wastes, a carrier of diseases.

Water absorbs oxygen which permits fish and underwater plants to live, reproduce and grow. Warm water contains *less* oxygen than cold water, thus limiting plant and animal life.

Plants obtain nutrients which are dissolved in water and held in a *thin* film on soil particles. This film is so thin that it would require 3.3 to 20 million film thicknesses to equal one inch. About half the pore space in soil is occupied by water.

Water is a source of the plant nutrient *hydrogen*. Evaporation and transpiration of water cause cooling. Alfalfa transpires over 850 lbs. of water for each pound of above-ground dry matter produced; sorghum 271 lbs., other crops intermediate.

About 70 per cent of the weight of the human body is water; 95 to 98 per cent of fresh plants is water, a large part of which provides *mechanical strength* through turgor or tension.

use efficiency.

It's Oversaturation

Before too long we can hope that irrigation engineers will devote more time and money to studies of how to use systems more efficiently. Statements such as "we throw a million gallons of water a night on our course" impress me only one way — adversely. No wonder we have so much poa annua to cope with, so many weeds to fight, and so much soft turf and crusted soils. Will it take a national catastrophe to cause us to seek better ways of growing grass than throwing on a million gallons of water a night? It is still true that "more grass has been ruined by too much water than by any other cause."

Overwatered Greens

Q. We have small greens and heavy play. The members insist on soft greens so the sprinklers run from 9 at night to 6 in the morning. Now the members complain that the greens are too hard. What happened? (Missouri)

A. The excessive watering and heavy foot traffic on wet soil has sealed the soil pores, "densified" the soil and created "brick". Oxygen in the soil has been depleted and roots restricted. You have created essentially a dead soil that has lost its resiliency. It may be necessary to start all over, rebuild the greens and manage more wisely henceforth.

Increases Water

Q. What is the role of potassium in water-use efficiency in the plant? (Maryland)

A. Potash-deficient plants are more wilted and the leaf openings (stomata) are opened more fully, with a consequent loss of water. K is essential in the stomata guard cells which

close the openings and "turn off the faucet."

Plants well supplied with K use less water per pound of dry matter. K increases water in plants, improves stiffness and turgor, keeps conducting vessels open for more effective water movement (and nutrients) in the plant.

Gallonage Requirements

Q. You have talked about fertilization and how it increases water efficiency. Can you give a concrete example? (Missouri)

A. In the May-June 1964 issue of Eastern Potash Newsletter there are statements on the subject in relation to corn (a grass). "Adequately-fertilized corn pushed its roots four feet or more into the ground - - -." Unfertilized corn rooted only two feet deep.

Fertilized corn used 5,600 gallons of water per bushel to produce 79 bushels. Unfertilized corn used 21,000 gallons per bushel to produce 18 bushels (per acre). We have no figures on turfgrass use of water but the principle would be the same.

Algae in Pond

Q. We have to pump our irrigation water out of a pond that is foul with algae. Are we likely to get into trouble on our greens? (Indiana)

A. Yes, quite likely you can develop serious trouble. First you should consult an expert on pond treatment to reduce the algae growth. Copper compounds can be useful but their use must be carefully supervised to limit danger of poisoning, both animal and vegetable.

On your greens you can reduce algae growth by periodic treatments with hydrated lime. One pound of hydrated lime to 1,000 sq. ft. should be enough at one application. Keep soil well aerated and the grass adequately fertilized and let soil become dry now and then. Algae can grow only in the presence of continuous moisture.

Sporting Goods Sales Up By Five Per Cent Margin

The retail consumer market for sporting goods in the U. S. during 1965 will probably bring total sales to a record high of $2,744,700,000 in the opinion of Richard E. Snyder, Chicago economist. His forecast appears a study prepared for the National Sporting Goods Association.

Snyder estimates that 1964 sales amount to $2,594,400,000, an increase of 5.4 per cent over 1963. He says if the projected 1965 increase in achieved, it will represent the largest year-to-year increase since the 1960 increase of 8.2 percent over 1959.

Fonken Got Retriever Idea from Watching Kids at Play

Martin (Duke) Fonken, who died a short time ago at the age of 60 in Glendale, Calif., built a business from an idea he got while watching children at play. He was practicing pitch shots on his lawn one day nearly 20 years ago when one of a group of youngsters, who were rolling flanged hoops, accidently picked up a ball with his hoop. Out of this grew a design for a retriever that is used at many golf ranges throughout the country.

Fonken

Fonken's first picker-upper consisted of a 3-foot row of flanged wooden discs, set slightly farther apart than the diameter of a golf ball (1.68 inches), that could be pushed by a jeep. The rolling discs picked up balls and tossed them back into a wire basket mounted directly behind the discs. Later, Fonken widened the picker-upper to 9½-feet and substituted rubber capped metal discs for the wooden models on his machine. He went into production with his first retriever in 1946.

According to Fonken's widow, Helene, the firm which he founded will continue to manufacture golf ball retrievers at 433 W. Magnolia ave. in Glendale. Other survivors are two sons, Arch Edward of Glendale, and Robert of Las Vegas, and a sister, Mrs Florence Miller.

Cornell Turf Conference

The annual Cornell University turf conference will be held Feb. 22-24 in Statler Hall on the university campus in Ithaca, N. Y. The New York State Turfgrass Association will hold its annual meeting in conjunction with the conference on the 23rd. The Association will elect directors for four sections, one being to fill a vacany created by the death of John Hohm.

Midwest Turf Conference

Midwest Regional turf conference will be held Mar. 1-3 at Purdue University, according to William H. Daniel, program coordinator, who is connected with the University's agronomy department.