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