While nobody was looking, Fairmont developed a Limb Lopper power pack that lets you trim branches quietly without being tied to your truck.

A hundred feet or a hundred yards. Distances no longer matter with the quiet, self-contained mobile hydraulic power pack from Fairmont.

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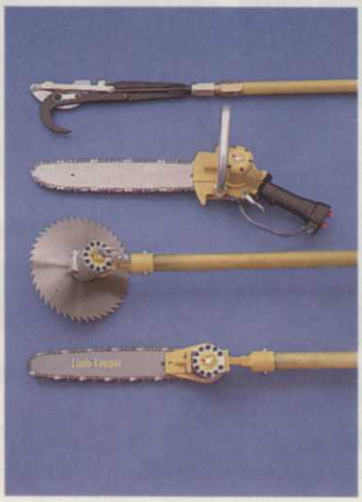
The practical benefits of Limb Lopper's mobile power pack are obvious. No longer do you have to equip each truck with manual and gasoline-powered tools for jobs that a basket can't reach. One set of quiet, efficient hydraulic tools takes care of every tree-trimming job.

Many of the big commercial tree-trimming companies have already switched to Limb Lopper chain saws, circular saws, and shade-tree pruners. It's easy for you to do the same. Just phone or visit your nearest member of Fairmont's trained, dependable Limb Lopper dealer network. Or write: Fairmont Hydraulics, a division of Fairmont Railway Motors, Bldg. B, Suite 408, 800 Roosevelt Road, Glen Ellyn, IL 60137. Phone (312) 790-1690.



Limb Lopper

FAIRMONT HYDRAULICS

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ware vendor can supply the hardware as well as the software.

5. Are some hardware brands better than others? Generally not to any great degree. Brand-name machines may cost a little more, and they may carry with them a better resource if problems crop up.

6. How big a computer do I need? In order to answer this, owners should sit down and take a hard, long look at their companies. If substantial growth is expected, computer needs should be planned accordingly. If little growth is expected, the same applies.

Generally, a reputable software company will ask several questions to see if they are talking to a likely candidate for their programs. The key issue will be growth. The ability of the programs and hardware to grow with a company is a key factor.

7. Can I do everything on a personal computer? While this is close to question No. 6, it's not the same. Certain personal computers have fairly fast internal speed coupled with a large memory, generally in the form of a hard drive.

What should be avoided is a dual floppy computer, which a company of almost any size will find unusable. Several fine programs available for personal computers should be considered with the question above.

8. Should I buy generic or customized programs? It is better to work with programs that have industry-specific factors. Dozens of A/R programs are available, but they don't necessarily work the way the green industry likes to use them. By choosing a software company with some industry experience, owners have some assurance that they have designed programs with the right type of company in mind.

9. When should I buy my computer system? Most companies wait too long rather than the reverse. If staff is overworked, billing lags, inventory is confusing, or a business suffers any other major problems relating to information, a computer should be considered.

10. What do I have to know about computers to use one? Not much. The better the programming, the easier the machine is to use. Many people with "computer apprehension" fail to buy a computer system because of visions of large unmanagable machines. This is not true in the case of the programs we reviewed. They were all usable by someone who had little or no basic knowledge of computers.

Owner/operators must have easy access to information in forms that will help them manage their companies better.

11. How long will it take me, or my staff, to learn to use the computer? This varies, but generally the types of programs we reviewed could be learned within a week and then would become comfortable after about a month.

12. How will I learn to use the computer? Either by on-site visits from the progammers, phone assistance, or the manuals. It's really not that tough once you start.

13. Finally, what will it cost? Several components go into the cost of a computer system. Hardware, software, peripherals and the support system all have costs associated with them. An owner has to assess what he or she wants the computer to do, then check on the available options. Some people might want to look up some computer magazines and find articles on peripherals, for example, to get a working idea of the available products.

The general answer to the cost question is that the computer package will probably run somewhere between $5,000 and $20,000, depending on size. They can get a lot more expensive, but that is the general range of prices of programs we reviewed. The key is to question more than one vendor so a comparison base can be determined. Some answers will confuse some people. The only protection is to understand—not computers—but what they can do.

Remember in computer shopping that the companies themselves are better at describing the specific parts of their program than we can next month in our program appraisals. They will be better able to answer any questions on individual issues. Before buying, a check should be made of the support system: what it costs, how it's done and who will be doing it. This is an additional cost in some cases but may be well worth it.

Finally, a choice should be made based on needs and personal relationships with suppliers. The astute owner would call several so that he or she could begin to make comparisons.

All the programs we will be reviewing next month were logically written, and each of them had special features unable to fit into short reviews. A final decision should be made based on the costs, the machines, the features of the programs and—most importantly—on how individual owners feel about answers to any questions.

Many of the companies listed visit major national conventions to demonstrate software. By taking time to make a decision, a system should be purchased that fits both the present and future needs of the company. These systems will help the company be more effective and profitable in the future. **LM**

In November, LANDSCAPE MANAGEMENT will look at software programs available to the green industry.

Diagonal Data's software helps companies keep track of vehicle maintenance.

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Water is the most abundant compound in the world. It is also taken for granted—until its quantity or quality becomes scarce. Recently, drought conditions in parts of the country have severely limited maintenance of turfgrass quality. These experiences have made turfgrass managers more aware of the critical need to effectively manage water supplies. The following article is the first in a series which will cover information presented at the 25th Nebraska Turfgrass Conference.

The authors have considerable experience and expertise relating to turfgrass water quality and quantity, water use and drought resistance.

Some of this information is technical by the very nature of drought resistance in plants. Drought stress is complex and involves a number of interactive factors. However, turfgrass managers should not despair, as you will read this month and in following months.

PART I OF IV

WATER: AN ENDANGERED HERITAGE

H_2O: How can we use it wisely, share it fairly, and still maintain its quality?

by A. E. Dudek, Ph.D., University of Florida

Water is something everyone seems to take for granted. It is cause for concern only during times of scarcity. Yet it is the most abundant chemical compound in the world. It is a major constituent of all living organisms. Without water, life would cease to exist.

It is used in most agricultural and industrial processes. But most importantly, there is no substitute for water, even in this age of high technology. A person can survive one week without food, but only three days without water.

Conversion of water into plant dry

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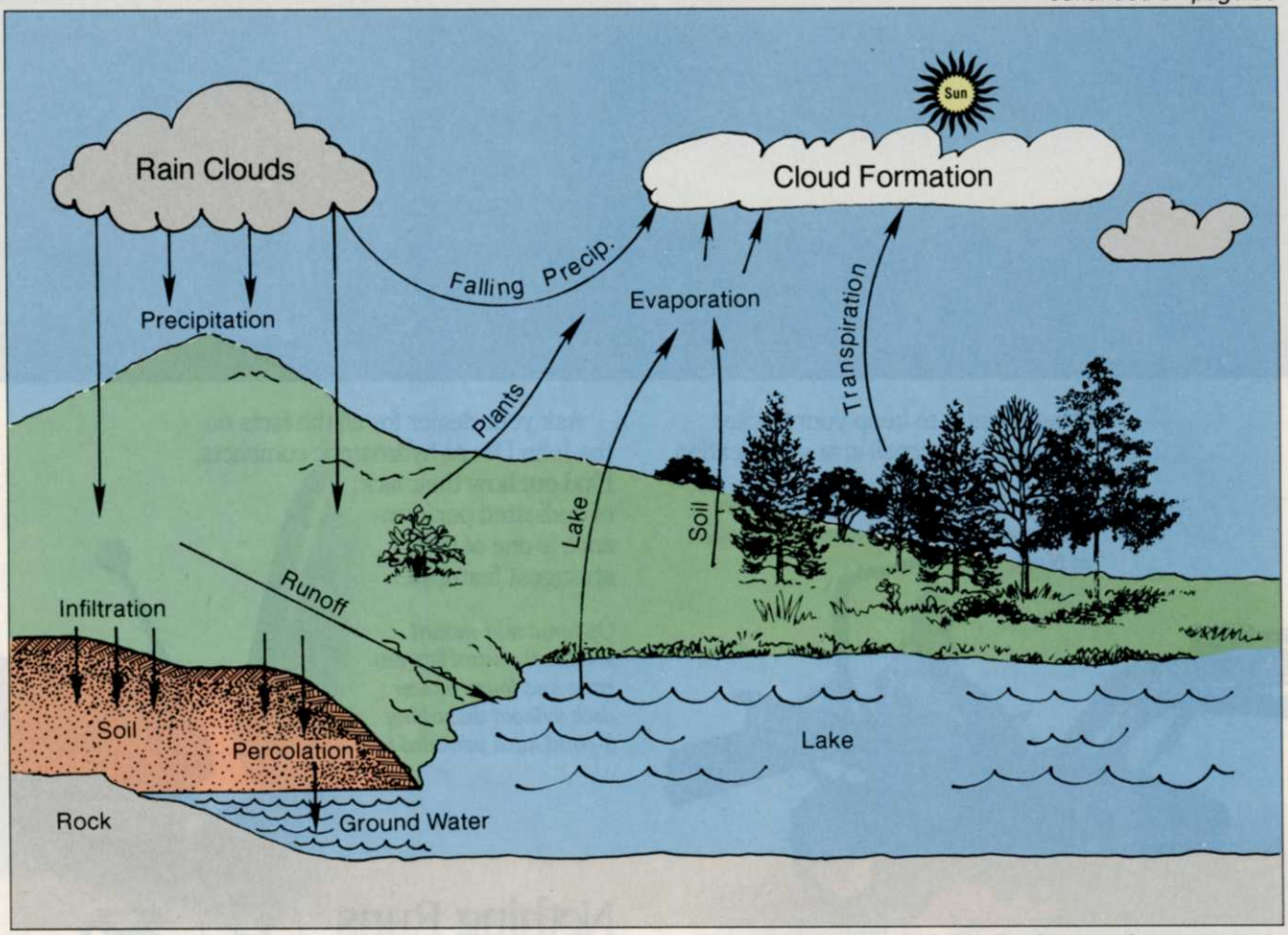

Figure 1. Hydrologic Cycle - Moisture is recycled through evaporation, condenses and falls back to earth as rain, sleet, hail, snow, dew and fog.

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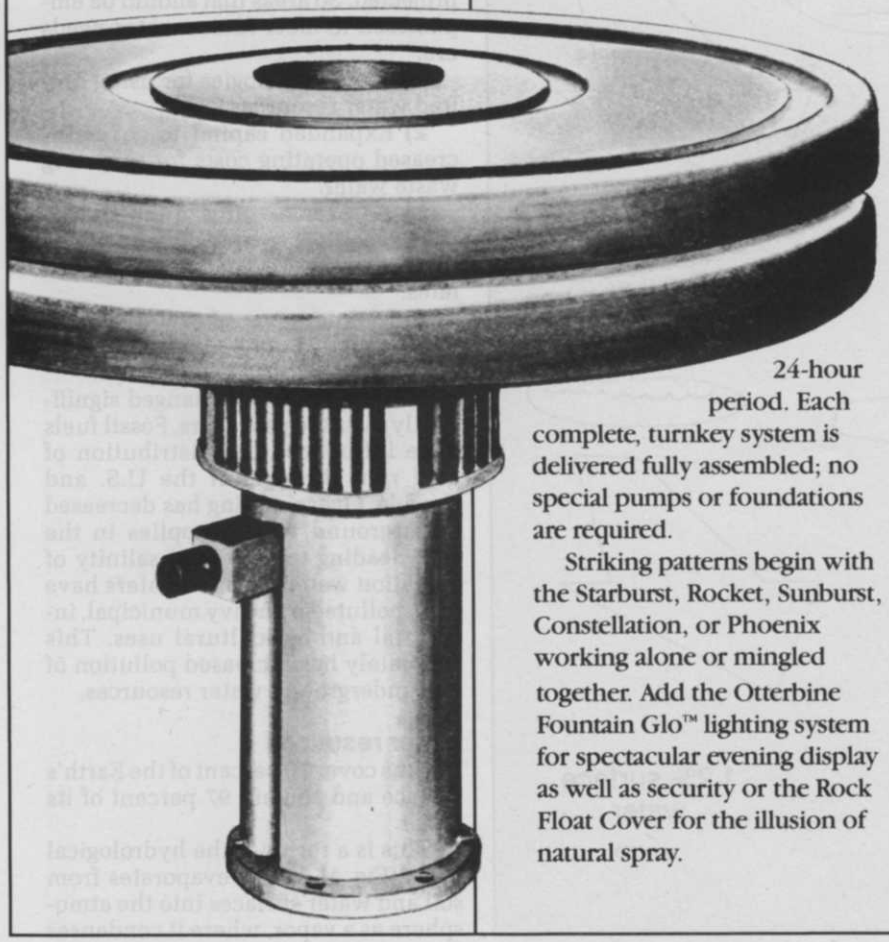

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matter is very inefficient. Botanists say that 1000 pounds of water (approximately 120 gallons) is needed to produce one pound of plant dry matter. Industrial needs also have great demands for water, requiring 200 gallons to produce a pound of rubber, 30 gallons to produce a pound of paper, and 18 gallons to produce a pound of steel.

Furthermore, agricultural and industrial demands on water are heavily impacted by human needs, which in many cases are very wasteful. On the average, we use 25 gallons of water for a shower, 16 gallons to run the dishwasher, three gallons to flush the toilet, but only five to six pints for body functions.

Water crisis

Today, most people are unaware of a water crisis which involves quality and quantity. This crisis is a result of increased demand on a constant supply. Worse yet, we have contaminated and continue to pollute our present resources.

Average annual precipitation in the United States is 30-60 inches per year in the humid East to 10-30 inches in the dry West.

It has been estimated that, if we continue to increase use of fossil fuels at the present rate of four percent per year, the mean global temperature will increase by two degrees Celsius by the year 2000 and seven degrees by the year 2050. This temperature increase may not seem much, but it would make North America significantly drier than it is today. The drying trend would magnify our future water needs.

One researcher says that, "for the next generation of Americans, water—its competing uses and conflicts that arise out of those uses—may be *the* most critical national problem."

Since the amount of available water is fixed, and water needs multiply with population and industrial growth, how can we use it wisely, share it fairly, and still maintain water quality?

Most people are unaware of a water crisis which involves quality and quantity.

The U.S. Water Resource Council predicts that our 1980 water requirements for municipal, industrial and agricultural uses of 443 billion gallons of water per day (bgd) will nearly double to 805 bgd by the year 2000 and triple to 1,386 bgd by the year 2020. A gloomy outlook for water has been projected. So areas that should be emphasized to meet future water needs are:

1) New technologies for using limited water resources.

2) Expanded capital to cover increased operating costs for recycling waste water.

3) Awareness of a quantitative water shortage in the Southwest, and that other states will share similar fates.

4) Maintenance of water *quality* being equally or more important than *quantity*.

Water quality has changed significantly over the past years. Fossil fuels have influenced the distribution of acid rain throughout the U.S. and Canada. Overpumping has decreased underground water supplies in the U.S., leading to increased salinity of irrigation water. Surface waters have been polluted by heavy municipal, industrial and agricultural uses. This ultimately has increased pollution of our underground water resources.

Water resouces

Oceans cover 70 percent of the Earth's surface and contain 97 percent of its water.

This is a result of the hydrological cycle (Fig. 1). Water evaporates from soil and water surfaces into the atmosphere as a vapor, where it condenses

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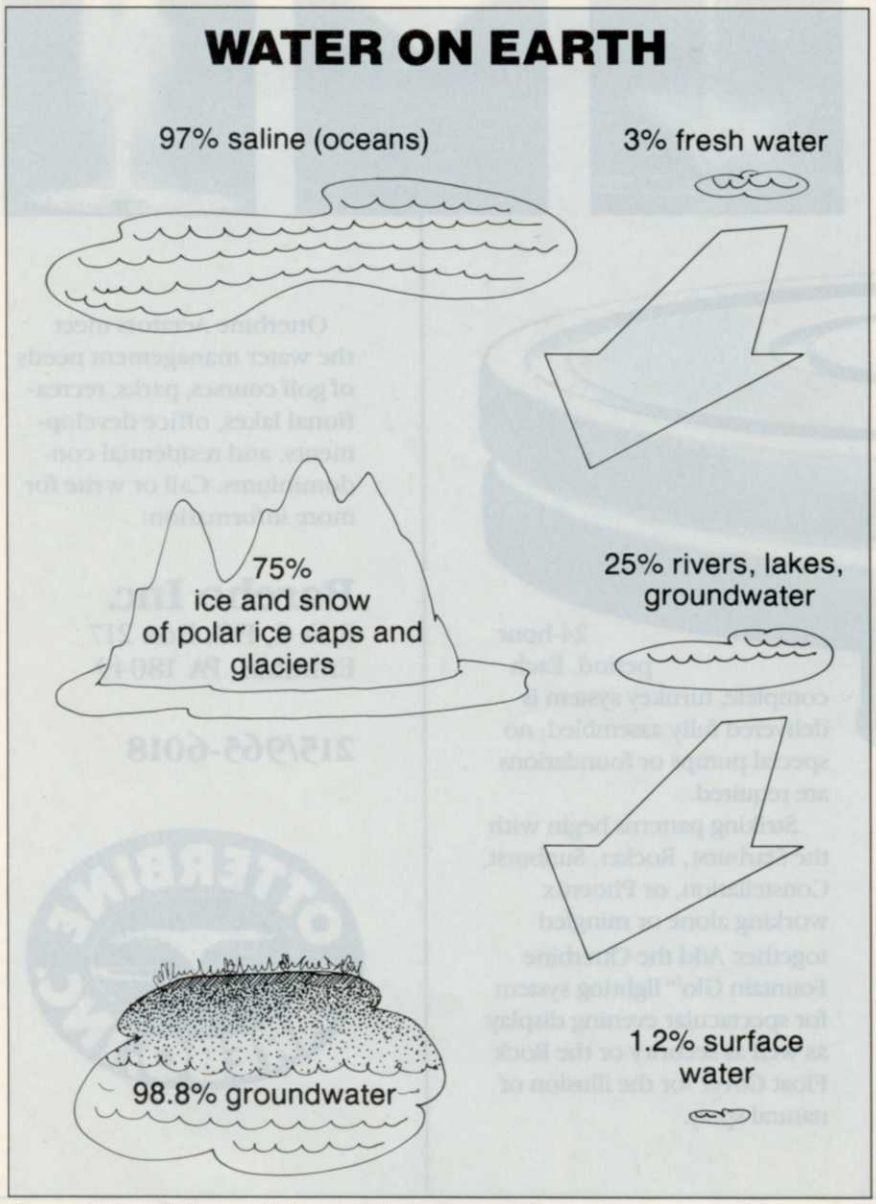

Figure 2. Breakdown of the earth's water supply.

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WATER *from page 58*

as rain or snow which falls back to the ground as precipitation. Free water then percolates through the soil, picks up dissolved minerals, and carries them back to the ocean by means of streams and rivers. This cycle is continuous, and is why the oceans of the world are as salty (saline).

Only three percent of the Earth's water supply is fresh (non-saline). Of this three percent freshwater, 75 percent is trapped as ice and snow in polar ice caps and glaciers. Only 25 percent is found in rivers, lakes and groundwater. The 25 percent is further broken down to only 1.2 percent surface water with the remaining 98.8 percent as groundwater. Oceans are being used as a water source by desalination, but this process is costly.

Present-day water resources involve wells, rivers and streams, and effluent. Well water was once a relatively constant source of stable, good quality water, free of toxic materials and pest problems. But overpumping and groundwater contamination have caused serious environmental concerns with this water source. Rivers and streams are also polluted because of surface runoff.

Effluent may be the turfgrass industry's salvation.

Recycled effluent

Increased population goes hand-in-hand with increased waste. On the average, each person produces 70-100 gallons of waste water and .25 pounds of sewage sludge daily. Thus, 400 gallons of polluted water are produced with every pound of organic matter transported to the nearest sewage treatment plant.

Water recycling will become the rule rather than the exception, and turf would be a *natural* for recycling effluent water.

Turf is a perennial ground cover that grows most of the year, in contrast to annual agronomic or horticultural crops. Turf has a high water requirement. Most importantly, turf is an urban commodity that is used close to the source of effluent supply. Wastewater is used on a turf ground cover for plant uptake, evapotranspiration into the atmosphere, and percolation into the ground where it is filtered and then purified by soil microbes. Thus, benefits of wastewater irrigation are several:

1) Inexpensive source of water.

2) Save potable water for other purposes.

3) Urban greenbelt areas for recreation.

4) Economic returns on crop sales.

5) Positive alternative to advanced wastewater treatment and surface water discharge.

Depending on the degree of wastewater treatment and availability, some states require the use of recycled water for turf irrigation instead of potable water.

Gray water

Gray water is a relatively new idea being used in new housing developments.

Forty percent of the average household's wastewater comes from the toilet, 30 percent from the bath and shower, 15 percent from the laundry, 10 percent from the kitchen and 5 percent from other sources.

The gray water concept isolates the toilet water from other household water. Only toilet water with its organic matter is connected to sewage lines for transportation to a sewage treatment plant where it undergoes normal processing. Thus, processing at the treatment plant is reduced 60 percent because the remaining sources of water are collected, treated and recycled at the home. Gray water is used for washing automobiles, watering landscapes, etc. Also, this water may be recycled back to the bathroom where it can be used in the toilet to further reduce our demands on potable water.

For the next generation of Americans, water may be the most critical national problem.

The future

The 1972 Federal Water Pollution Control Act amendments set a national goal of eliminating discharge of pollutants into navigable waters by 1985. We've made a lot of progress to date, but we still have a long way to go. Unfortunately, the Clean Water Bill has not yet been resolved in Congress.

Obviously, a master plan involving federal, state and local water planning groups is needed to analyze our existing and future needs. All water-related industries must be protected. During times of water shortages, turf facilities are the first to be restricted. Water priorities must be set based on essential, critical needs which are fair to all concerned.

Water is our most precious resource. Be careful how you use it. **LM**