Energy Conservation Through Irrigation Practices—for Homeowners
Michigan State University
Cooperative Extension Service
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September 1978
2 pages

ENERGY FACTS

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Cooperative Extension Service
Michigan State University

Energy Fact Sheet No. 10 | Extension Bulletin E-1142 | Reprinted September 1978

Energy Conservation through Better Irrigation Practices—for Homeowners

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WILL MICHIGAN ever need water conservation? Will we always be able to have and use water in abundant amounts? The recent drought in California and in other Midwest states suggests that we may not take for granted that this resource will always be available in an unlimited supply. Coupled with higher fuel prices, the cost of water has risen dramatically. The increasing population of Michigan dictates that a greater number of people now share in this resource. It is only logical that we should begin to examine our water management practices to make sure that we are utilizing this resource to the best of our abilities. Even though Michigan seemingly has an abundant supply of water, the fuel required to tap this resource makes wasteful use of water an act not only contrary to national goals but also contrary to personal economic goals.

The Need for Irrigation

Southern lower Michigan receives approximately 30 inches of rainfall a year. Only about one-half of this falls during the growing season. The other half is not lost entirely by evaporation but replenishes the water stored in the soil profile and in deep aquifers,[1] and leaves the land as runoff to streams and rivers. Most soils can store only 25 percent of the water required by plants during a normal growing season—sandy soils even less. For optimum plant growth in summer, the water in the soil reservoir must be restored with periodic rainfall at the rate of 1 inch every 5 days. Rainfall records for Michigan show that on the average there is a 6- to 10-inch rainfall deficit for optimum plant growth during the summer season. Not only is rainfall insufficient, but frequently seasonal rainfall is inadequate because the amount and timing of the storms do not coincide with plant needs.

For the past decade or two, modern technology, cheap fuel and nearby water resources have made it possible for Michigan farmers and homeowners to supplement rainfall with irrigation. Irrigation in conjunction with other high productivity practices insures good yields from field crops and gardens and enhances the beauty of green lawns and blooming flowers around our homes. Regular irrigation of lawns and gardens comprises a significant water use for many Michigan suburbanites. Such a practice may be justified by the supplemental food source that it provides or the esthetic appearance that it gives to homes. For others, it is a hobby or a necessary diversion from business and job pressures. The importance of such an environment to enhance the quality of life for Michigan homeowners cannot be discounted.

Michigan people find themselves in a dilemma: People do not want to give up the qualities of life they now enjoy, many of them specifically related to our water resource. Yet national policy dictates that they start conserving or else governmental agencies at the state and community levels may pass laws demanding greater efficiency. The goal should be to maximize the benefits for as many people as possible. This can be accomplished only if individuals become sensitized and concerned about personal water usage. If some of these concerns lead to better water management practices, everyone may continue to enjoy the higher qualities of life.

Water Management for Lawn and Garden

The amount of water required by plants is closely related to temperature, incident radiation, relative humidity, and wind velocity (climatological factors). The normal summer requirement for water in Michigan is 1 inch of water from rainfall or irrigation every 5 days. This requirement may be more or less, depending on the intensity of the climatological factors. When applying water with a sprinkler, the volume and the distribution of water are very important management considerations in conserving water and plant nutrients. Most gardeners apply water without any knowledge of how much is being applied or how much may be stored by a particular soil.

Figure 1 shows the number of gallons of water required for a ½-inch and a 1-inch application delivered by a circle sprinkler of a given diameter. A water meter, shown in Figure 2, attached to a garden hose delivering the water to the sprinkler, may be set to close a valve when the specified amount is delivered. Care should be taken to adjust the sprinkler and the

[1] *Aquifers are water-bearing layers of rock beneath the soil.*

water pressure to get uniform water distribution over the area being irrigated. Empty food cans (#2 or #3) placed at varying distances from the sprinkler may be helpful in checking the distribution pattern and the amount applied.

Another way to check the sprinkler output is to collect the water in a large container for a given period of time. For example, 4 gallons for 30 seconds will give 480 gallons per hour, approximately 1 inch for a 32-foot diameter area.

After letting the irrigated soil drain for a few hours, check the depth of wetting with a soil auger or a spade. An inch of water should moisten the soil to a depth of one foot, depending on the initial water content of the soil itself. Clay soils may require more, while sandy soils may require less water to achieve these conditions. With these simple tests, most gardeners can develop some guidelines for better water management.

Other suggestions for conserving water and energy for lawns and gardens are:

1. Use lawn clippings as a mulch to reduce water evaporation from bare soil. Mulches also provide a food source for soil organisms, resulting in better soil structure and fertility, prevent soil crusting from raindrop impact, reduce the amount of weeding required, and reduce soil temperature. If a good soil organism population is present, the clippings are consumed in 2 or 3 months. If lawn clippings are not available, black plastic sheeting may be used to prevent water loss by evaporation from soil, but its cost must be weighed against anticipated benefits. Plastic sheeting will also increase soil temperature.

2. Sprinkle lawns and gardens when air movement or wind is negligible. Air movement usually is minimal early in the morning and late at night. As might be expected, nighttime irrigation is more efficient than daytime irrigation. Sprinkling water under high wind velocities can result in a poor distribution pattern and high water losses from evaporation.

3. Avoid sprinkling water on streets and roadways. Plants near the street should be hand-watered to avoid excessive water waste. Exercise care also when sprinkling plants next to the house to minimize water contact with doors, windows, and other wood-base surfaces.

4. To use water most efficiently, use chemical or organic fertilizers in accordance with a soil test recommendation. Popular organic fertilizers are partially decomposed manures, composts, or other household decomposable wastes.

5. Good water management is only as good as all the other factors contributing to plant yield and quality. Attention must be given to plant vigor, plant diseases, plant and soil insects, etc. Most plant pests thrive under high soil moisture conditions.

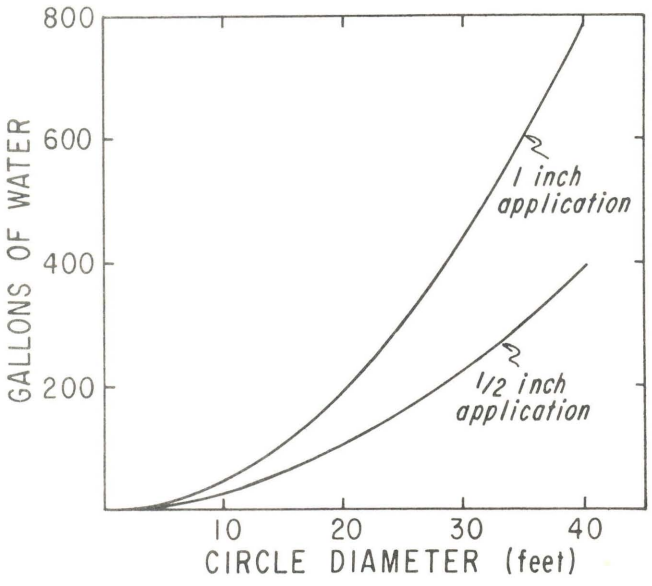

Figure 1—Gallons of water required for a ½-inch and 1-inch irrigation applied on a circular area.

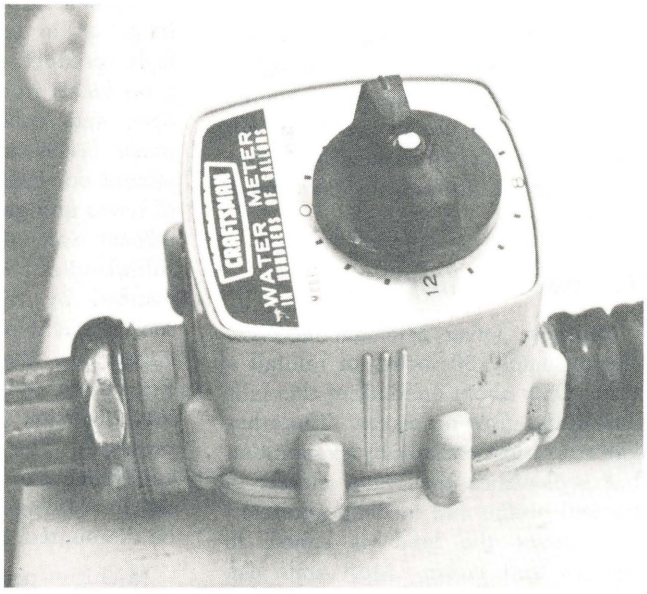

Figure 2—Water meter used for turning sprinkler off after a desired amount of water is applied.

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2P-10M-9:78-UP, Price 5 cents. Single copy free to Michigan residents

O-10955

Michigan State University Printing