THE HOW, WHEN, AND WHY OF WATERING

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Florida gardeners do not need to be told that they should water their plantings. Nor is there anything mysterious about the need for this supplementary water. In Florida, generally we are blessed with extremely light soils which have very low water holding capacities. Water which falls either leaches through quickly or is rapidly evaporated from the soil surface. Also, some months, particularly those of winter, are notably dry months. The greater part of our annual rainfall comes during June, July, and August when there are few tourists or visitors to see our green lawns. During the other months, the meager rainfall must be supplemented with some irrigation. With so much bright sunshine and balmy breezes for which Florida is famous, there is a high evaporation rate from plants and soil. As a rule, plantings of ornamentals require about two inches of water per week. In many parts of Florida we average only about a half inch of rain per week during the winter months, so the need for irrigation is evident.

Like most things, whether good, bad, or indifferent, the matter of economics must be considered. Excessive watering can be very expensive and even moderate applications are likely to increase water bills undesirably if the water is supplied by a city. While 1½ inches, the amount of additional water generally needed is about 40,000 gallons per acre per week, it has been found in many sections of the country where all crops are grown under irrigation, that by proper management of the irrigation system, it is possible to grow as good crops with one irrigation as was formerly done with as many as eight applications. (This represents a great saving in amount of water used.)

It would be highly advantageous if we could reduce not only the number of waterings but the total amount of water to be applied. This might reduce labor also. Again, it is no secret that the results obtained by some gardeners are not always what might be desired. For example, one gardener gave orders to his laborers that the irrigation system was to be operated every day of the week, from 12 o'clock noon till 1:00 p. m. rain or shine. Another could not understand why his plants wilted so badly every afternoon. He explained that he was conscientious about watering them with a fine sprinkler every evening after work!

Years ago someone evidently assumed that soil moisture could move around through the soil, and particularly upward from lower levels, by means of capillarity. This idea got into the text-books and until recently this movement has been taken for gospel truth. Lately we have been finding that soil moisture pretty much stays where you put it, leave it, or find it. Roots therefore must either move toward the moisture to get it, rather than waiting for the mountain to come to them, or else moisture must be applied so that it reaches the roots.

A simple demonstration will help to understand this better. If a fairly good grade of dry garden soil is placed in a glass container, wet places will be darker and will show up clearly. If the equivalent of ¼ acre inch of water is added to the surface of this soil, the free water disappears from the surface in a matter of seconds. During that time soil below the surface will become moist rapidly. When the free water is gone there is some gravitational water left in the pore spaces and water will continue to move downward for a few minutes. With only a ¼ inch application, the total depth (average) to which the soil will be moistened is likely to be only about 1 to 2 inches, depending on kind of soil. Thus the equivalent of about 7000 gallons of water per acre, which on a good sized garden would cost considerable money, will wet a dry soil only a short distance. If that kind of application was made often enough, the surface soil might remain moist but lower levels might be quite dry and roots would be inclined to grow more extensively near the soil surface. Also, with bright sunshine overhead, much of the water would be evaporated into the air and lost to the plants growing in that area. Not only that, but once the moisture has stopped moving downward, there is essentially no further movement of that moisture even if allowed to stand for hours or days. If dry soil is placed on top of this moist surface layer,

the capillary movement upward into the dry layer will be negligible.

The same experiment can be repeated using larger quantities of water, for example, equivalents of ½" and 1" applications. The greater the amount added, the deeper it will penetrate the soil before the free and gravitational water is taken up by the soil capillaries, but after ½" has reached the 3" depth it will cease moving, and after the 1" application has reached depths of 6" or 7" it will do likewise. Even these applications do not represent a watering treatment which would reach the major proportion of the roots of a properly grown plant. If the soil is partly moist in the first place, the added water will penetrate more deeply. However, a 2" application may be no more than sufficient to moisten the root zone for many plants. This represents about 55,000 gallons of water per acre, which would cost upwards of $15 at city water prices. In one month this could run up a sizeable water bill. Maybe it is fortunate that most of us don't own an acre which must be watered. The point which should be emphasized here is the fact that regardless of the amount of water applied at one time, the depth to which it will moisten the soil is definitely limited, unless of course enough is applied to reach the ground water table. Therefore, the depth of the moist soil layer is very much under control of the gardener.

Water generally is applied by means of sprinklers which cover a large area with a gentle spray, and must operate a long time in one place. The water then penetrates as fast as it is applied, with no evidence of it running off to lower places. However, if the application of water is very heavy in one place, and if the soil is not exactly level, penetration will be anything but uniform. This can be demonstrated by means of a long glass container so arranged that water may run on the soil from one end to the other when the soil is lower. If ½ inch is applied at once, the effect obtained is exactly as though one end of the container had about ⅛" of water added to it and the other had 1½ or 2 inches. The situation is often encountered in heavy rains, so that plants on high spots are on much drier soil.

This clearly indicates that there is only one way to get water to penetrate to lower depths in the soil and that is to *add more water at the surface.* Applying 1" of water on Monday and another inch on Thursday or Friday is not the same thing as applying 2 inches Monday. This system is complicated, if only ¼ to as much as 1" of rain falls near the time which watering should be done. Such rain may be very welcome but obviously if it is to be most helpful, it should be forced down in the soil farther than it normally would penetrate. The only way to get it down to where it should go is to add more water at the surface. Hence irrigation immediately after a moderate rain, if the soil below was on the dry side, may be the only way to get maximum benefit from both rain and irrigation. The combination would be better than either alone or both if spaced differently.

No doubt much of the difficulty encountered from not knowing when to apply water and when not to do so comes from too superficial examination of the soil for moisture. Examination of the top inch or two tells little about the root zone; the top soil dries out rapidly anyway. Examination should always be made to depths of 6 to 8 inches, using a spade, and watering should not be done until soil at that depth is becoming dry. Generally watering oftener than once a week will not be justified, and if good advantage is taken of the natural rain, it may not be necessary to water that often during the cooler parts of the year.

FLORIDA CUT FLOWER TRENDS

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The Agricultural Agents of the 67 counties of Florida have advised me that some 10,202 acres are presently being cultivated for the commercial production of cut flowers. The acreage figure presented by each Agricultural Agent represented an estimation and it is my firm belief that the true figure would be closer to 12,000 acres.

Disregarding the multitudes of backyard growers that produce every type of cut flower