UNIFORM WATER DISTRIBUTION NEEDED FOR HERBIGATION

by

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Both research and farmer experience would indicate an irrigation system can be effective method of applying certain preplant and post-emergence herbicides. Although my discussion concentrates on the need to know what one is doing and some of the problems associated with this method, it is not intended to discourage but, rather, to encourage future use of this method of weed control.

For best success, one must have an irrigation system that applies water uniformly, with the operator knowing how much water is being applied. The operator must also know the approximate depth of wetting which will occur with a given amount of water and relating this to the type of material being used and its ability to move with the water in the soil. Preplant and pre-emergence herbicides applied through the sprinkler system should be distributed in the surface two inches of soil to be effective against germinating weed seeds. Generally, the herbicides should be applied with about .25 to .5 of an inch for best results. Large amounts of water may move highly soluble herbicides too deeply on sandy soils and some herbicides may tie up readily with the surface soils and greater amounts of water may be needed to move them to the desired depth.

Just knowing the water holding capacities of one's soil may not be sufficient, since the soil may be nearly full of winter moisture at the time of applying the herbicide. A little experimenting ahead of time with the grower applying a measured amount of water to a small area just prior to applying the herbicide should be helpful.

Normally, at the time of year herbicides are applied, the infiltration rate of the soil is sufficient to take the water at the rate of application without runoff. If, however, the application rate of the system does exceed the infiltration rate of the soil, the desired depth of wetting will not be achieved. The possibility exists of the runoff causing some damage in places outside the field or exceeding the crop tolerance level in areas where the water collects.

Uniform Application

A fairly uniform distribution of water is desired for a good weed control; therefore, the manager should have some idea of the ability of his system to apply water evenly. With 100 percent overlap, the uniformity of the average spray system of a ground spray rig is about 80 percent and also is the equivalent of the uniformity of a good aerial application. Good uniformity can be achieved with all types of systems by adequate pressure and close spacing of sprinklers. Center pivot systems have sprinklers spaced infinitely close in one direction and two to five times as close along the lateral as they normally occur in set type systems; therefore, a good uniformity should be expected. Most of the center pivot systems which I have monitored have had uniformities ranging from 80 to 96 and even the new corner catcher systems tested have shown over a 90 percent uniformity. Testing for this uniformity is done by placing cans parallel to the lateral lines but not at right angles. When winds are blowing at right angles to the lateral, uniformities should be quite high. When winds are blowing parallel to the direction of the lateral in gusts or with frequent changes it undoubtedly will affect the uniformity. Uniformities under these conditions have not been documented but are suspected to be the cause of a streaking condition which can be seen from the air. U. S. Weather Service records would indicate that the windiest periods are from 9:00 a. m. to 5:00 p. m. and the quietest hours are from 5:00 a. m. to 8:00 a. m. which would be the ideal time to apply herbicides through non-circle systems. Most circle systems revolve in 12 or more hours, making it difficult to

complete an application without some wind. Center pivot systems on rolling topography and without pressure regulation can have wide variations in pressure and, thus, water and herbicide distribution. One foot difference in elevation creates .43 pounds pressure differences.

Solid Set Systems

Herbicides can be applied through solid set systems but it is very important that the system be designed properly and wind velocities are low at the time of application. Solid set systems do lend themselves better than center pivots to take advantage of nonwindy periods. In general, however, the uniformity of distribution usually is less than center pivot systems. One solid set uniformity measured showed 86 in a non-windy period but the same system operated at a uniformity of 36 during windy conditions. Flushing the system after an irrigation or systems located on sloping ground where the water flows to the low area may cause excessive leaching where excess water occurs.

Hand Move and Sideroll Systems

Although herbicides can be applied, excess labor usually limits their use by this method. By making frequent moves with close lateral spacings, these systems can be used efficiently.

To determine application rates:

$$\frac{\text{gpm X 96.3 X hours}}{\text{area in sq. ft.}} = \text{inches applied}$$

Example 1:
Sprinkler head 5 gpm
Lateral location 60'
Sprinkler heads 40'
Four hour sets

$$\frac{5 \text{ X } 96.3 \text{ X } 4 \text{ hrs.}}{60 \text{ X } 40} = .8 \text{ inch}$$

Example 2:
Circle system 1,000 gpm
Area of circle 100 acres
Twelve hour rotation

$$\frac{1{,}000 \text{ X } 96.3 \text{ X } 12 \text{ hrs.}}{100 \text{ A X } 43560} = .26 \text{ inch}$$