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A Simple Way to Estimate the Distribution Uniformity of Furrow Irrigation Systems

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Distribution uniformity (DU) - how evenly water is applied throughout a field - is important in managing water efficiently. Poor uniformity causes excessive deep percolation, where water percolates below the root zone and is lost to crop use.

Using the following method, growers can quickly and easily determine the distribution uniformity of furrow irrigation systems.

1. First, calculate the advance ratio:

$$\text{Advance ratio} = \frac{\text{Irrigation}}{\text{Time Advance Time}}$$

where irrigation time is the time elapsed from when the water is turned on until it is turned off and advance time is the time elapsed from when the water is turned on until it reaches the end of the field.

2. Use the guidelines below to estimate the distribution uniformity according to soil type and conditions. Guidelines are for soils cultivated prior to an irrigation. For soils not cultivated before irrigation, the distribution uniformity is at least 85 percent regardless of the advance ratio.

Sandy/Sandy Loam Soil	
Advance Ratio	**Distribution Uniformity**
1 - 1.5	less than 65%
1.5 - 2.0	at least 75 - 80%
2.5 - 3.0	at least 80 - 85%
4	greater than 90%

Loams/Clay Loams	
Advance Ratio	**Distribution Uniformity**
1 - 1.25	less than 70%
1.5 - 2.0	80 - 85%
2.5 - 3.0	at least 90%

Distribution uniformities of less than 70% are poor. DUs of 80 - 85% are good, and DUs greater than 90% are excellent. The most effective way to increase the DU for field lengths of one-quarter mile or more is to reduce both field length and set time by one-half, but not reduce the furrow flow rate. Keep in mind, reducing the run length and set time can greatly increase the surface runoff and/or ponding at the end of the field. This can be controlled by cutting back furrow flow rates after water reaches the end of the field. In some soils, the DU may also be increased with a higher furrow flow rate, although in cracking clay soils, little change may occur in DU.