Water Application Uniformity

The water application uniformity is determined by measuring emitter flow rates at a minimum of 18 points throughout each irrigated zone. The emitter discharge rates are analyzed just as the previously discussed pressure data were analyzed. Flow rates can be determined by measuring the times required to fill a container of known volume. A stop watch can be used to measure times.

In Figure 1, the sums of the high 1/6 and the low 1/6 of the times measured should be used to determine the water application uniformity. Again, as discussed for pressure measurements, the high and low 1/6 times can be adjusted by multiplying both by the same constant. This is required if the data do not fit the scales in Figure 1 well. Alternatively, Figure 1 can be used with flow rates (calculated by dividing the volumes measured by the times) instead of the time or pressure axis scales currently used.

As an example of the use of Figure 1, assume that water from 18 emitters was collected to fill a small container, and the times required to fill the container was recorded (in seconds). The data measured are recorded in the third column of Table 3.

From the six-step procedure used for pressure analyses:

Step 1. 1/6 of 18 = 3

Step 2. 62 + 64 + 64 = 190 sec (lowest 3 values)

Step 3. 90 + 88 + 86 = 264 sec (highest 3 values)

Step 4. Locate 264 sec on the vertical axis in Figure 1 and draw a horizontal line across the graph from that point.

Step 5. Locate 190 sec on the horizontal axis in Figure 1 and draw a vertical line from that point.

Step 6. The intersection of these two lines occurs between the 80% and 90% lines. This indicates a "Very Good" water application (statistical) uniformity coefficient of about 88%.

From this analysis, it can be concluded that the irrigation system represented by the flow rate data in Table 3 was designed and constructed to achieve a high degree of uniformity of water application throughout the zone that was analyzed. Also, because the 88% water application uniformity was only slightly less than the 90% hydraulic uniformity, it can be concluded that the variability among emitters used in this irrigation system is very low. No emitter plugging is indicated.

Emitter Performance Variation

Emitter performance variation, Vpf, refers to non-uniformity in water application caused by the emitters. If the emitter performance variation is high, this is normally due to emitter plugging or to