

Reduced Sprinkler Radius

Occasionally someone will complain that the Hunter PGP sprinkler does not apply enough water near the head, and they adjust the diffuser pin into the nozzle stream to remedy “the problem.” This is particularly true with impact-

sprinkler installers who are accustomed to the area next to the head being soaked when they diffuse the spray. Tests at the Hunter facility revealed that an impact sprinkler with a 5/32 nozzle reduced to a thirty-foot radius produced a precipi-

tation rate near the head of over 5 inches per hour. In most soil conditions this would cause close-in puddling. In addition to dramatically increasing the precipitation rate at the head, reducing the radius has a negative effect on performance and decreases the efficiency of the system.

PGP with #7 Nozzle

FIGURE 1a

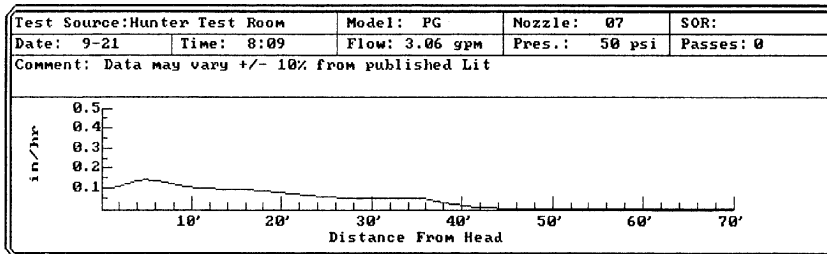
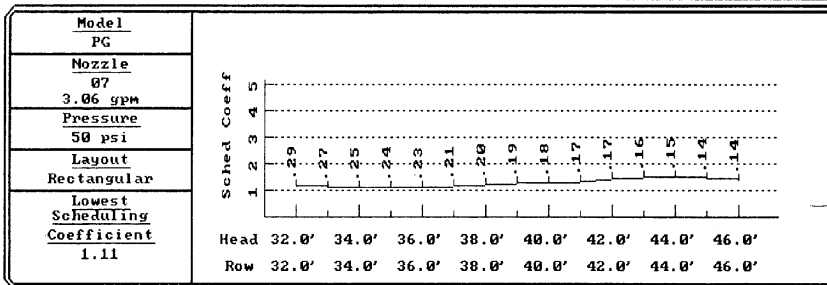


FIGURE 1b



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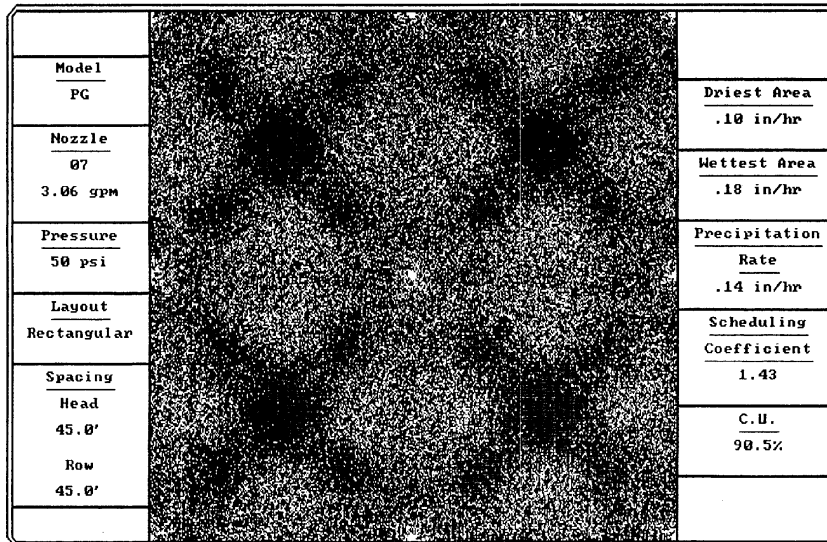
Data created from Hunter Industries tested profiles

PGP with #7 Nozzle

Let’s look at what actually occurs. The performance chart for the Hunter PGP states that at 50 psi, the No. 7 nozzle has a radius of 42 feet. Looking at the distribution profile for this configuration (shown in Figure 1a), we see that the radius of throw is in fact 42 feet. Note that the amount of water distributed next to the head is about 0.10 inches per hour. With the nozzle undiffused, the scheduling coefficient (Figure 1b) is under 1.5 for spacings from thirty-two to forty-six feet.

Now we’ll look at a distribution analysis plot (densigram) for this head, spaced at 45 feet (Figure 2). Notice that the scheduling coefficient is 1.43 — still under 1.5. But as you can see, the driest area is next to the head.

FIGURE 2



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Radius Reduced

The common belief is that if the spray is diffused, the water from the extreme end of the pattern will be transferred so it is applied next to the sprinkler head. Figure 3 is a distribution profile for the same head. With the radius reduced to 30 feet, this chart shows that the common belief is inaccurate.

There is minimal increase in the application rate in the area within 10 feet of the head. But in the area 10 feet to 20 feet from the head, the application rate has doubled. (This is the reason for the large green rings produced by a great many irrigation systems.)

Notice also that the scheduling coefficient has increased (Figure 4). In this case, there would be severe stressing in the areas between the heads.

The normal practice to eliminate the stress is to increase the nozzle size to increase the application rate, and diffuse the spray to ensure enough water next to the head.

PGP with #7 Nozzle - Radius Reduced

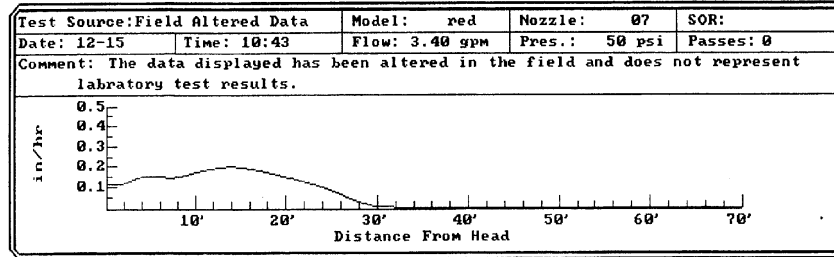
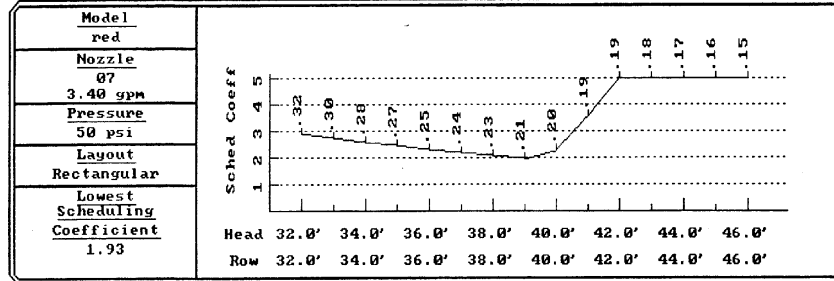


FIGURE 3



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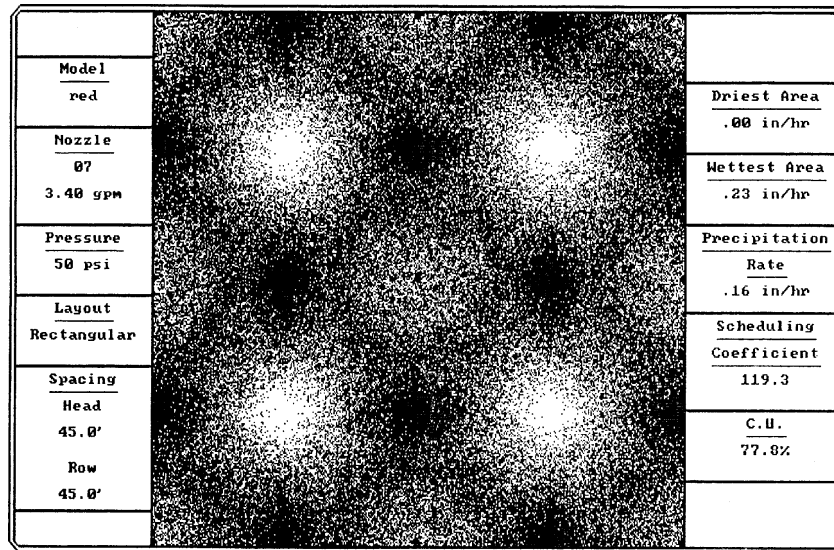


FIGURE 4

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A Guide to the Charts

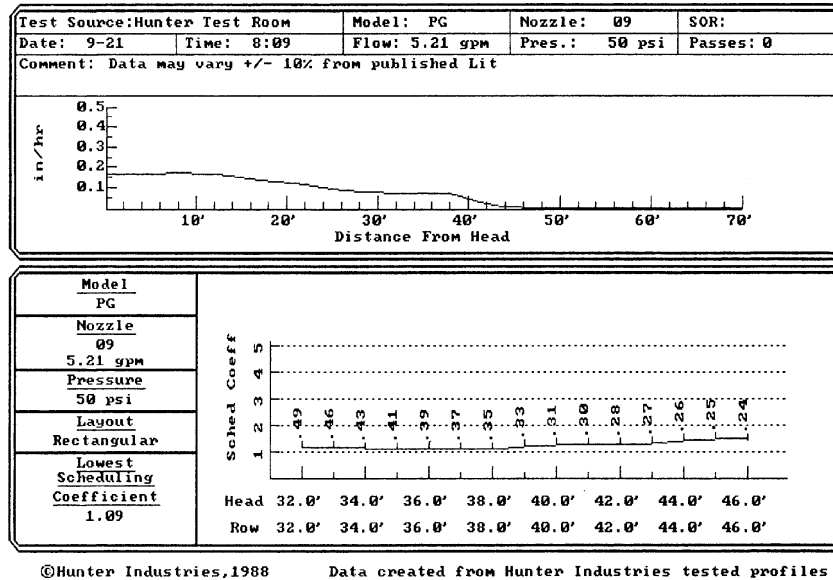
In a distribution profile (Figure 1a), the sprinkler is located on the left side. Catchment cans are placed in a straight row in two foot increments. The sprinkler is then allowed to operate as it normally would under field conditions for a predetermined amount of time. At the completion of the test, the water in the catch cans is measured and the results are plotted on the chart. This is the actual amount of water that falls in the catch cans (distribution uniformity, or DU).

The scheduling coefficient (SC) is shown on the chart in Figure 1b. The SC measures the uniformity of the application of water by the sprinkler. It is a measure of how much water falls into one catch can as it relates to the amount falling into the rest of the cans. A perfect SC of 1.0 states that all catchments fill to the same level.

You can see in the graphs in Figures 1 and 5 that the nozzles that have not been reduced have a nearly perfect SC.

PGP with #9 Nozzle

FIGURE 5

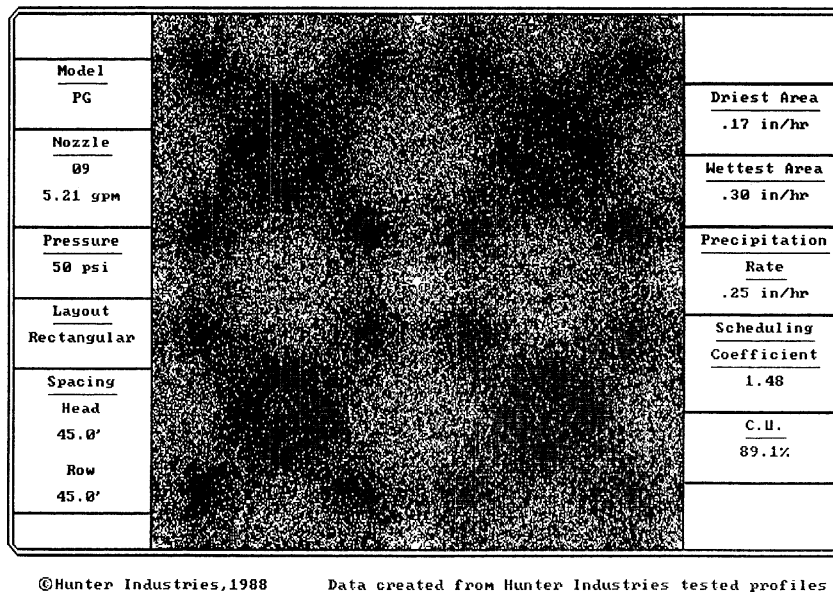


PGP with #9 Nozzle

First look at the distribution profile in Figure 5 for the PGP with a larger (No. 9) nozzle at 50 psi. Notice the plateau/wedge shape. This profile indicates very uniform coverage throughout this spacing range.

As you can see, at a 45-foot spacing the over-all precipitation rate is increased from 0.14 inches per hour for the No. 7 nozzle, to 0.25 inches per hour for the No. 9 nozzle.

FIGURE 6



Another view of the water distribution patterns of a zone or zones of sprinklers is shown in the densigram (Figure 2, for example). Here, the watering pattern is represented by the darker areas. The white areas represent the areas with the least amount of water. Sprinklers are placed so that the spray patterns overlap and produce a more uniform distribution (Figures 2 and 6). The densigram illustrates that reducing the radius to try to increase the precipitation near the head will actually result in reducing the overall performance of the sprinklers (Figures 4 and 8).

The uniformity coefficient (CU) and the SC are stated on the densigram. A CU of 100% would represent a perfectly uniform distribution of water. A CU of 80% to 90% for a working system is considered high.

Radius Reduced

In Figure 7 the distribution profile is for the larger, No. 9 nozzle with a diffused spray. The amount of water has doubled next to the head, but the application rate in the middle of the range has also increased. The amount of water applied at the "hump" is two to three times the amount applied in the area next to the head.

As Figure 8 makes immediately apparent, this is a disaster. We have green circles, each with a radius of 20 feet, and all areas between these circles receive little or no water.

Summary

Hunter nozzle sets have been designed for optimum performance when installed "head to head." With the PGP sprinklers, the fine mist from the secondary orifices supplies more than enough water in the area close to the heads, especially if it is supplemented with some of the range spray from the adjacent heads.

Additionally, the performance of the nozzles tends to be better in the middle of the recommended pressure range.

Use the nozzle closest to the radius of throw you need and do not diffuse it unless reduced radius is required to keep water away from hardscape areas. If there is a coverage problem, do not assume that a new or different nozzle will solve the problem.

If the system is designed for head-to-head coverage and the range spray is not reaching the adjacent sprinkler, the probable cause is *not* the nozzle that was supplied.

Look for other sources of the problem, such as pressure (too high or too low), heads that are not perpendicular to the turf, damaged

nozzles, leaks in the system, and nozzles not installed properly. Check these prior to changing or adjusting the nozzles.

PGP with #7 Nozzle - Radius Reduced

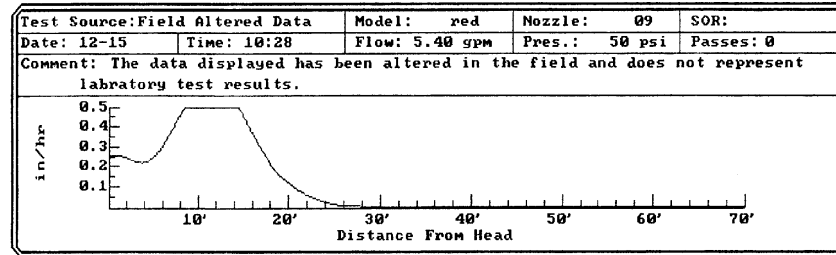
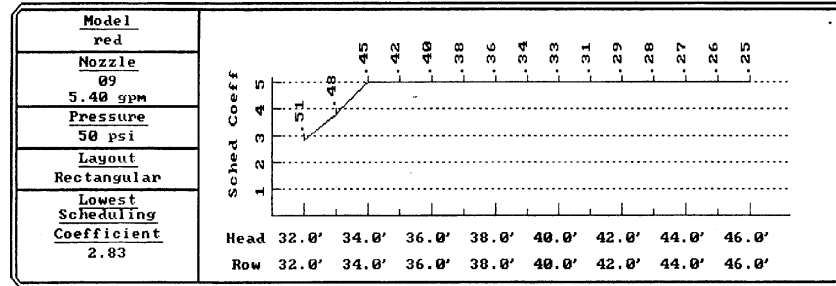


FIGURE 3



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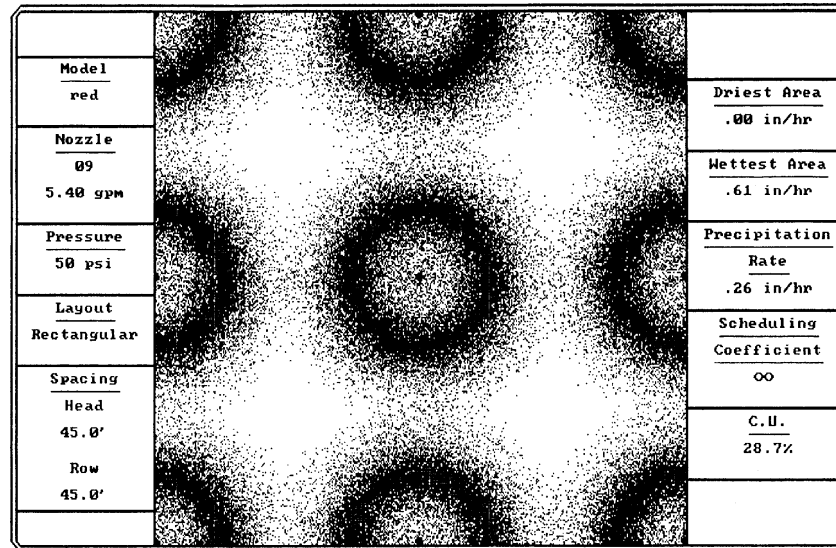


FIGURE 4

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