

Micro-Sprinklers

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The term *micro-sprinklers* is a general one including misters, mini- and low-volume sprinklers. Low-volume sprinklers have been in use at our nursery for approximately five years. The following discussion is limited to low-volume sprinklers which are generally also low-angle design and operate on low pressure.

Originally, the problem of irrigation of containers in shadehouses with covers at or below 10 ft led us to the low angle design of the NAAN Turbo Hammer model (Figure 1). At a separate propagation facility the problem of elevation changes of 80 ft in 600 ft of line distance and limited water availability demanded some unusual solutions. To compound the problem, growing space on a small hilly acreage looks more like grandma's crazy quilt than an efficient, high tech nursery facility. Level space for container beds and shade houses does not come in regular shapes and sizes. Small sprinkler patterns were needed to avoid waste. The NAAN 7102 has been most useful in production of 2- and 4-in. liners, and for some 1 gal stock in these unconventional areas (Figure 2).

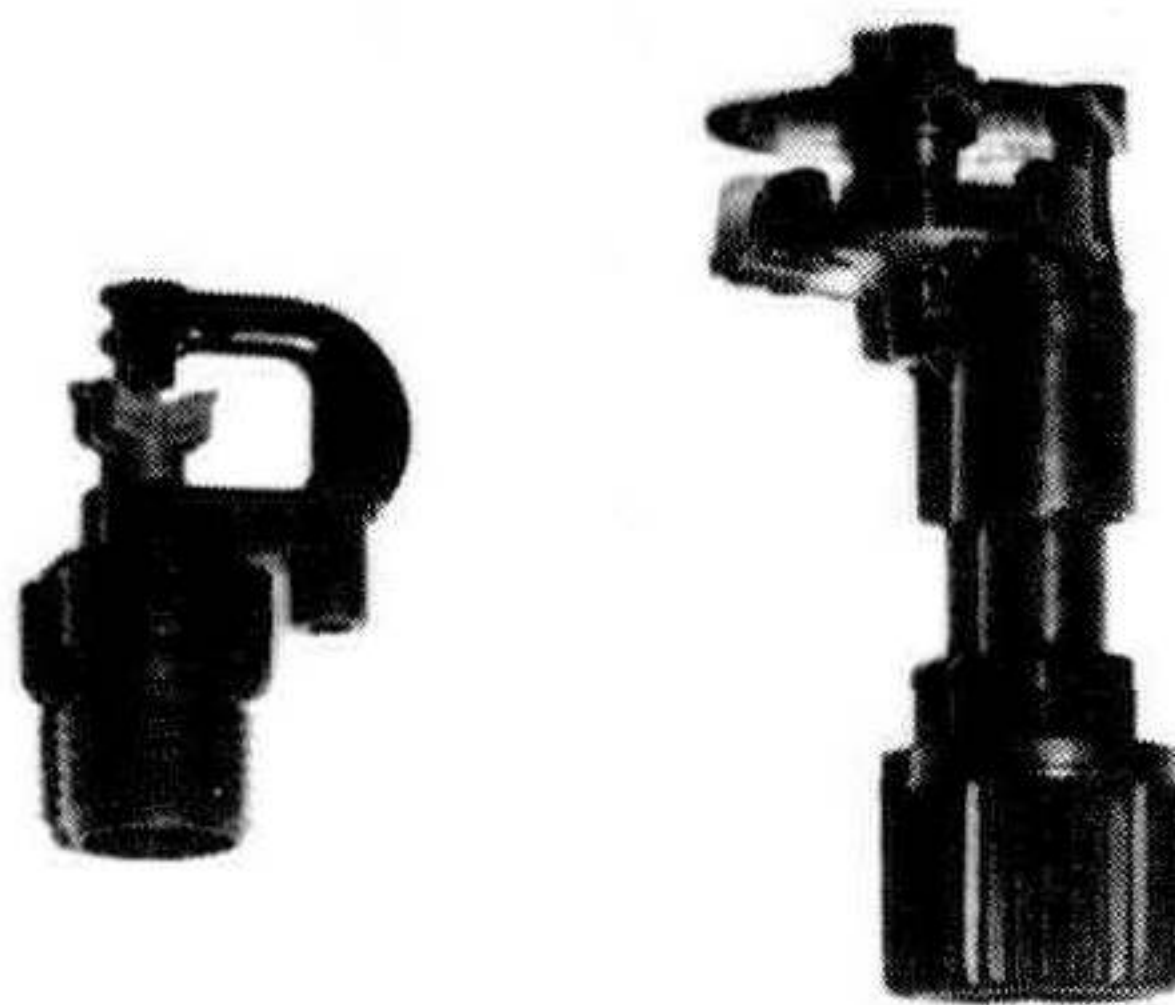


Figure 1. Two types of low volume sprinklers:

Left. NAAN 7102 Spinner— low Volume, very low angle, 0.57 gpm at 15 psi. *Right.* NAAN 501 Turbo Hammer— low volume, low angle. 9.7 gpm at 15 psi.

The nursery produces flowering shrubs, primarily rhododendrons and azaleas for landscape use. The facilities have evolved over the past decade, therefore most changes have included adapting the old systems as much as possible to minimize the expense of improvements. The two sprinklers mentioned above are designed to be installed on PVC with standard threaded couplings. Standard electrical control systems are effective with these units.



Figure 2. NAAN 501 Turbo Hammer sprinklers in use during the summer.

Advantages

Using the familiar brass impact sprinkler for comparison, Table 1 shows some of advantages of the micro-sprinklers.

Other advantages of the low-volume sprinklers:

- The low operating pressures mean longer equipment life.
- Parts can be hand-tightened without wrenches or special tools.
- Replaceable parts reduce the expense of maintenance.
- Low rate of application allows the grower to closely match the discharge rate to the absorption rate of the container mix and soil.
- Small diameter coverage pattern minimizes waste outside the growing area.
- Visual monitoring of uniformity is simplified because the rotation speed of a sprinkler varies with the volume of water ejected from it. A damaged or partially plugged sprinkler will rotate slower than others in that line.
- Though I have no quantitative evidence, it seems that droplet size or velocity produces a gentler spray. I have noticed reduction of soil compaction and splashing which can carry disease organisms and dislodge fertilizer beads.

Table 1. Comparisons between brass impact and micro-sprinklers

	Brass impact	NAAN 501	NAAN 7102	Comments
Minimum pressure	psi 20	15	15	The brass impact sprinkler is not uniform at low psi Pressure regulator may be needed for low-volume units
Maximum pressure	psi 70	45	45	
Peak of water stream above nozzle	ft 7	1 to 2.5	0.5	
Discharge at minimum pressure	gpm 2.0	0.15	0.09	
Discharge at maximum pressure	gpm 3.9	1.73	1.02	
Diameter coverage	ft 72 82	26 53	17.4 35.1	Brass impact needle setting moves during operation. Low-vol adjustment parts installed— stay set

Disadvantages

- In unsheltered areas wind can distort intended distribution. Shade covering on walls of growing houses minimizes this problem.
- The Turbo Hammer model is an impact sprayer. The hammer does split after several seasons of use.
- The Turbo Hammer model seems to have a dry zone between 2 and 4 ft from the sprinkler. Uniform application on pot sizes 1 gal and smaller can be a problem.
- Pressure differences must be calculated to assure that each sprinkler on the line matches all others. Elevation differences and friction losses significantly affect the output.
- Minimum water application on plants in containers with fertilizer can develop excessive amounts of dissolved fertilizer. Frequent monitoring is necessary and appropriate flushing routines must be observed.

CONCLUSIONS

Irregularities of water distribution in the installations at our nursery are in general related to the use of sprinklers in container beds. These low-volume sprinklers are primarily designed to be used in field growing and orchard situations where water can move laterally to moisten the entire root zone. Also the nature of the crop we grow does not allow the low placement of the sprinklers—above ground but below foliage, where they would be less affected by wind.

Water management in the future will be important to the entire industry. Many alternatives are available to meet the many growing situations and variety of crop needs. Good design, good maintenance and good management of any system are the keys to efficiency. "A properly designed, maintained, and managed low-volume sprinkler system can deliver water with an application efficiency greater than 90 percent."

REFERENCE

- Goldhamer, D.A. and R.L. Snyder.** 1989. Irrigation Scheduling, A Guide for Efficient on-Farm Water Management, University of California, Division of Agriculture and Natural Resources, Publication 21454. Berkeley, California