

7.1 Nursery Production Systems

Applicability

This BMP is applicable to irrigation of nursery crops and agricultural producers that grow nursery crops.

Description

This BMP considers the design of the irrigation system used for distribution and application of irrigation water to field, container, and greenhouse grown nursery plants. Improved efficiency of water use in the production of nursery crops includes the following practices:

Irrigation System Design and Management

1. Scheduling irrigation according to crop needs and growing-medium water depletion. Watering requirements will vary and should be adjusted based on time of year, weather, methods of storage and type and stage of the plant (e.g., dormancy). Plants need less water during cool, rainy weather than during hot, dry, windy weather.
2. Upgrading irrigation equipment to improve application efficiency. For example, a computerized irrigation scheduler using a drip system can reduce overwatering and excessive leaching compared to an overhead system.
3. Plugging sprinkler heads that are not watering plants, keeping sprinkler heads as low as possible to the plants, and use of the largest appropriate water droplet size to reduce irrigation time.
4. Use of drip tubes or spray tanks for each individual container, when reasonably practical.
5. When using programmable irrigation booms, travel rate and flow rates should be adjusted to specific crop needs.
6. Use of sub-irrigation systems where appropriate, using ebb and flood or capillary mat irrigation technologies with water capture and reuse systems.

Plant Media and Management

1. Grouping plants together that have the same water requirements (i.e., use hydrozoning).
2. When ball-and-burlapped stock and containerized stock are received, they should be kept out of the wind and sun. Ideally, balls should be covered with moisture-retaining materials such as sawdust or wood chips if stock will be stored for a long time.
3. Knowing characteristics of the application site, including soil type and depth to groundwater under the greenhouse or nursery.
4. Spacing containers under fixed overhead irrigation to maximize plant irrigation and reduce waste between containers.
5. Minimizing leaching from containers or pulse-irrigate containers. Many textbooks recommend leaching greenhouse and nursery crops to 10 percent excess. This rate can

be reduced to close to zero by reducing fertilizer rates and closely monitoring the electrical conductivity or the root substrate.

Implementation

Many operational procedures and controls to improve water use efficiency of the nursery operations should be implemented simply as a matter of good practice. Implementation of this BMP consists of the following actions:

1. Perform a water efficiency audit of the nursery facility to identify areas of improvement for water savings and optimization of water use. The audit should review all aspects of operations including types of plants and specific water requirements, growing medium characteristics, and the irrigation system.
2. Implement appropriate water efficiency practices, including:
 - Design of the irrigation system such that water can be delivered to different zones at different application rates and for different durations.
 - Upgrading or modernization of irrigation system.
 - Organization of plants by water use.
 - Programming of irrigation system controllers for optimal water use.

Schedule

The time required to implement one or more of the above practices depends on the size and extent of the nursery operation and which conservation practices are to be implemented. Implementation of some of the above practices can be done in less than a week (programming of irrigation controllers, replacement of sprinkler nozzles, scheduling irrigations, etc.) to several months (installation of a new irrigation system or water recovery and reuse system).

Scope

Nursery production systems vary in extent from small (less than 1 acre) operations to multi-acre farms and greenhouses. The applicability of each of the above practices must be customized for the specific requirements of each Nursery Production System. Some of the above practices may be not be cost effective for smaller operations. Larger operations may select to implement all of the above practices.

Documentation

The following information can be used to document implementation of this BMP:

- Description of irrigation techniques and water zones;
- Description of mulching practices and soil amendments used;
- Description of the irrigation and water recovery and reuse system; and
- Water use records for the periods both before and after implementation of water efficient practices.

Determination of Water Savings

Determination of the quantity of water saved by implementing this BMP must be determined specific to each nursery production system and is dependent on the amount of water used by the existing system and which conservation practices are currently implemented by the producer. Water use records prior to and after implementation of one or more of the above practices can be used to determine the amount of water saved.

Cost-Effectiveness Considerations

The cost-effectiveness of implementing one or more of the above practices must be analyzed for each nursery production system. The cost ranges from minimal (for reprogramming irrigation controllers, changing sprinkler heads, etc.) to significant (installation of water recovery and reuse system, upgrading or replacement of irrigation system, etc.). Some basic operational practices should be corrected without a cost-effectiveness analysis.

References for Additional Information

1. Colorado Springs Utilities, Water Conservation Program, *“Hydrozoning-Irrigation Definitions and Requirements”*, www.csu.org/files/general/2656.pdf, 2 p.
2. Southern Nursery Association, *“Production Practices for Nurseries, Greenhouses, and Growers”*, www.sna.org
3. Texas Nursery Landscape Association, www.txnla.org.
4. Department of Horticulture, Texas A&M University-College Station, Texas Greenhouse Management Book, www.aggie-horticulture.tamu.edu.