# Drip Irrigation and Fertigation Procedures for Field Grown Nursery Crops

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Design your irrigation system while planning your field layout and planting strategy. The main irrigation trunk lines will need to be buried in the field, usually along roads, with the valves located at convenient intervals. Remember to plan for a method of draining irrigation lines to avoid damage caused by winter freezing. Also, leave space for a traveling gun to move across a field if you think you will be using this type of irrigation system. If you may expand your nursery in the future, plan the layout accordingly.

The water supply is dictated by the total area and crops being irrigated and the water quality is dictated by type of irrigation system used. Agricultural crops can be watered using hose reel irrigation equipment fed from surface water. Nursery crops can also be watered with this equipment and this water source, however two things are important. Nursery crops continue growing after agricultural crops are harvested, so nursery crops must continue to be watered. If not, loss of growth may occur, which results in loss of sales at harvest. Secondly, hose reel and gun types of irrigation are extremely inefficient to use when watering nursery crops because of large plant spacings. An acre of nursery stock may need an inch of irrigation (acre-inch) applied 1-2 times per week. An acre-inch of water is 27,000 gallons. If this amount of water is applied at each irrigation to large acreages, then either an adequate water supply or an efficient application method is required. Drip irrigation alleviates both of these critical issues in one system. Less water is needed per irrigation and water is delivered only to the root zone.

Drip irrigation is a low volume, low pressure system with many benefits compared to irrigation with large irrigation guns. In fields irrigated with overhead systems, water is lost when applied between trees and run-off may occur. With drip irrigation, water is applied directly to the soil surface gradually over extended periods of time (e.g., 1.0, 2.0 or 5.0 gallons per hour), which results in less water lost to evaporation or run off. Because drip irrigation applies water only to the root zone of the nursery crop, roots tend to concentrate within this wet zone. Digging root balls is easier and survivability after sale may be better. An additional benefit is that weeds are not germinated by water distributed over large areas, thus weed pressure is decreased within the nursery. Less weed competition increases the effectiveness and reduces the costs of pre-emergent and directed post-emergence herbicide management programs. One disadvantage of drip irrigation is the inability to protect flowers buds and flowers from frosts or freezes by irrigating lightly overhead. Another disadvantage is the inability to “water-in” preemergence herbicide applications. When drip irrigation is employed, preemergence herbicides need to be applied well before weed germination is expected, or in advance of a natural rain event.

Drip irrigation does require very clean water free of sediment and minerals. Well water generally requires only minimal filtration for drip irrigation. County water supplies, if available, may prove to be affordable and are also a clean water source requiring only minimal filtration. Surface water from rivers or ponds generally requires costly sand media filters ($5000) to prevent plugged or reduced water flow through drip emitters, therefore surface water may be more effective for overhead irrigation.

If fertilizer is applied to crops through drip irrigation (fertigation), the amount of fertilizer can be reduced because applications can be proportioned during the growing period and each application can be directed to the root zone. When fertigating, the amount of fertilizer used is one-half that of granular fertilizers applied as a top-dress. Less fertilizer can be used to actually produce more growth because more fertilizer is likely to get to the plant when fertigating and less fertilizer will be leached from the soil.

**For example**: If you have 1200 plants per acre, each plant would normally receive 0.5 oz. nitrogen (N) per plant. Instead, each plant would receive 0.25 oz. N per plant or half of 0.5. Further calculations are as follows:

1. The number of plants per acre multiplied by the amount of fertilizer needed equals the amount of fertilizer needed per acre.

    1200 plants/acre X 0.5 oz. N/plant = 600 oz. N per acre.

2. One-half of 600 oz. N is 300 oz. N (600/2 = 300). If the source of nitrogen is ammonium nitrate (34-0-0), approximately 900 oz. of ammonium nitrate per acre is required (300 oz. N divided by 0.34 N in ammonium nitrate equals 882 oz total product). Because 16 oz. are a pound, approximately 56 pounds of ammonium nitrate (900/16 = 56) are required to fertigate 1200 plants.

3. Fifty-six pounds of ammonium nitrate is to be applied over a period of eight weeks during the growing season. Therefore, 1/8 is applied each week. To determine how much to apply each week, divide the total amount by the number of weeks fertilizer is applied (56/8 = 7). Dissolve seven pounds of ammonium nitrate in water then inject this nitrogen stock solution through the irrigation system.

**Fertigation Procedures**:

1. Determine the length of time to fertigate nursery crops. Fully charge the irrigation system. When the system is fully charged, water should be coming out of the emitter farthest from the injection point. Record the amount of time required from when the irrigation is turned on until water is flowing from the farthest emitter. Add a couple of minutes for safety margin.

2. Begin injection. The length of time required to inject the fertilizer should be at least as long as it took to fully charge the system.

3. After all fertilizer solution is injected, run the system for at least as long as it took to charge the irrigation system so you are sure all fertilizer solution has been flushed from the system. This is a good time to walk the system to make sure emitters are not clogged.

4. Herbigation is the application of herbicides through the irrigation system. In nursery crops, herbicides should not be applied through the irrigation system, whether drip or overhead.

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