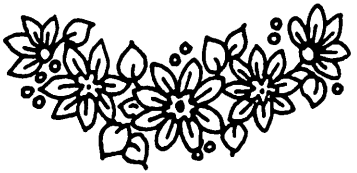

Reducing waste water from the greenhouse

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As plants are watered in the greenhouse, drainage out of the containers carries fertilizer into the ground. The waste water that is produced presents a special problem for greenhouse growers and the environment because it occurs continuously throughout the year and it occurs as a point source of pollution (in the same location over time).

Management practices which reduce waste water both in quantity and quality must be adopted by the grower in order to address this problem. Feed programs must also be modified, along with reduced water usage, to insure quality crop production.

Ways to reduce the waste water drainage out of the greenhouse include:

1) **Using an ebb and flow irrigation system.** It is estimated that a grower can realize a 50% reduction in the amount of water used over the life of a crop with this system. At the end of a crop, the problem of disposing of waste water still exists. However, the total quantity released into the environment is reduced, and the continuous release of waste water is eliminated. Some growers use the water to top water containerized plants or to irrigate an adjacent field when the water is no longer needed.

In Europe this water is never discharged into the environment. The water is used continuously crop after crop. The pH and conductivity are monitored continuously and adjustments are made as they are needed. Water is sterilized between crops and periodically during a crop using either heat, ozonization, UV light or some other method usually in combination with ultrafiltration. The problems encountered in Europe with water quality and the solutions being employed are a preview of what American growers will face in the not-so-distant future.

2) **Using hydrogels in the potting substrate.** Hydrogels are water absorbing polymers which can be added to a potting medium. The polymers swell when wet, increasing the water holding capacity of the medium and reducing the amount of drainage out of the pot. The effect of hydrogels on plant growth is still under debate (some report enhanced growth, while some report no effect).

Hydrogels work best in larger pots (3 inches and up) and with reduced fertilizer rates. Salt levels tend to accumulate as drainage is reduced. Therefore, periodic soil analyses are recommended. Finally not all hydrogels are created equal. The chemical make-up of hydrogels range from starch-based compounds to polyacrylamide gels. The reaction of these materials to fertilizers, fungicides, growth regulators and other chemicals varies greatly. It is important to test the material under your growing conditions prior to use, look for breakdown or loss of function (i.e. does the gel reswell after drying, does it become slimey after exposure to fertilizer, fungicides, etc.).

3) **Lowering the salt content of drainage water.** Physical properties of the growing medium have a big influence on plant growth and on the amount of salt which leaches from the medium. These properties are also influenced by the container size and by the handling of the medium. The air and water holding capacities of a medium most influence plant growth. Salts tend to accumulate more in media that are the most porous. Media with high porosities generally have high air and water holding capacities, properties which favor good plant growth. As container size decreases, drainage also decreases, therefore coarser mixes should be used. Also, compaction of the mix will reduce drainage. Wetting the mix

prior to pot filling will cause the medium to swell and reduce medium compaction.

4) **Reducing water usage.** In many instances greenhouse crops are overfertilized and overdrained. The amount of fertilizer used and the amount of water applied can be decreased without sacrificing production. Most recommendations suggest that 10-15% of the fertilizer solution should be leached at each watering for pot crops. In reality most growers leach in the 30-60% range. This means that up to 50% of the fertilizer is delivered directly into the ground. As a result of these high leachate rates, most growers need to compensate by increasing fertilizer concentrations. If the amount of leachate is reduced, the fertilizer will also be reduced.

Fertilizer usage and leachate levels can be further reduced by stopping feed programs two weeks prior to the end of the crop. If adequate fertilizer levels are in the potting substrate, crop growth will not be adversely affected. However, if the levels are low, then the feed program will need to be maintained until the crop is finished.

5) **Retaining more fertilizer in the potting medium.** The use of mineral soils in a peat-lite mix will substantially reduce the amount of phosphorous leached from a pot crop. Research has shown that peat-vermiculite mixes fortified with superphosphate will lose up to 37% of the phosphorous in the leachate. In comparison, mixes containing up to 1/3 soil will only leach 4% of the phosphorous.

Whenever you modify your cultural practices, it is especially important to keep close watch on the crop. This requires testing. Frequently test your potting media and also test new production practices on a small scale to gain some experience under your own unique growing conditions before making a large-scale commitment.