

PREVENTION



Prevention through Sanitation,
Weed Control, and Monitoring Soil Health

SANITATION

- ✓ **Sanitation should be addressed throughout the growing season.**

Sanitation is a key component of greenhouse IPM. Removing potential sources of pathogens and insects is the cheapest and most efficient way to grow healthy crops.

- ✓ **Weeds should be removed in and around your greenhouse. All benches should be sanitized before new plants are brought into your greenhouse.**

Weeds under benches are a source of insects and pathogens. For example, weeds growing under a bench in a local greenhouse harbored both western flower thrips and tospovirus. The yellow sticky cards in the greenhouse had no thrips nor did the crop display signs of the insect or virus. Careful inspection and a virus test of the weeds detected the problem. A thorough weeding eliminated the source of the pest and disease, potentially preventing major problems in the crop cycle.



*Before sanitation (above) and
after sanitation (below).*



Weeds under bench.

- ✓ **All plant material should be removed and used pots and potting mix or soil should be discarded or sterilized before reusing.**

All surfaces should be sprayed with a disinfectant (e.g., Greenshield® or Zero-tol®).

- ✓ **Incoming plants should be inspected for disease or insects.**

At least 10% of each shipment should be randomly inspected. Look under leaves for eggs and/or adult insects. Segregate infested or diseased materials and treat, discard, or send them back to the distributor.

START CLEAN TO STAY CLEAN!

Sanitation is essential to making IPM work. The benefits are numerous - fewer pest and disease problems, decreased pesticide use and healthier plants.

- ✓ **“Pet” plants should not be held over and plants grown outside during the summer should not be brought inside.**

“Pet” plants are stock plants or a favorite one-of-a-kind plant that you may have held over for years. These are often reservoirs for pests. To minimize this source of problems, don’t bring them into a clean greenhouse. If you must bring them in, treat them with pesticides first and segregate them from your commercial growing area.

- ✓ **Alert your employees of the importance of sanitation.**

Employees should not wear yellow or light colored clothing, which attracts whitefly and thrips. This increases the risk of carrying insects from house to house. Hands should be washed whenever diseased plants are handled, and infected plants should be bagged before being carried out of a house and thrown into the trash. Do not compost them.

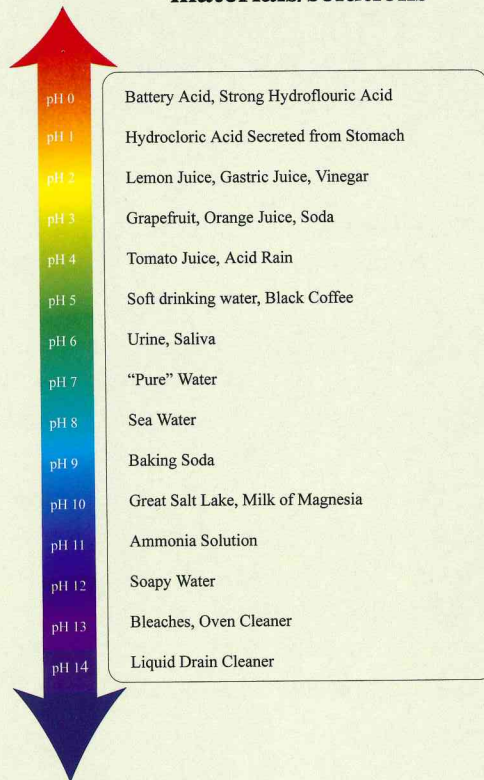
TESTING pH AND NUTRIENT LEVELS

Water is the biggest input into your crop and it controls the availability of plant nutrients. It also affects the performance of some pesticides and growth regulators. Your growing medium is critical for proper growth of your crop and batches vary. As you add water and fertilizer to it, it changes. A rise in soluble salts is an indicator of overfertilization and this can result in plants with greater susceptibility to diseases and many other serious problems. You must be concerned with soluble salts and remember that their increase is reflected in pH and nutrient levels.

What should be done?

- ✓ Submit water and growing medium samples to an analytical laboratory in your state OR buy the appropriate meters and do them yourself.
- ✓ Test your water at the beginning of the growing season and when you have problems. Test for pH and soluble salts.
- ✓ Test your growing medium at pre-plant and during the growing season.
- ✓ Test for pH, nutrient levels and soluble salts.
- ✓ Test your fertilizer injector for total soluble salts on a regular basis (weekly).

The pH levels of common materials/solutions



Normal levels of micro- and macro-nutrients in growing media

Macronutrient	Normal (ppm in growing media)	Micronutrient	Normal
Nitrate (NO-N)	35-200	Iron (Fe)	0.3-3.0
Phosphorus (P)	3-50	Manganese (Mn)	0.02-3.0
Potassium (K)	35-300	Copper (Cu)	0.005-0.5
Calcium (Ca)	60-400	Zinc (Zn)	0.3-3.0
Magnesium (Mn)	30-200	Boron (B)	0.05-0.5
		Molybdenum (Mo)	0.01-0.1

What do the results mean?

Water pH: The range of pH for watering and substrate solutions for production depends on the crop being grown. Generally for irrigation water = 5.2 to 6.8; for substrate solutions = 5.4 to 6.3.

Growing medium: Optimum pH values for crop production are generally 5.5 to 6.0 for soilless growing mix and 6.2 to 6.5 for growing mixes with 20% or more field soil.

Nutrient levels: The levels listed above (in ppm) are for most growing media used in northern New England. Values below these levels signify a potential nutrient deficiency; while values above may mean that too much fertilizer was used.

Soluble salts: Prolonged periods of high soluble salts lead to root damage, leaf chlorosis, marginal leaf burn and wilting. This is commonly caused by overfertilization, inadequate watering, leaching or poor drainage, or low root activity as a result of disease or physical damage. Normal soluble salt levels for seedlings and young transplants = 0.7-1.0; established plants in soilless growing medium = 1.5-3.0; established plants in a growing mix with 20% or more field soil = 0.8-1.5. Your observations of each species should be recorded.