e-GRO Edible Alert

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Managing Substrate pH and Fertility of Containerized Herbs

Containerized culinary herbs are best grown when a substrate pH of 5.8 to 6.2 is maintained and 100 to 150 ppm N is provided. If these levels are not managed, nutrient disorders can develop. This Alert provides resources to help keep your crops on track.

Containerized culinary herbs are popular among consumers and thus, an important component of many greenhouse growers' product mix. Managing substrate pH and providing adequate nutrition is essential to optimize plant growth, development, and yield of containerized culinary herbs. This e-GRO Alert provides a photographic guide of substrate pH and nitrogen concentration research on containerized basil (Fig. 1), cilantro (Fig. 2), dill (Fig. 3), parsley (Fig. 4), rosemary (Fig. 5), and sage (Fig. 6).

Substrate pH can be influenced by several factors including the substrate components, amount of limestone to adjust initial pH, irrigation water alkalinity, fertilizer type, and the species grown. When substrate pH drifts above or below the optimal range of 5.8 to 6.2 or when plants are under or overfertilized, plant growth can be negatively affected and/or nutritional disorders can develop. Nutritional disorders can also be induced by other cultural practices and environmental conditions such as overwatering and cold root-zone temperatures. Growers should be mindful that diagnosing suspected nutrient disorders requires testing because visual symptoms vary among species, nutrients, and the location in which they develop within the plant.

To avoid pH and soluble salt [referred to as electrical conductivity (EC)] induced nutritional disorders, growers should implement an in-house nutritional monitoring program. For instance, growers can use recommended 1:2 Extraction, saturated media

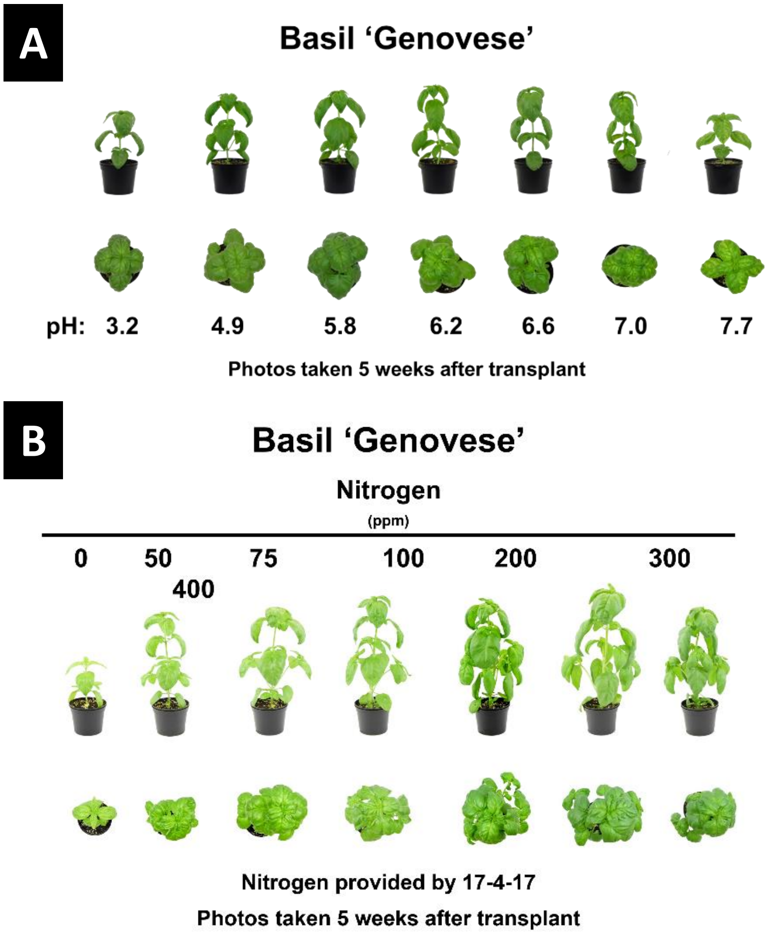

Figure 1. Basil (*Ocimum basilicum*) grown at varying substrate pH levels (A) and with increase nitrogen concentrations (B). Photos by: W. Garrett Owen.

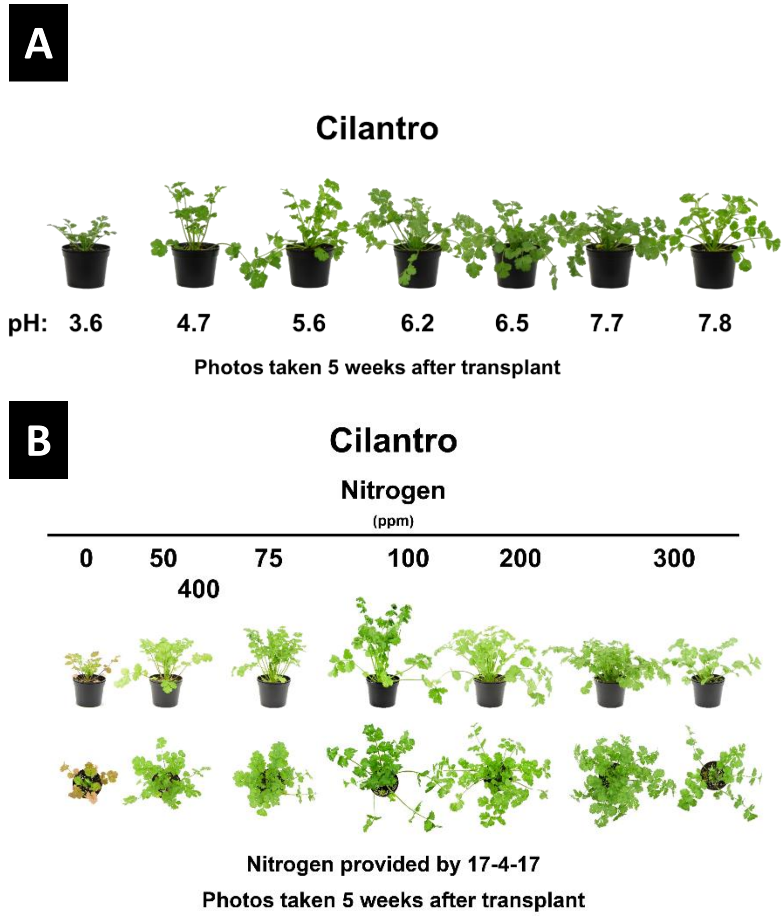

Figure 2. Cilantro (*Coriandrum sativum*) grown at varying substrate pH levels (A) and with increase nitrogen concentrations (B). Photos by: W. Garrett Owen.

extraction, or PourThru methods to determine and monitor substrate pH and EC values. To learn more about these methods and steps, refer to: e-GRO Alert 6-37: Monitoring pH and EC of Growing Medium. While establishing an in-house nutritional monitoring program is a quick and simple method to determine substrate pH drift or if crop nutritional requirements are being met, submitting irrigation water, fertilizer solution, substrate, and/or plant tissue to analytical labs for nutrient analysis is also helpful to diagnosis nutritional disorders. To learn more about these procedures, refer to:

- e-GRO Alert 9-6: Target Leaf Tissue Sampling for Precise Nutrient Diagnosis
- e-GRO Alert 9-10: Sampling Irrigation Water for Routine Lab Analysis
- e-GRO Alert 10-1: Sampling Substrates for Routine or Diagnostic Lab Analysis

Once you have obtained your test results, interpret the data my referencing optimal ranges or values for the chemical composition of substrates, irrigation water, and leaf tissue. For recommended species-specific substrate pH and EC values, leaf tissue concentrations, and corrective procedures for high and low substrate pH and EC, refer to e-GRO Nutritional Monitoring factsheets:

- Basil
- Cilantro
- Dill
- Parsley
- Rosemary
- Sage

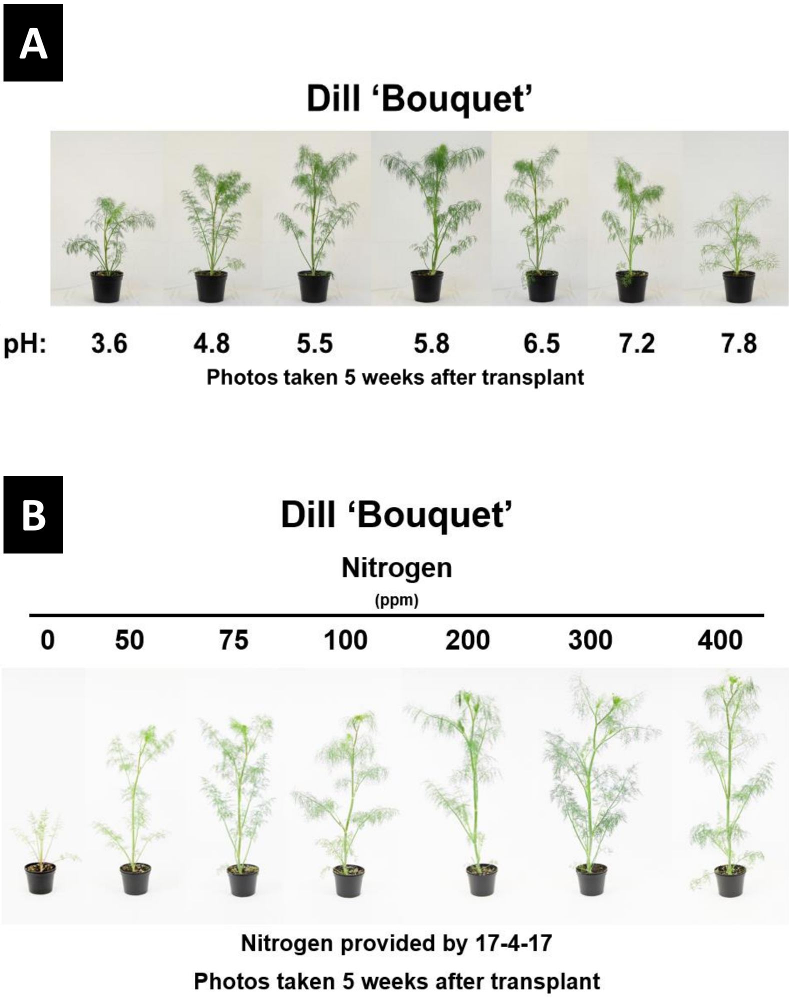

Figure 3. Dill (*Anethum graveolens*) grown at varying substrate pH levels (A) and with increase nitrogen concentrations (B). Photos by: W. Garrett Owen.

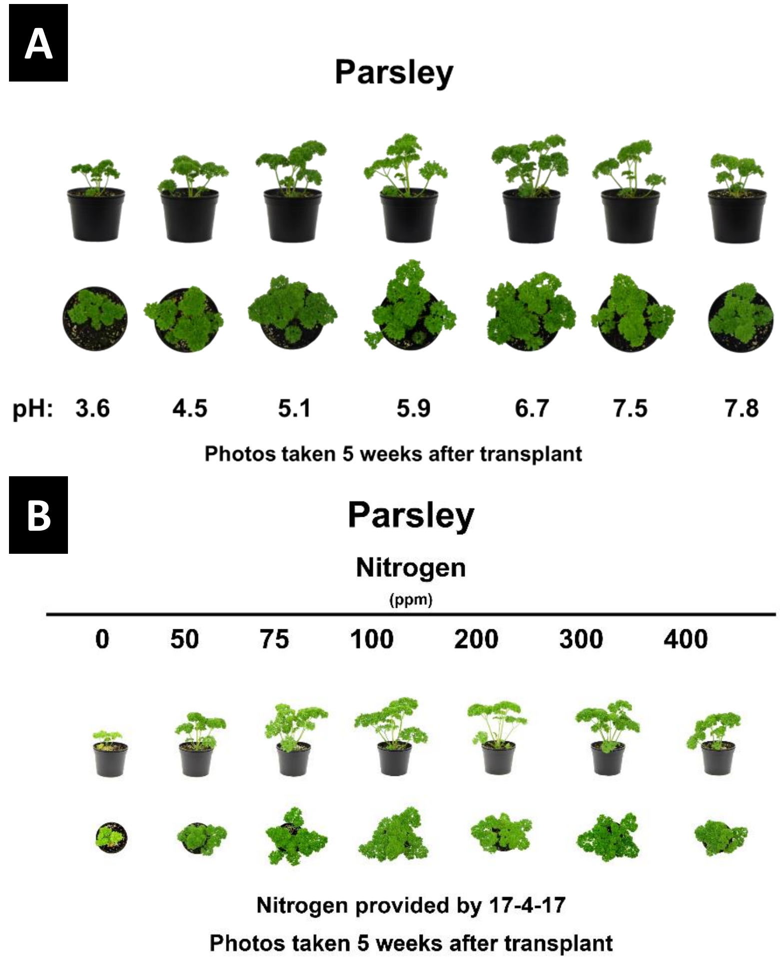

Figure 4. Parlsey (*Petroselinum crispum*) grown at varying substrate pH levels (A) and with increase nitrogen concentrations (B). Photos by: W. Garrett Owen.

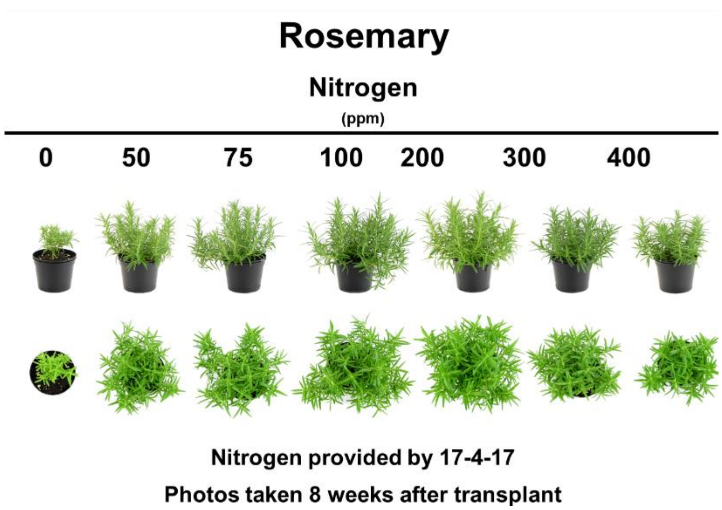

Figure 5. Rosemary (*Rosmarinus officinalis*) plants grown at increasing nitrogen concentrations from 0 to 400 ppm N. Under and overfertilization affects plant growth.
Photos by: W. Garrett Owen.

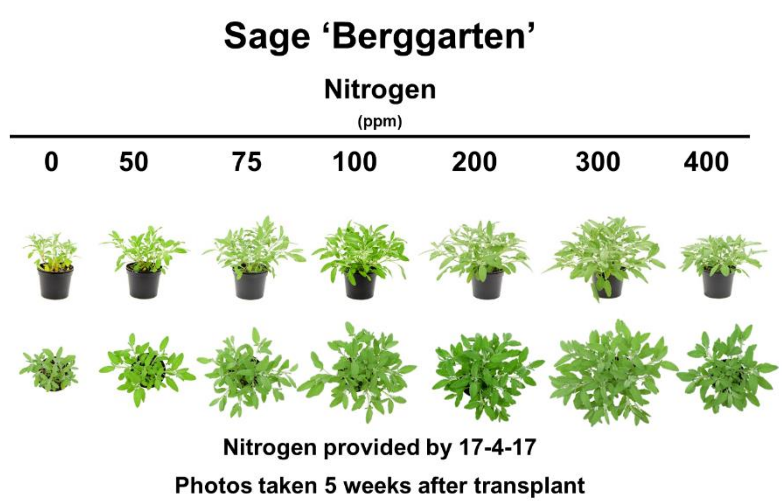

Figure 6. Sage (*Salvia officinalis*) plants grown at increasing nitrogen concentrations from 0 to 400 ppm N. Under and overfertilization affects plant growth.
Photos by: W. Garrett Owen.

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