e-GRO Alert


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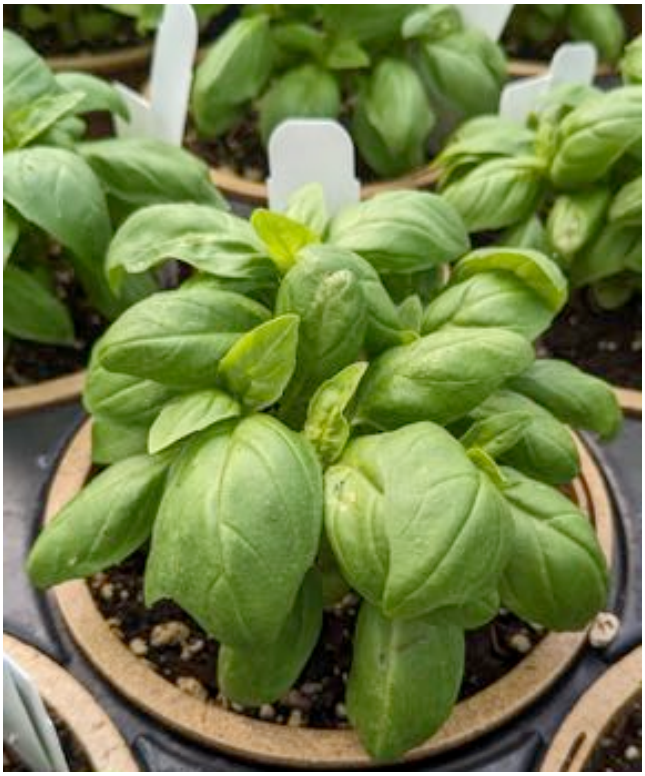
Know Before You Grow

What Nutrients Are in Your Substrate?



Growers have many options for fertilizing their crops, ranging from controlled-release fertilizers (CRFs) to water-soluble fertilizers (WSFs) or a combination of the two options. Optimizing fertilizer strategies to produce visually appealing plants while minimizing inputs is important. One source of plant-available nutrients that is commonly overlooked is pre-plant starter charges incorporated into the substrate at the time of mixing. Many commercially available substrates that are focused on the retail market advertise increased growth compared to their competitors. Often this is a result of pre-plant fertilizer charges (both organic and nonorganic) that are included in the substrate. However, how do these preplant charges impact the chemical properties of the substrate, and is a preplant charge needed for your spring transplant production system?

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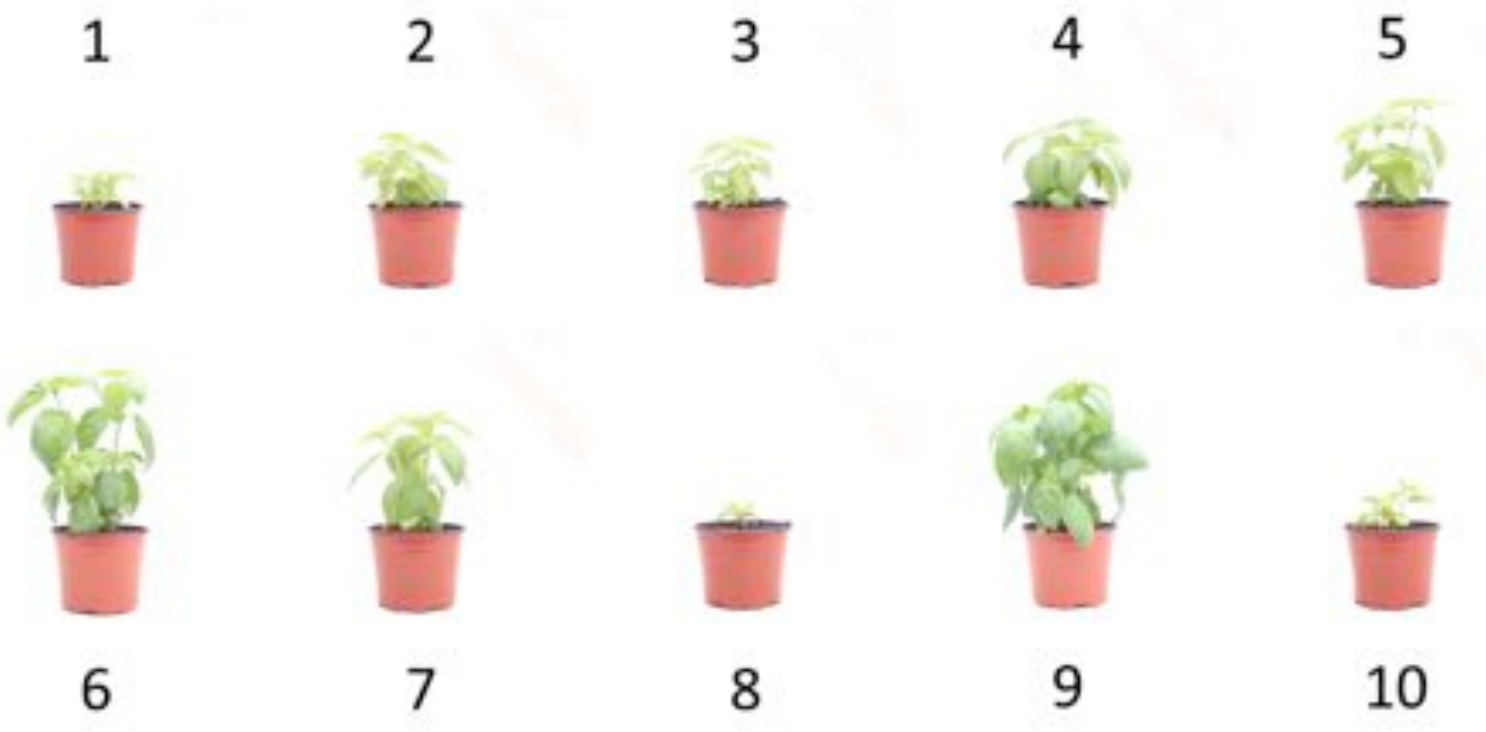

Figure 1: Observed side plant growth after 6 weeks of total growth when plants were irrigated with clear water and no additional fertilizers were supplied. (Photo: Patrick Veazie)

A pre-plant fertilizer charge is included during the manufacturing process that is intended to provide nutrients to the crop immediately following transplant for a short period. The composition of a preplant charge can be a variety of forms ranging from inorganic and organic granular nutrients to organic matter including compost. In contrast, post-plant fertilization is supplied by the grower after transplant. Post-plant fertilization programs can be implemented in many forms ranging from water-soluble fertilizers to controlled-release or slow-release fertilizers. Additionally, growers can utilize a combination of these two strategies, a preplant fertilizer charge to help encourage plant growth initially, followed by post-plant fertilization. However, growers should test the chemical properties of their substrate to optimize their fertilization program if preplant charges are included. Matching your nitrogen (N) source for your desired plant characteristics is important, higher percentage nitrate fertilizers will produce more compact plants while fertilizers containing higher ammoniacial percentages will produce darker green more lush growth but with more stretch.

At NC State University we examined the effects of 10 different retail substrates' pre-plant charge on the substrate pH, EC, and plant growth without additional fertilizers for spring basil transplants. Growers should understand what nutrients are in their substrate so they can customize their fertility regime to optimize plant growth.

When looking at the substrate pH and EC across the different blends there were large differences observed with pH ranging from 5.14 to 7.45 and EC from 0.36 to 4.26 (Table 1). The N concentration supplied by the pre-plant charges is most commonly in the form

Figure 2: Observed top plant growth after 6 weeks of total growth when plants were irrigated with clear water and no additional fertilizers were supplied. (Photo: Patrick Veazie)

of nitrate compared to ammonical or urea nitrogen (Table 1). Additionally, the substrates that included a nitrate pre-plant charge also exhibited increased potassium, calcium, magnesium, and sulfur in the substrate. However, when the substrate EC is excessively high for young plants, stalled growth or girdling at the soil line can occur. Knowing your substrates initial pH and monitoring changes overtime can useful to allow for changes in growing practices before problems occur.

When plants were not provided additional fertility, substrates with a low initial EC exhibited stunted growth and chlorosis three weeks after transplant. Additionally, substrates that initially exhibited a greater EC yielded larger plants after five weeks of growth when compared to plants that had a smaller pre-plant charge (lower initial EC) (Fig. 1 & 2). The most common nutrient disorder observed across all substrates after five weeks of growth was nitrogen deficiency. Nitrogen deficiency is first observed as chlorosis of the lower foliage which advances into entire leaves turning yellow and in severe cases necrosis and leaf abscission.

While large differences in plant growth are observed when no additional fertilizer is provided when supplemental fertilizer was provided immediately after transplanting no differences in plant growth were observed. Substrates that contain a larger preplant charge will allow growers to lower their fertility program for spring herb transplant production. However, a larger preplant charge is not necessary if growers correctly match their fertility program to the crop's needs.

Table 1: Comparison of 10 retail substrates EC, pH, and nitrogen concentrations preplant of three samples.

Substrate	pH	EC	Nitrate	Ammonical	Urea	*Total N*[1]
1	5.14	0.94	42.15	15.29	0.81	*58.25*
2	6.19	0.36	0.30	9.47	0.15	*9.91*
3	6.28	0.69	14.31	5.44	0.20	*19.95*
4	5.22	2.46	200.23	52.04	0.18	*252.44*
5	5.54	3.56	125.42	0.53	0.54	*126.49*
6	5.86	4.26	227.24	0.35	0.32	*227.91*
7	5.81	3.06	190.55	0.44	0.14	*191.14*
8	5.46	0.79	0.14	0.12	0.08	*0.34*
9	7.45	1.78	1.38	146.94	0.17	*148.50*
10	6.09	0.76	15.00	0.32	0.00	*15.32*

[1] Total N is the summation of nitrate + ammoniacal + urea concentrations.

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