e-GRO Alert

Patrick Veazie[1] Brian E. Whipker[1]

Volume 13 Number 28 May 2024

Considerations When Selecting a Water-soluble Fertilizer

What should one think about when selecting a fertilizer?

Selecting a fertilizer is one of the first steps to a successful growing season and can help avoid many problems later. There is a wide assortment of factors to consider when selecting a fertilizer including crop needs, water quality, desired growth (compact vs lush), and nutrient ratios.

Figure 1. Ammonium toxicity can be observed when plants are grown using a higher ammoniacal percentage fertilizer under cool and dark conditions. (Photo: Brian Whipker)

One of the first considerations is what is in the water, growers should conduct an annual water test to determine the alkalinity and concentration of other elements within their water supply. Water quality can vary seasonally and year to year.

Fertilizers can fall into one of three categories acidic, neutral, or basic. This is generally dictated by the ratio of ammoniacal (NH_4^+) (acidic) or nitrate (NO_3^-) (basic) nitrogen source. Each fertilizer blend has a different amount of potential acidity or basicity (Table 1). Pairing a fertilizer that balances out the alkalinity in your irrigation water will help prevent the substrate pH from increasing above the recommended ranges.

[1]NC State University, Dept. of Hort. Science
bwhipker@ncsu.edu

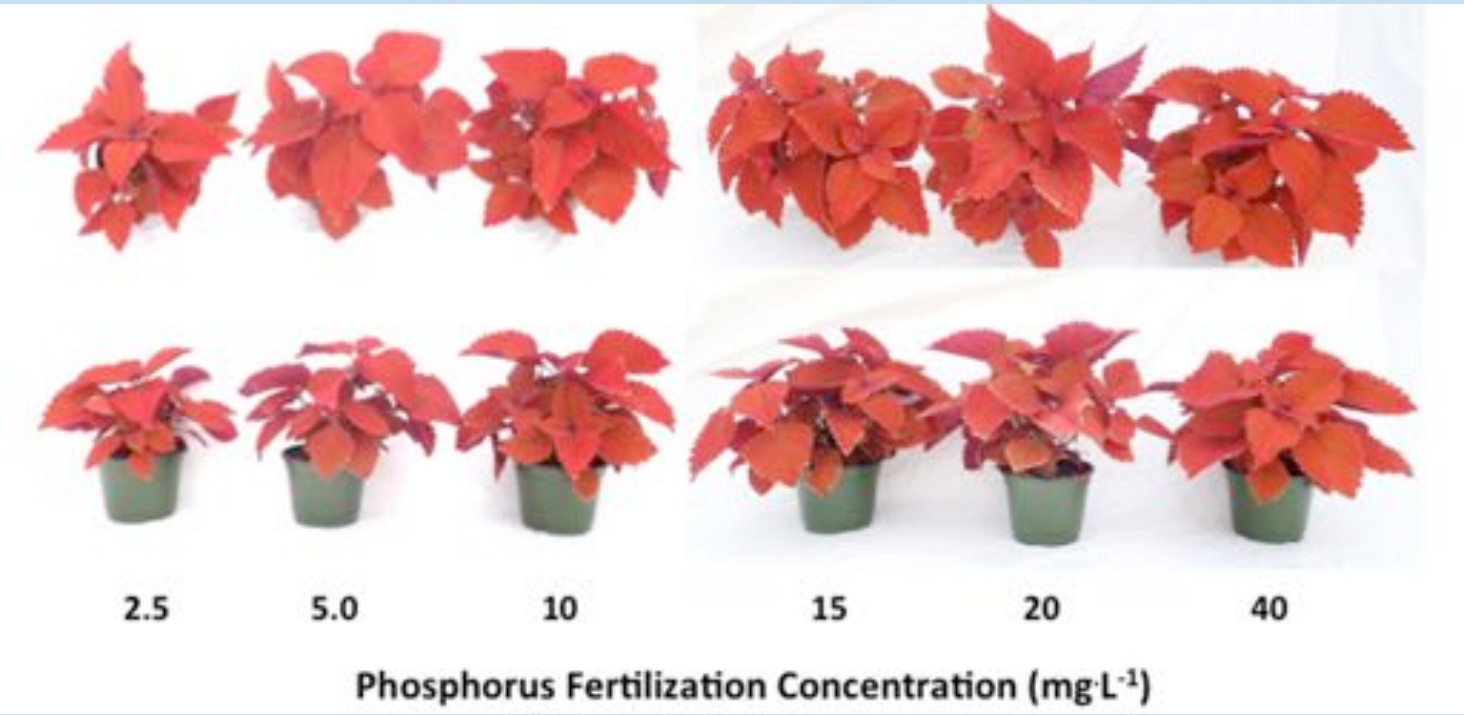

Figure 2. Utilizing a lower phosphorus fertility rate can prevent internode elongation occurring allowing for growth control. (Photo: Brian Whipker)

For growers with high (>200 ppm $CaCO_3$) or moderate (75-200 ppm $CaCO_3$) alkalinity in the irrigation water should consider selecting an acidic fertilizer that can neutralize the alkalinity while supplying adequate concentrations of calcium (Ca) and magnesium (Mg). However, growers with low alkalinity in the irrigation water selecting an acidic fertilizer may result in a substantial decrease in substrate pH and experience micronutrient toxicity or decreased plant growth. If the alkalinity concentration in a water supply is low, growers should consider utilizing a basic Cal-Mag fertilizer to avoid pH drop and provide sufficient nutrients. Taking into account the alkalinity and other nutrients within the water plus the nutrients supplied through the fertilizer you can calculate the total nutrients supplied and make adjustments as needed.

When selecting a fertilizer, one must also consider the type of growth desired.

Fertilizers that are higher in ammoniacal nitrogen will promote more lush growth while higher nitrate ratio fertilizers will result in more compact growth. When wanting to encourage extra growth to target a ship date, switching to a higher ammoniacal ratio fertilizer will result in addition size over a 2 to 3 week period.

Fertilizers with a high ammoniacal N percentage can be useful for micronutrient-inefficient crops such as petunia or calibrachoa. The acidic form of these fertilizers will help prevent the substrate pH from increasing and promote micronutrient availability. However, while ammonium toxicity is not common, growers must consider the growing environment (Fig. 1). In cool and dark climates, the occurrence of ammonium toxicity increases, and monitoring substrate pH is recommended to prevent large decreases in substrate pH.

You should also be aware of the phosphorus (P) percentage within a

fertilizer and the impact on plant growth. Selecting a fertilizer high in P will produce plants with greater internode length and can reduce anthocyanin (red) color for foliage plants (Fig. 2). By manipulating the P fertilization rate, one can hold back plant growth with the use of 3 to 7.5 ppm P or promote more growth with P rates of 20 to 40 ppm. Please note, most substrate blends have limited nutrient holding capacity and P deficiency symptoms can be induced within 2 or 3 weeks if a zero P program is used.

Matching a fertilizer to a substrate is also an important consideration when selecting a fertilizer. While new alternative substrate components are more commonly available the chemical properties are vastly different from traditional peat-perlite substrates. Peat generally has a pH of 3.0-4.5 while peat alternatives such as coconut coir (pH of 5.5-6.5) and wood fiber (5.5-6.5) are much higher. This change in substrate component composition will also impact the fertilizer rate, substrates with a carbon: nitrogen ratio greater than 30:1 generally result in N immobilization resulting in the need for the fertilizer rate to be increased. Growers utilizing substrates that are composed of a higher pH component should routinely monitor substrate pH to prevent the pH from increasing above recommended levels. Additionally, utilizing a fertilizer with greater acidity to prevent balance out any increase in substrate pH over time is an option to consider.

Selecting a fertilizer does not have to be complicated. Designing a program starts with evaluating your irrigation water alkalinity levels, then neutralizing excessive alkalinity with acid injection or use of an acidic fertilizer. The next step is to incorporate the selection of fertilizer type to help customize plant growth. Together, fertilizer selection is a tool in your grower toolbox to help you grow the best crop possible.

Table 1. Potential acidity or basicity and theoretical neutralizing ability of commonly used commercial fertilizers at various ppm of nitrogen.

Fertilizer	Potential Acidity or Basicity		NH_4-N (%)	Theoretical meq alkalinity neutralized by fertilizers at various ppm N			
				100	150	200	250
20-20-20	583	Acid	69	2.39	3.58	4.78	5.97
20-10-20	422	Acid	38	1.61	2.42	3.22	4.03
15-15-15	261	Acid	52	1.43	2.14	2.85	3.57
15-5-25	76	Acid	28	0.42	0.62	0.83	1.04
17-5-17	0	Neutral	25				
15-5-17	134	Basic	21				
13-2-13	330	Basic	5				

e-GRO Alert

www.e-gro.org

CONTRIBUTORS

Dr. Nora Catlin
Floriculture Specialist
Cornell Cooperative Extension
Suffolk County
nora.catlin@cornell.edu

Dr. Chris Currey
Assistant Professor of Floriculture
Iowa State University
ccurrey@iastate.edu

Dr. Ryan Dickson
Greenhouse Horticulture and
Controlled-Environment Agriculture
University of Arkansas
ryand@uark.edu

Dan Gilrein
Entomology Specialist
Cornell Cooperative Extension
Suffolk County
dog1@cornell.edu

Dr. Chieri Kubota
Controlled Environments Agriculture
The Ohio State University
kubota.10@osu.edu

Heidi Lindberg
Floriculture Extension Educator
Michigan State University
wolleage@anr.msu.edu

Dr. Roberto Lopez
Floriculture Extension & Research
Michigan State University
rglopez@msu.edu

Dr. Neil Mattson
Greenhouse Research & Extension
Cornell University
neil.mattson@cornell.edu

Dr. W. Garrett Owen
Sustainable Greenhouse & Nursery
Systems Extension & Research
The Ohio State University
owen.367@osu.edu

Dr. Rosa E. Raudales
Greenhouse Extension Specialist
University of Connecticut
rosa.raudales@uconn.edu

Dr. Alicia Rihn
Agricultural & Resource Economics
University of Tennessee-Knoxville
arihn@utk.edu

Dr. Debalina Saha
Horticulture Weed Science
Michigan State University
sahadeb2@msu.edu

Dr. Beth Scheckelhoff
Extension Educator - Greenhouse Systems
The Ohio State University
scheckelhoff.11@osu.edu

Dr. Ariana Torres-Bravo
Horticulture/ Ag. Economics
Purdue University
torres2@purdue.edu

Dr. Brian Whipker
Floriculture Extension & Research
NC State University
bwhipker@ncsu.edu

Dr. Jean Williams-Woodward
Ornamental Extension Plant Pathologist
University of Georgia
jwoodwar@uga.edu

Cooperating Universities

Cornell CALS College of Agriculture and Life Sciences

Cornell Cooperative Extension Suffolk County

UTIA Institute of Agriculture The University of Tennessee

Iowa State University

College of Agricultural & Environmental Sciences University of Georgia

UConn

UofA Division of Agriculture Research & Extension University of Arkansas System

Michigan State University

NC State University

Purdue University

The Ohio State University

In cooperation with our local and state greenhouse organizations

Maumee Valley Growers — Choose the Very Best.

Metro Detroit Flower Growers Association

NC Flower Power

Western Michigan Greenhouse Association

Connecticut Greenhouse Growers Association

Indiana Flower Growers Association

LIFGA

Cincinnati Flower Growers Association

Michigan Greenhouse Growers Council

NYSFI New York State Flower Industries, Inc.