10 Tips To Save on Fertilizer Costs

Photo 4. This torenia, grown at 50 ppm constant liquid feed, is unmarketable.

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While our sky-high energy cost issues seem to have evaporated overnight (at least for the short term), fertilizer costs have soared in the past couple of years and are likely here to stay. In fact, according to the USDA Economic Research Service, during the past four years, per-ton bulk-fertilizer costs have increased by 100%, 204% and 210% for nitrogen, phosphorus- and potassium-based fertilizers, respectively.

Consequently, complete fertilizer costs have followed suit. During the same four-year period, the cost of a 25-lb. bag of fertilizer has increased from $17 to more than $30. That's why enhancing your fertilizer application efficiency can improve your bottom line.

And as an added benefit, it will demonstrate your commitment to environmental responsibility.

To help get you started, we describe below our top 10 tips for getting the most our of your fertilizer dollars.

1 Group your crops according to fertility requirements

We all know that some crops require more fertilizer and others require less. Over-fertilizing sensitive species such as impatiens or torenia can lead to salt-burn and reduced marketability. For example, research at Cornell found that while snapdragons thrived at 350 ppm N (Figure 1), torenia growth was reduced by more than half due to salt buildup (Figure 2). At the same time, we found that snapdragons receiving 100 ppm N were significantly smaller than plants receiving 200 ppm N (Photo 1). So in terms of crop quality, keep in mind that it's important to feed according to need. By grouping crops by fertility requirements, you can ensure that fertilizer bags will stretch further.

For example, say you have 3,000 flats of snapdragons and 7,000 flats of impatiens. Ideally you'd like to feed these 250 ppm N and 150 ppm, respectively. But as a compromise, you choose 200 ppm N just to make it simpler, and you end up using 100 lbs. of fertilizer to produce the crop. If you separate these crops and give the impatiens 150 ppm, you'd use 25% less fertilizer to finish the crop (52.5 lbs. rather than 70 lbs.). Likewise, snapdragons would use 25% more to finish (37.5 lbs. rather than 30 lbs.). Overall, you'd need 90 lbs. rather than 100 lbs. of fertilizer to produce the same crops.

2 Only leach when necessary

Standard practice in our industry has been to apply 20-30% more water than required to flush excess salts from the substrate. However, high substrate salt concentrations are typically only encountered when the raw water source is high in non-essential salts or the applied fertilizer rate is too high. By monitoring substrate salt level with electrical conductivity (EC) meters you can learn whether leaching is really necessary. For short-term crops, as long as your raw water isn't too bad and you're using the right fertilizer concentration, leaching may not be required.

Let's say your operation has two range growers, Bob and Jane. Bob can achieve the appropriate EC set-point by applying 200 ppm N with a 20% leaching fraction; meanwhile Jane found she can achieve the same EC set-point by using 150 ppm N with little or no leaching. It turns out that Jane is using 40% less fertilizer due to reduced water volume and fertilizer rate used.

3 Know what rate your plants are really getting

How do you know your plants are really getting 200 ppm N? Normal wear and tear of fertilizer injectors means that they often aren't dispensing at the rate you think they are. Further, even though it's routine, errors can happen when mixing fertilizer stock solutions. So it's important to periodically verify hose-end EC.

Begin by looking at the fertilizer label to determine what the hose-end EC value should be, and be sure to add your raw water's EC to this value. How does this value compare to what the EC meter reads? If the hose-end EC is off, either your injector isn't working correctly or there was a mistake in mixing the stock tank solution. More information on injector calibration and troubleshooting is available online at Cornell's commercial greenhouse website: www.greenhouse.cornell.edu/crops/nfmanagement.htm

4 Irrigate more efficiently

If you use water soluble fertilizers, any water that you waste also wastes fertilizer. It's been estimated that 30-50% of the water we apply never reaches our crops. The amount that's wasted depends on the crop and how it's produced. A University of Florida study of nine commercial propagators found that on average 20% of the N applied during liner production was wasted. (And liners are spaced tightly and have low overall N requirements.) On the opposite end of the spectrum, a University of California study with nursery crops that were spaced to cover about one-third of the production area found that about 70% of the overhead-sprinkler-applied water was wasted.

Some tips to get the most of out of your applied water: install hose-end gate valves so growers can turn off the water supply between crops; consider installing drip irrigation systems for crops that are widely spaced or otherwise inefficient to irrigate by hand (hanging baskets); and when booms are used, make sure to program them to water each section appropriate to the crop under that area.

5 Consider water capture and reuse systems

Since subirrigation results in little or no leaching, fertilizer rates are typically 30-50% less than overhead irrigation; plus 30% less water is used due to efficiency of water delivery, giving you a total savings of 50-65% on your fertilizer. In the nursery industry many states already require that applied water is captured and reused. Subirrigation systems can provide reduced labor costs, greater crop uniformity and reduced foliar disease incidence (Photo 2). However, these systems also require that care be taken to prevent the spread of root-borne pathogens through recirculated water by the inclusion of disinfestation systems or improved sanitary protocols.

6 Consider controlled release fertilizers

Controlled release fertilizers often make sense when your water delivery method is inefficient, such as widely spaced crop grown under overhead sprinklers. In a recent study at Cornell we collected leachate from field-grown garden mums receiving controlled release fertilizer (CRF) and water soluble feed (WSF). After 10 weeks, the leachate phosphorus concentration was five times lower when CRF was used. However, while the CRF-only mums were marketable, plant size was significantly reduced (Photo 3). While cost savings and reduced leachate are possible, care must be taken to get the rate right: CRFs can cause salt burn on sensitive crops such as impatiens, begonia, torenia; and as noted above, low rates can cause reduced plant size for heavier feeders. Be sure to conduct trials first when using CRFs with a new crop.

7 Test your water supply

By testing your raw water source you can determine which of the plant essential nutrients are already being supplied and hence aren't required in your fertilizer program. For example, across much of the U.S., water is high in alkalinity. This water may supply enough calcium and magnesium so that they don't have to be added separately in your fertilizer program.

Photo 1. Snapdragon growth responds to fertilizer rate. Concentrations were (left to right) 50, 100, 200 and 350 ppm N.

Photos: Cornell University

Photo 2. Sub-irrigated poinsettias.

8 Spend money to make money

Despite recent cost increases, fertilizer remains one of the cheapest inputs that we provide our crops. By trying to save a little on fertilizer, you can end up with a crop that has reduced visual appeal (Photo 4). Additionally, most consumers won't take the time to fertilize their plants once they take them home, so consider adding controlled release fertilizer to hanging baskets or other container products before they leave your door. A bit of added fertilizer can ensure your consumers will have plant performance they can be proud of, leading to repeat sales.

9 Prevent costly deficiencies

A proactive approach, fertilizing based on crop needs and making periodic adjustments based on media testing ensures that you'll stop nutrient deficiencies before they occur. Once visible on a plant, single-element corrective actions (such as foliar iron-chelate additions) are costly both in terms of added labor and cost of specialized corrective fertilizers.

Here's a good example of the dollars and "sense" it costs to be proactive versus reactive in your approach. You see iron deficiency on all of your 10-in. petunia baskets; tissue and media tests confirm it's due to low iron and rising pH. One corrective application (32 ppm) of 11% Fe-DTPA ($30/lb.) made as a 5-gal. concentrate at 1:100 will cost you

Table 1.

SOME COMMERCIALLY AVAILABLE FERTILIZERS, THEIR PERCENTAGE OF TOTAL NITROGEN AS NITRATE OR AMMONIUM PLUS UREA, AND POTENTIAL ACIDITY OR BASICITY a.

Fertilizer	NO3	NH4 b	Potential acidity c or basicity d
Ammonium sulfate	0	100	2200 a
Urea	0	100	1680 a
21-7-7 acid special	0	100	1539 a
Diammonium phosphate	0	100	1400 a
Ammonium nitrate	51	49	1220 a
Monoammonium phosphate	0	100	1120 a
18-9-18	47.7	53.3	708 a
20-20-20	27.5	72.5	532 a
20-10-20	60	40	401 a
21-5-20	60	40	390 a
17-5-17	70.6	29.4	106 a
20-0-20	54	46	0
15-0-20	76.7	23.3	38 b
15-5-15	80	20	69 b
15-5-15	78.7	21.3	131 b
15-0-14	82.7	17.3	165 b
15-0-15	86.7	13.3	221 b
15-0-15	80.8	18.8	319 b
Calcium nitrate	100	0	400 b
Potassium nitrate	100	0	520 b
Sodium nitrate	100	0	580 b

Figure 1. Snapdragon shoot dry weight increases in response to fertilizer rate.

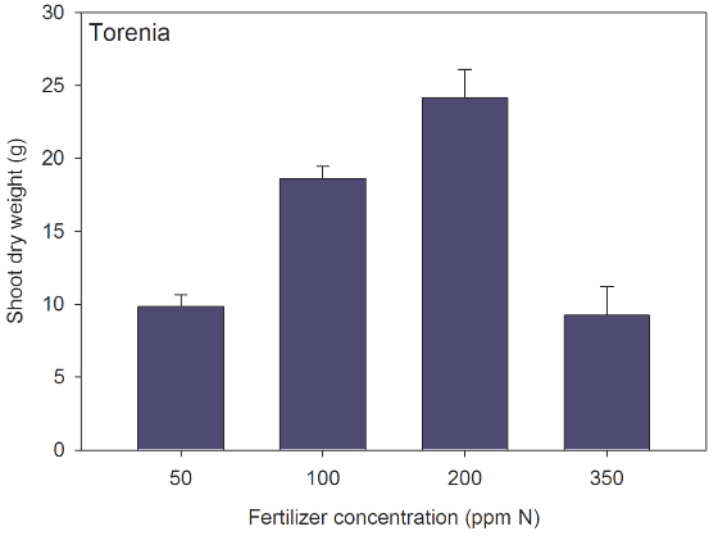
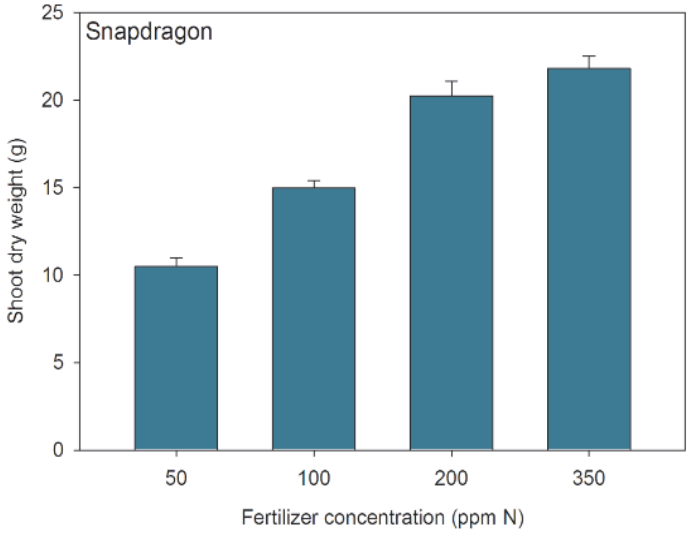


Figure 2. Too much or too little fertilizer causes reduced shoot dry weight of torenia.



$37.50. This application will most likely need to be repeated, along with additional treatment to lower media pH, increasing the total corrective cost to over $75 per 12,000 10-in. baskets. Remember, this is on top of your regular fertilizer costs!

Compare this with the use of a specialty water-soluble fertilizer that's specifically designed as a potentially acidic formula with double the amount of iron from a blend of three iron chelates to keep iron available even if the media pH climbs over 7. These crop-specific formulas are usually more expensive ($5 more a bag) than a typical 20-10-20; however, continual use will prevent deficiencies from developing and pay off in the long run. For instance, in the same example, the use of a crop-specific feed (such as Jack's Petunia Feed 20-3-19) at 200 ppm will deliver 1 ppm of iron (3 chelate blend) at each feeding. At $30 a bag, a 5-gal. concentrate injected at 1:100 with a CLF strength of 200 ppm equals about $5. After eight weeks, by providing these blended nutrients at each feeding you'll prevent iron deficiency and produce high quality plants. The overall cost is approximately $138 for over 12,000 of your 10-in. baskets and the added benefit of fewer headaches.

10 Keep a fertilizer "tool box"

Realize that any given fertilizer is a "tool" that can be used to manage your plant's root zone and growth form. If pH adjustments are needed, nitrate-based fertilizers will raise pH, while ammonium-based fertilizers lower pH. The net pH effect of a given fertilizer is referred to as its relative acidity or basicity and can be found on the fertilizer label (Table 1). Your basic tool kit might consist of three fertilizers: 1) an all-purpose fertilizer matched to your alkalinity for every day use (ex: 20-10-20, 21-5-20); a nitrate-based fertilizer (ex: 15-0-15) when you need to drive pH up; and high ammonium fertilizer (ex: 21-7-7) when pH must be lowered. Low P fertilizers (such as 15-0-15) can be used to help control plant stretch. This is a tool to use when you want to keep internodes short or if you know a crop will have to be held tightly spaced for an extended period of time. In addition, look for formulas that can reduce your overall fertilizer use when producing heavy feeders like mums. These high-efficiency fertilizers lower the actual amount of fertilizer used to mix up same-strength of nutrients while still delivering a balanced secondary and micronutrient package to your plants. For example, to mix a 200 ppm solution it takes 13.5 oz./100 gal. of 20-10-20 compared to 10.8 oz./100 gal. of 25-5-15; that's a reduction in fertilizer of about 20%. Formulas like these are also very useful as a tool to produce a fast green-up in warm weather for annuals, perennials and nursery stock.

By incorporating these tips you'll be well on your way to getting the most bang for your fertilizer buck! **GT**


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Photo 3. Chrysanthemum 'Helen' grown using constant liquid feed (left) was significantly larger than plants grown using only controlled release fertilizer (right).

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