

Understanding the options will help you customize your program

# Choose the right fertilizer

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Agricultural-grade granulars are inexpensive, but often contain impurities and unessential fillers.

Professional-grade liquids are high quality but can require specialized equipment, such as injectors, to be distributed to nursery crops.

**F**ertilizer is a necessity when you're in the plant-growing business. As a result, fertilizer is big business.

Consider that in 1999, 53.5 million tons of fertilizers were applied in the United States alone, according to USDA. It comes as no surprise, then, that nursery professionals are subject to a near-constant bombardment of fertilizer images and advertising.

The sheer number of manufacturers — all laying claim to the latest and greatest NPK fertilizers — can be staggering or overwhelming. Because of this, many growers have been left wondering how to determine which fertilizer best fits their needs.

Though this process seems daunting, it's indeed possible for growers to sort through all the rhetoric. The process can be accomplished with some research, knowledge and time spent reading product labels.

Plenty of people ask if one fertilizer is really any different from the rest. The answer is a definitive yes.

There are, in fact, myriad factors to look at when choosing the fertilizer that best address-

es the needs of your plants. Factors include raw ingredients, cost, time/labor implications, efficacy, plant health, media type, regulations and production.

It's also important to remember that there are various forms of fertilizers, including (but not necessarily exclusive to) granulars, coated granulars, water solubles, true liquids and liquid suspensions. Each of these has unique characteristics that must be considered.

## Agricultural-grade granulars and liquids

Fertilizers created using agricultural-grade materials have one advantage over others — they are inexpensive. However, it's important to note that the nutrient sources for agricultural-grade fertilizers are of a lower quality (impurities are the norm, as are unessential fillers) than those found in other fertilizer forms. Agricultural-grade fertilizers are most often made from these sources:

- **Nitrogen:** Ammonium sulfate and urea nitrogen (for liquids only), ammonium nitrate.
- **Phosphorus:** Triple superphosphate, monammonium phosphate, diammonium phosphate (for granulars).

- **Potassium:** Potassium chloride.

Generally speaking, agricultural-grade fertilizers are rarely the best option for use in nurseries because they present the possibility of many serious problems. These include leaching and groundwater contamination, high potential for plant burn (the result of high salt content), inefficient plant uptake and usage, rapid release of nutrients and excessive waste.

## Water solubles

Water-soluble forms of fertilizer represent a significant upgrade in quality from agricultural-grade fertilizers. Some formulations are better than others, though for the most part, most are created using these ingredients:

- **Nitrogen:** Urea nitrogen, ammoniacal nitrogen, nitrate nitrogen, sodium nitrate, potassium nitrate, ammonium phosphate.
- **Phosphorus:** Phosphoric acid, ammonium phosphate.
- **Potassium:** Soluble potash, potassium nitrate.

The ingredients in water solubles are generally of a better quality than those in agricultural-grade fertilizers. This translates into improved efficacy and reduced chance of salt damage and plant burn.

Because this form of fertilizer has been around for many years, it also offers growers a certain sense of familiarity. Water-soluble fertilizers come in a wide range of analyses, some of which include slow release nitrogen (SRN) and/or chelated micronutrients.

Water solubles are not without disadvantages. Because of their form (powder), the bags in which they are packaged are highly susceptible to hardening. To combat this, manufacturers will often include anti-caking materials.

Obviously, this only adds to the nonessential ingredients in the mix. Anti-caking materials present another problem — they are abrasive to irrigation equipment. The other disadvantages to using water-soluble fertilizers have mainly to do with an increase in time, labor and equipment expenditures.

Because they settle out of solution in mixing barrels, water solubles require constant mixing. But even with diligent mixing, clogging and equipment abrasion problems are high.

## Professional-grade coated granulars

Coated granulars offer many important advantages over agricultural-grade and water-

soluble fertilizers. Like water solubles, they come in a wide range of analyses. Because they are made from higher-quality raw materials, professional-grade fertilizers offer growers improved performance. The materials used to make professional-grade coated granulars include:

- **Nitrogen:** Polymer-encapsulated, sulfur-coated urea, ammonium nitrate, ammonium phosphate.
- **Phosphorus:** Ammonium phosphate, calcium phosphate.
- **Potassium:** Potassium sulfate.

First among the advantages of pro-grade coated granulars is that they offer slow release of nitrogen, phosphorus and potassium. As the name implies, these fertilizers are coated with inorganic materials like sulfur, waxes, polyethylene, polyurethane and acrylic resins. When this coating degrades from exposure to heat, moisture and microbial activity, the nutrients they encapsulate are released.

Perhaps the most attractive benefit of using pro-grade coated granulars (especially those with osmotic

release) is the predictability of nutrient release. It's important to consider prill size and quality, as these factors have significant effects on nutrient spreading, distribution and release rates.



Professional-grade coated granulars can be top-dressed or dibbled into container media.

Coated granulars can be blended into soilless mixes, though settling out can be a problem, and they may also be applied as top dressing.

There are a few disadvantages to pro-grade coated granulars that should be noted. Because of the

sodium, chloride or nitrate dissolve in water. Excessive levels of these essential nutrients can damage or destroy a plant. In fact, the most common cause of soluble salt damage is overfertilization. The risk of such problems in nursery crops is particularly acute because potting media can be low in essential nutrients and require significant fertilizer inputs.

When soluble salt levels become high, water in the root cells moves by osmosis out into the soil causing the plant to wilt and die. Warning signs include reduced germination, stunted growth and leaf burn.

## Common fertilizers and salt indexes

Salt index is used to compare the solubility of chemical compounds. Most nitrogen and potash fertilizers have high indexes and phosphate compounds have low indexes. When applied too close to seed or onto foliage, the compounds with high indexes cause plant wilt, burn and death.

Soluble salts (often called fertilizer salts) are produced when ammonium, potassium,

### Salt indexes

Nitrogen source	Salt index
Methylene urea, liquid (slow-release N)	2-4
Isobutylidene diurea (IBDU) (slow-release nitrogen)	5
Methylene urea, solid (slow-release N)	24.6
Monammonium phosphate (MAP)	29.9
Diammonium phosphate (DAP)	34.2
Calcium nitrate	65
Ammonium sulfate	69
Potassium nitrate	73.6
Urea	75.4
Sodium nitrate	100
Ammonium nitrate	104.7

Phosphorus source	Salt index
Superphosphate	7.8
Triple superphosphate	10
Monammonium phosphate (MAP)	29.9
Diammonium phosphate (DAP)	34.2

Potassium source	Salt index
Potassium carbonate, liquid	4.75
Monopotassium phosphate	8.4
Potassium sulfate	46.1
Potassium hydroxide	61
Potassium nitrate	73.6
Potassium chloride	116.3

#### Salt index

**Less than 30:** Nearly undetectable level of soluble salts.  
**30-40:** Very low potential for plant damage.  
**60-70:** Low to moderate level for plant damage.  
**70-80:** Moderate to high potential for plant damage.  
**More than 100:** High potential for plant damage. Avoid if at all possible.

manufacturing process used to create them, they can be expensive. As mentioned previously, release rates are dependent upon factors like heat and humidity, so soluble salts must be monitored carefully, especially during periods of high temperatures to avoid root/plant burn. And, any coating imperfections in these fertilizers can contribute to early nutrient release and unwanted growth surges.

### Professional-grade liquids

Because they are in a liquid form, professional-grade liquid fertilizers offer some unique benefits to nursery growers. Created from technical-grade raw materials, they offer quality, consistency and performance. Professional grade liquids are created using:

- **Nitrogen:** Methylene urea, low biuret urea.
- **Phosphorus:** Monammonium phosphate (MAP), phosphoric acid, polyammonium phosphate, diammonium phosphate (DAP).
- **Potassium:** Liquid potassium carbonate.

The advantages of professional-grade liquids are numerous. These fertilizers come in a wide range of analyses, with some including chelated micronutrients and slow-release nitrogen sources. In most cases, they are less expensive than professional-grade coated granulars.

Their liquid formulation makes them extremely easy to use, and they can be tank-mixed with other technical materials, reducing time and labor costs. They don't require mixing or agitation and eliminate costly problems like clogging and abrasion.

Pro-grade liquids are well suited for finishing off plants immediately prior to transport. Liquids may be applied foliarly, allowing for nutrient uptake via the leaves and roots.

It's always important to check the product labels to discern the percentage of slow-release nitrogen a professional liquid contains, as it will have significant effects on plant quality and health. The even, sustained release provided by slow-release nitrogen prevents unhealthy nutrient dips and, if managed properly, will produce healthier plants while reducing the amount of nitrogen used.

The one obvious disadvantage to using liquids is that growers must have the necessary equipment to implement such a program, which

can add to equipment, labor and maintenance costs.

#### What does it mean?

Because of the obvious trickle-down effects for the grower, selecting the right fertilizer is an extremely critical decision. Using high-quality fertilizers effectively means higher-quality plants without worry about things like phytotoxicity, burn and leaching.

With most nurseries and landscapers offering guarantees on plant materials, growers are far less willing to take chances when it comes to fertilization. There are a plethora of fertilizers on the market. Only by knowing what's out there, reading product labels and asking questions can growers make educated decisions about which fertilizers will best meet their specific needs.

*Kevin Hattori is director of public relations at Growth Products Ltd., P.O. Box 1252, White Plains, NY 10602; (914) 428-1316; fax (914) 428-2780; khattori@growthproducts.com; www.growthproducts.com.*

