



## **Fertilizing Organic Vegetable Bedding Plants**

Conventional growing media containing synthetic ingredients (wetting agents, starter chemical fertilizers) cannot be used in organic production of vegetable bedding plants. However, acceptable growing media can be created from a wide variety of approved materials. These blends for organic production may be purchased off-the-shelf, custom-blended by manufacturers, or produced on the farm.

Most commercial potting mixes contain synthetic fertilizers and wetting agents that do not meet organic standards. One alternative is to arrange a special order from a commercial supplier who agrees to exclude starter fertilizers and wetting agents and then, plan to add your own. Purchasing a commercially prepared mix for organic production is the easiest way to get started and most growers choose this option to ensure consistency and reduce the risk of soil-borne diseases. Common components such as peat moss, perlite, vermiculite, and coconut coir are acceptable for organic certification. Compost, being the most renewable, is another preferred material for many organic growers. Commercial mixes for organic production may contain a "starter charge" of organic fertilizer or no starter fertilizer at all. Check with your organic certifier to make sure your mix complies with standards. More information on growing media used for organic production can be found in the publication, "Potting Mixes for Certified Organic Production" on the ATTRA website.

Supplementing preplant fertilizers or compost with liquid organic fertilizers is generally required to provide adequate nutrition. Many growers are familiar with fish fertilizers made from waste products of the ocean fish processing industry. This material is a thick, heavy liquid. Different fish fertilizers supply plant nutrients at varying levels of availability. Some fish fertilizers are stabilized with phosphoric acid, which gives them a high concentration of readily available phosphorus. Others contain liquid seaweed for a boost in potassium. Fish fertilizers supply mostly ammonium nitrogen.

During cool growing conditions, (less than 60° F), wet growing media and low pH, nitrifying bacteria are suppressed so that ammonium may build up to toxic levels. Tomatoes, eggplants, and peppers are particularly sensitive to high levels of ammonium, but other vegetable bedding plants can also be damaged.

Symptoms of ammonium toxicity include yellowing or chlorosis between the veins, and scattered necrotic spots. Plants may be stunted. At first, young leaves are affected, but later older leaves show symptoms. Roots tips are also damaged. If you are using organic growing media, the aerobic bacteria that are needed to convert ammonium nitrogen to nitrate nitrogen are dependent on environmental conditions. The speed of this reaction depends upon both temperature and microbial activity. When ammonium levels are excessive, plants can easily take up too much resulting in toxic levels, causing cell damage. Compost that is high in nitrogen sources, such as poultry litter or food wastes, can be high in ammonium and other nutrients.

If ammonium toxicity has occurred, raise greenhouse temperatures, stop fertilizing and leach with clear water. Preventing ammonium toxicity is much easier than trying to solve this problem after it occurs. In addition to sending media samples to a laboratory, you can routinely test your growing media.

Fish fertilizers can be a problem to store diluted because they become moldy and develop a very strong odor. They are difficult to use with fertilizer injectors because the concentrate consists of very fine particles in suspension. Since fish emulsion fertilizers develop a very strong odor, fertilizing infrequently may be preferred, for example, every two weeks or once a month. The rate applied will vary depending upon how often they are applied. In New England, the Neptune's Harvest brand is the most commonly available fish fertilizer and it is OMRI-approved for organic greenhouses.

Several liquid fertilizers used for organic production are derived from plant extracts. The best known of these has been Nature's Source Organic Plant Food 3-1-1, in which the nutrients were derived from "oilseed extract". The container has dilutions rates expressed in familiar terms for greenhouse growers and has been recommended based on research trials at University of Massachusetts.

Some growers use Nature's Source Professional Plant Food (formerly Daniels) 10-4-3 a liquid, "organically-based" fertilizer. The organic portion is oilseed extract. Most of the nutrients, however, are derived from inorganic salts so it cannot be used for certified organic production.

Several other liquid organic products are available, such as Biolink 3-3-3 (also an oilseed extract), Converted Organics 3-2-1 (a byproduct of grain fermentation), 1-1-1 Liquid Compost Concentrate, Verdanta PL-2, 2-0-6 (a liquid made from fermented sugar cane and sugar beet molasses). Verdanta would be used as a supplement in combination with other fertilizers used for organic production low in N or K.

Verdanta EcoVita 7-5-10 (granular) is composed of bone meal, soybean meal, cocoa shell meal, feather meal, fermented sugar cane and sugar beet molasses. Both Verdanta products from Bioworks have been trialed by Dr. Cox at UMass Stockbridge School (see resources).

**Mixing and application.** The fish fertilizers and plant extract fertilizers are sold as concentrates and they must be diluted in water to be safe for plants. Nature's Source, Bombardier, and Espartan have a pleasant "beery" aroma as concentrates, but within 7 days of being mixed with water they "spoil" and develop unpleasant odors. The nutrient value of spoiled fertilizer is unknown and the colonies of bacteria that develop may plug irrigation lines, so diluted fertilizer solution should be used as soon as possible after mixing.

Fish fertilizer has the thickest and least consistent solution and should be agitated before mixing with water. Bombardier and Espartan concentrates are "syrupy" but mix

well with water. Nature's Source is the thinnest concentrate and it mixes well with water and can pass through fertilizer injectors.

Sustane 8-4-4 and EcoVita are granular fertilizers mixed with the growing medium before planting. These are the easiest organic nutrient source to use in combination with the liquid types.

**Fertilizer analysis.** Some fertilizers used for organic production supply only one or two of the NPK elements; an example is Bombardier (8-0-0). A grower using Bombardier would have to use other fertilizer(s) to supply P and K. One possibility would be Sustane with an 8-4-4 analysis or some other complete NPK granular organic fertilizer.

**Nutrient disorders.** Plants may develop an overall light green or yellowed color caused by a general nutrient deficiency or more likely, N deficiency. For example, if Sustane is used alone the symptoms might occur about 45 days after planting, the end of its release time. Apply an organic liquid fertilizer supplement about 30 days after planting to prevent nitrogen deficiency symptoms from developing.

Interveinal chlorosis sometimes occurs about halfway through cropping time if plants are only fertilized with liquid organic fertilizers. This chlorosis is most likely caused by an accumulation of too much ammonium-nitrogen in the plant, or "ammonium toxicity." Most greenhouse crops do best with a combination of ammonium and nitrate nitrogen. Unfortunately, fertilizers used for organic production generally do not contain nitrate-nitrogen. The best approach is to rely on Sustane as the sole source of nutrients for the first month after planting and then start applying Nature's Source or another liquid organic fertilizer.

Use fertilizers for organic production with caution on plants you know have exacting nutrient requirements or those that are prone to foliar chlorosis. Trial first on a small number of plants, not your entire crop. Test your growing media, before use.

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## **Resources**

Cox, D. 2016. Plant Response to Nature Source and EcoVita Organic Fertilizers vs Plantex Chemical Fertilizer. Floral Notes 29(1).

[https://ag.umass.edu/sites/ag.umass.edu/files/newsletters/16fnjuly\\_aug.pdf](https://ag.umass.edu/sites/ag.umass.edu/files/newsletters/16fnjuly_aug.pdf)

Cox, D. 2014. Organic Fertilizers - Thoughts on Using Liquid Organic Fertilizers for Greenhouse Plants. UMASS Extension Greenhouse Crops and Floriculture Program Fact sheet. <https://ag.umass.edu/greenhouse-floriculture/fact-sheets/organic-fertilizers-thoughts-on-using-liquid-organic-fertilizers>

Grubinger, V. 2012. Potting Mixes for Organic Growers. University of Vermont Extension. <https://www.uvm.edu/vtvegandberry/factsheets/OrganicPottingMixes.pdf>

Mattson, N. 2014. Substrates and Fertilizers for Organic Vegetable Transplant Production. <http://blogs.cornell.edu/greenhousehorticulture/crops-culture/substrates-and-fertilizers-for-organic-vegetable-transplant-production/>

Organic Greenhouse Vegetable Production, Potting Mixes for Certified Organic Production, Organic Greenhouse Tomato Production, Plug and Transplant Production for Organic Systems, ATTRA - National Sustainable Agriculture Information Service. <https://attra.ncat.org/>

Wander, M. 2015. Organic Potting Mix Basics: eOrganic. <https://eorganic.org/node/3442>

Williams, K. 2020. Organic Root Media and Fertilizer: Making the Switch from Conventional Work for You. Greenhouse Grower. <https://www.greenhousegrower.com/production/organic-root-media-and-fertilizer-making-the-switch-from-conventional-work-for-you/>

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