

# What's Growing On?

**BASTROP COUNTY MASTER GARDENER ASSOCIATION**

February 2023

## SPRING PLANT SALE

**MARCH 11TH**  
 9:00a - 1:00p **Tax-Free**

**BASTROP AREA LIVESTOCK SHOW & FAIR ASSOCIATION**

●●● **Mayfest Park - 25 American Legion Dr. Bastrop, TX 78602** ●●●



**pollinators** ● **perennials**  
**natives** ● **herbs**  
**vegetables** ● **annuals**

Ask  
the  
Expert



Door  
Prizes



## Insect Life Cycles

By Wizzie Brown

Insect life cycles can be broken down into two major categories: incomplete and complete. Incomplete can then be further broken into three varying types.

Incomplete metamorphosis, also called paurometabolous, has three life stages. The first stage is the egg which hatches into an immature insect called a nymph. The nymph eats, grows and molts, going through several different nymphal stages called instars. With each successive molt,

Please attend our Spring plant sale

Many plants have been grown by Bastrop County Master Gardeners, representing locally-grown, native plants best adapted to our county.

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the nymph grows larger and begins to develop wings. Nymphs look similar to adults in appearance with the exception that they do not have fully developed wings. The final stage is the adult which has fully developed wings (of course, unless the insect is wingless i.e. bed bugs). Adult insects seek out the opposite sex, mate, and females lay eggs to begin the cycle anew. An example of an insect with paurometabolous metamorphosis is a cockroach.

One variation of incomplete metamorphosis is called ametabolous and happens in primitive insect groups. This type of metamorphosis also has three life stages: egg, nymph, and adult, but the immatures/nymphs look exactly like the adults except they are smaller in size. Dissection may be needed to tell immatures from adults. An example of an insect with ametabolous metamorphosis is a silverfish.

The second variation of incomplete metamorphosis is called hemimetabolous and insects with this type of metamorphosis have an immature stage that is aquatic. Again, there are three life stages: egg, nymph, and adult. The nymphal stage of hemimetabolous insects lives in water and is called a naiad. The last nymphal instar- or the last stage before the insect molts into an adult- crawls out of the water onto a dry surface so the adult insect can emerge without getting their wings wet. An example of an insect with hemimetabolous metamorphosis is a dragonfly.

The second basic category of metamorphosis is called complete, or holometabolous, metamorphosis. Complete metamorphosis has four life stages: egg, larva, pupa, and adult. Eggs are laid by fertilized adult females and hatch into the second stage called a larva. Larva\* look very different from the adults and often feed on different food sources than adults. Larva are often have elongated bodies, no wings, and may or may not have legs. After going through several instars, or larval stages, the insect turns from a larva into a pupa. The pupa is a transformation stage for the insect where it rearranges its body into the adult form. Sometimes you can see adult features in the pupal stage, but other times the pupa is within a case- like with fly or butterfly\*\* pupa- and you cannot see development. The adult insect emerges from the pupal stage, seeks out a mate for mating, and continues the cycle.

\*Larva is the general name for immature insects that go through complete metamorphosis. There are more specific names for various types of larvae based on what Order they belong to. Larva that are in the Order Lepidoptera and turn into butterflies and moths are referred to as caterpillars while larva in the Order Diptera and turn into flies are called maggots. Also, in the Order Diptera, wigglers are the larval stage of mosquitoes (and mosquito pupae are often called tumblers). Larva that become beetles, Order Coleoptera, are called grubworms or wireworms (depending upon what type of beetle they turn into).

\*\*A butterfly pupal case is called a chrysalis.

For more information or help with identification, contact Wizzie Brown, Texas AgriLife Extension Service Program Specialist at 512.854.9600.

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**TEXAS A&M**  
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# Circle of Friends

by Monterrey Williams



Many years ago; while vacationing in New Mexico, we purchased a piece of pottery called “Circle of Friends.” The modern clay candle holder is based on ancient groups celebrating around bonfires, with dancing and sharing stories of each other’s good qualities and becoming close to one another. The inter-locked arms of the figures are meant to be symbolic of the bond between close friends.

The “Circle of Friends” legend originates with the Mayan Indians and is shrouded with great mystery. Legend says if you give the candle holder to a friend, it solidifies your bond for life.

With the New Year of 2023 and Spring soon approaching, my husband and I decided to build our own “Circle of Friends” fire pit. We already had several cinder blocks and after purchasing a few more, we picked a spot and started construction.



We used two rows of nine cinder blocks, hole side up and formed a square. Next, we put cinder block tops on the top layer. Finally, we put red “lava” stones in the middle of the fire pit.

We wanted to put an inviting and aesthetically pleasing perimeter around the fire pit. After considering several kinds and sizes of stones, we settled on pea gravel. It will pack down nicely and give a sturdy floor for Adirondack chairs. The final diameter of the circle around the fire pit was about 13 feet. We called a local stone company and gave the dimensions. Based on the measurements, we needed 1.5 cubic yards of pea gravel. This would give us 2 inches of depth. We knew that we would have a little extra, given the fire pit took up the middle. Upon discussing it further, we decided to add another cubic yard to get an adequate depth for a total of 2.5 cubic yards.



To finish the fire pit area, we put down a layer of pea gravel in the circumference. Then we placed bricks around the outer edge for a boundary wall. Finally, we put down the rest of the pea gravel.



## Volunteering

Master Gardeners volunteer in the community to teach others about horticulture. We follow the research-based recommendations of Texas A&M AgriLife Extension. Members who complete 50 hours of volunteer service in the year after training earn the designation “Texas Master Gardener.” We use our title only when engaged in Texas A&M AgriLife Extension activities.

# 'Organic' Doesn't Always Mean 'Sustainable'

By Howard Nemerov

Organic gardening is a desirable goal. Non-toxic, fresh produce is good for you. Organic gardening helps create healthy soil and people, and supports pollinators. Sustainability is another good goal, because it helps keep our environment cleaner, which also supports better health. At the same time, “organic” doesn't always mean environmentally sustainable, and the educated consumer needs to look behind the label to understand what they're buying to make informed choices. This article examines two products: a fertilizer and a soil amendment.

## What is 'Organic'?

Generally, “organic” means natural and not synthetic: Compost made from rabbit manure and fall leaves is an organic nutrient source, while chemical lawn fertilizer is not.

The United States Department of Agriculture (USDA) organic standards address issues like “animal raising practices, pest and weed control, and use of additives.”

*Organic producers rely on natural substances and physical, mechanical, or biologically based farming methods to the fullest extent possible.*

USDA also defines what substances are considered organic: “Organic standards are designed to allow natural substances in organic farming while prohibiting synthetic substances.” The main benefits of organic farming are soil conservation and health issues:

- Maintain and improve fertility, soil structure and biodiversity, and reduce erosion, and
- Reduce the risks of human, animal, and environmental exposure to toxic materials.

## The Organic Materials Review Institute (OMRI)

Organic Materials Review Institute is a private, third-party certifier that verifies products are suitable for organic operations. It has been around for many years and is widely respected as credible: OMRI certified products are safe to use for organic gardening.

*The Organic Materials Review Institute (OMRI) is an international nonprofit organization that determines which input products are allowed for use in organic production and processing.*

As long as a product falls within organic guidelines, it can earn the OMRI listing if the manufacture pursues this application process.

## Sodium Nitrate

Not all organic fertilizers are sustainable. Allganic Nitrogen Plus, 15-0-2 (N-P-K) is also an OMRI listed product. This is a “natural sodium nitrate from Chile.” Since sodium nitrate is a naturally-occurring substance, it's a valid organic product. It has been extensively mined in Chile since the early 1800s, and played a part in South American wars of independence from Spain, since sodium nitrate is a compound used in making gunpowder.

Sodium nitrate may negatively impact soil structure, biodiversity, and erosion. It's usually recovered by

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Figure 1: Abandoned sodium nitrate mine (Courtesy of Atlas Obscura)

open-pit mining, involving heavy equipment, blasting, and drilling. This can result in environmental disruption, negatively impacting air, soil, and water quality. Since sodium nitrate deposits formed about 10–15 million years ago, this cannot be considered a renewable resource. Nor can mining it be considered a sustainable practice: once a deposit is mined out, all that's left is a large hole in the ground, and perhaps abandoned infrastructure.

Sodium nitrate is a salt, making it a readily-available nitrogen source for plants: When dissolved in water, it's ready for uptake by plant roots. However, if your soil test indicates high conductivity levels (generally indicating high salt content or salinity), adding more salts could degrade your soil's ability to grow healthy vegetables and flowers.

According to Tony Povin, Texas A&M Professor of soil chemistry and Extension Specialist:

*As soils become more saline, plants become unable to draw as much water from the soil... when the soil salinity levels are high enough, the water in the roots is pulled back into the soil. The plants become unable to take in enough water to grow.*

## Sodium Nitrate alternatives

Calcium Nitrate is a manufactured—non-organic—nitrogen source, created by reacting limestone (calcium carbonate) with nitric acid. Like Sodium Nitrate, it can be taken up by plants directly when in water solution. As of this writing, an online retailer sells 50-pound bags for \$23, or \$0.46 per pound; with shipping (\$49.34) the total price per pound is \$1.45. The same retailer sells 50-pound bags of Sodium Nitrate for \$51.00; with shipping (\$44.75) the total price per pound is \$1.92.

Calcium Nitrate is a more “efficient” fertilizer: 19% nitrogen compared to Sodium Nitrate's 15%. You'll use less Calcium Nitrate to input the same amount of nitrogen, making it an even more economical alternative.

Numerous OMRI-approved fish emulsion fertilizers are suitable nitrogen sources, and you can raise fish in a sustainable manner. While Sodium Nitrate is 15% nitrogen, fish emulsions test around 2–5% nitrogen. Being a true organic source, microbes must decompose fish products to mineralize their nitrogen into inorganic nitrates—the natural form of Sodium Nitrate—before plant roots can absorb it.

You can get a 5-gallon bucket of OMRI-listed fish emulsion shipped free to a local big-box store for \$129, at 49 pounds net weight, it costs \$2.63 per pound. Considering that Sodium Nitrate contains triple the nitrogen, to make fish emulsion an equivalent nitrogen source it would cost \$7.89 per pound—over four times as much—to supply the same amount of nitrogen to your garden.

## What about perlite?

Perlite is another OMRI-listed soil amendment, often used to create lighter commercial potting mixes that enhance root development and plant growth. There are currently over 50 OMRI-listed perlite products.

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The Nevada Mining Association defines perlite as “an uncrystallized volcanic glass that is primarily a byproduct of the natural formation of obsidian.” It has many uses beyond horticulture, including plasters, masonry, and insulation. Volcanic perlite ore gets heat-treated to create the soil amendment we use.

*Rapidly heating perlite ore to temperatures of about 900°C (1,700°F) softens the volcanic glass causing entrapped water molecules in the rock to turn to steam and expand the particles like popcorn.*

The result is light, fluffy white particles that make potting soils lighter while improving water-holding capacity.

## Perlite mining

Perlite is often dug out of open-pit mines. One example is the Tucker Hill mine near Paisley, Oregon. Because it resides within the Freemont National Forest, the U.S. Bureau of Land Management had to approve the application to mine “a 20-acre perlite quarry.” As part of the agreement, BLM required “reclamation of the road and quarry at the end of the 10-year operating period.” The quarry has since been enlarged to 70 acres. To the right is a Google Earth screen print of the Tucker Hill quarry post-expansion, taken on July 15, 2016. (search “Tucker Hill, Lake, OR”)



Figure 2: Tucker Hill perlite mine (Courtesy of Google Maps)



Figure 3: New Zealand perlite mine

To the left is a picture of a perlite quarry in New Zealand; there’s also a short video of the operation on Youtube. The Perlite Institute represents mining companies and associated facilities called “expanders” performing perlite’s heat treatment.

Perlite “may contain trace amounts of crystalline silica dust, a chronic health hazard by inhalation.” Breathing in silica dust could cause Silicosis, potentially scarring lung tissue, and the Centers for Disease Control has developed best-practices for those working with perlite.

Best practices would include using it outdoors with excellent ventilation, and moistening it as soon as possible to reduce dust dispersal. Wearing a mask may help, too.

## Perlite alternatives

Parboiled rice hulls (PBH) are a by-product of packaging rice for consumption—like separating wheat berries from chaff—and are also OMRI certified, creating an amendment that provides similar weight, aeration and water-holding capacity as perlite. But there are two main caveats.

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Parboiled rice hulls are cheaper per pound than perlite. As of this writing, an online retailer sells three bales of PBH for \$3.23 per cubic foot. Another retailer sells perlite for \$10.25, more than triple the price of PBH. But shipping places PBH out of reach for most operations. While special sale events enable you to get lighter products like perlite shipped at no charge, heavier, bulkier items like PBH must arrive via motor freight. It costs \$401.63 to ship those three PBH bales selling for \$67.81, making the real cost \$22.35 per cubic foot.

Secondly, research indicates that straight substitution of PBH for perlite may not work well in many growing situations. For example, a Perdue University research project found that some bedding plants grow best with some perlite remaining in the mix.

Between expense and the inability to replace perlite with PBH, this may not be a viable alternative.

Vermiculite is another alternative to perlite. Like perlite, vermiculite is also mined and expanded using heat to create a light, water-holding amendment. In the past, vermiculite contained dangerous levels of asbestos. Modern vermiculite has little to no asbestos and is considered safe for horticultural purposes. However, this varies by source, and it's a good idea to only purchase vermiculite from companies that provide test results from third-party laboratory testing.

Vermiculite sells for \$10.68 per cubic foot, 4% more than perlite. OMRI lists numerous vermiculite products for organic production, making this another organic perlite alternative, albeit with similar mining and environmental concerns.

## Conclusion

The goal here to educate you on alternatives to Sodium Nitrate and perlite, and to show that organic products may contain hidden environmental and health costs. I still add perlite to organic potting mixes, and use sodium nitrate for organic vegetable production. But there can be a difference between organic and sustainable. Make sure you understand the true cost of each product, and then decide what works best for you.



## Endnotes

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