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JOHN'S CORNER:

ORGANIC FERTILIZERS AND NUTRIENTS 16 - MOLASSES

by John Ferguson

Many gardeners do not know about the benefits of using molasses as part of their fertility, insect, disease and weed control. Molasses is used for a lot of things from animal food to a food additive for humans. Molasses contains many forms of sugar that provide energy (16 calories per teaspoon) for the microbes in the soil and much more. Molasses can be a very cost effective tool for gardeners.

There are many grades or types of molasses available on the market of which the price and benefits vary greatly. Molasses is made from either sugarcane or sugar beets and along the Gulf Coast. Sugarcane is the most common. The refining of these plants produces different grades that we call; first molasses (mild or Barbados), second molasses (dark), sulfured and un-sulfured molasses, third molasses (blackstrap) and feed grade molasses.

For gardeners un-sulfured Blackstrap molasses is the best as it is the most nutritionally dense form of molasses. During processing the simple sugars have been removed to make first and second molasses. As a result the complex sugars, other carbohydrates and nutrients are left and the original nutrients have become concentrated.

In addition to the carbohydrates (carbon compounds that relate to energy), it is rich in sulfur, potash, iron and micronutrients (trace minerals). As a result it stimulates the growth of microbes and plants.

Molasses also has an interesting property in that in functions as a chelating agent which means it can help convert nutrients in the soil that are chemically unavailable into a form that makes it easier for microbes and plants to absorb.

Microbes feed on the sugars in molasses. One strain of bacteria is the *Azotobacter* that is found in a good compost and in healthy soils. This bacteria can fix nitrogen without the need for a root of a legume as long as it has a good energy source such as the complex sugar and other carbohydrates in molasses. Dr. Louis Thompson found that Azotobacter could fix the equivalent of 1,000 pounds of nitrogen per acre from the air in ten weeks if given diluted molasses solutions regularly. This is one of the reasons why many gardeners get a rapid green-up to their turf grass after applying a good compost and molasses.

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If dilute solutions of molasses can cause microbes to fix nitrogen, what happens if we apply strong (concentrated) solutions of molasses?

We know from soil microbiology that bacteria grow rapidly on simple sugars to the exclusion of fungus until the sugar concentrations become very high. Many organisms cannot grow in a high concentration of sugar. This is why sugar can be used as a preservative. Hence if we apply too much molasses at one time we can have problems as the molasses supplies a lot of carbon (C) for the bacteria. As a result for the bacteria to grow rapidly they use a lot of nitrogen (N) as they are the most nitrogen rich life form on earth with a 5:1 C:N ratio. They are so effective at tying up nitrogen (and other nutrients) that plant growth can be reduced or even stopped outright. When plants compete with bacteria for nitrogen in the soil....the bacteria always wins, hence plants can be killed due to a lack of nitrogen. This is why some gardeners use a concentrated molasses solution to pour on weeds as it can kill them. I have had several folks tell me that strong solutions are effective on nut grass (nutsedge) when applied directly to the plant. (Note: I have never tried this technique but would like to hear from anyone whom has had success in controlling nut grass).

Many gardeners attest that applying molasses to their vegetables and fruit trees increases the flavor, fragrance and perceived sweetness.

On a side note, several researchers have found that molasses can be an effective pest control. A few years ago I was down in Needville at a farm supply company and there was a big 5,000 gallon tank in the parking area. I asked what it was and was told it was molasses for the cotton farmers. Molasses has been used since 1900 for helping control boll weevils.

For many chewing insects and caterpillars 1-2 tablespoon molasses in one quart water, one drop soap or other surfactant and shake well then spray the plants with the solution. Molasses solutions have been found to deter or kill numerous insects. Several mechanisms or modes of action have been proposed as to why it works. We have known for decades that plants with a high "Brix" index (measure of sugar concentration in plant sap) are naturally more pest resistant than the same species with a low Brix index. One mode is that an insect cannot digest the sugars on the leaf when they eat it. Bacteria then produce gasses that expand in the digestive tract of the insect that builds up pressure which ruptures their digestive system that leads to insect death. For other insects the sugars in the molasses ferment into alcohol which then kills the insect. The third method is that the molasses causes a microbial explosion in the soil which then attack eggs and larval stages of some insects killing them.

Molasses can be used to kill other insects (e.g. grasshoppers) by using it in a trap. Just fill a jar half-way with a molasses

solution and set it in the ground. Insects are attracted to the smell then fall in and are killed. This is similar to how beer traps get rid of slugs and snails.

Other researchers have found that fire ants do not like molasses. If applied to an area the ants will leave, *IF* they have an untreated area to move to. Concoctions of compost tea, orange oil and molasses have been found to kill fire ant mounds through several methods of action. However, unless one makes it themselves, it is not cost effective to purchase commercial products.

Scientists at the USDA-ARS (Agricultural Research Service) has found that compost, molasses and anaerobic soil disinfection (ASD) in soil saturated with water and covered with a plastic tarp was as effective as methyl bromide in reducing pathogens, pests and controlling weeds (Agricultural Research, March, 2011).

DRY MOLASSES - Dry Molasses is just molasses that has been sprayed on a grain residue carrier like ground soy or corn meal. It makes it easy to spread and use. It is often used to get fire ants to leave an area or help green up a lawn. Costs a little more than using liquid molasses, diluting it and spraying.

Other Uses:
Some folks mix molasses with alfalfa or cottonseed meal and let steep in water for a few days. They then apply to the soil as a liquid fertilizer.

For home composters it is often difficult to get the compost pile to heat up enough to kill weed seeds and pathogens. Hence one can add molasses to compost piles to cause increased heating and speed the rate of decomposition. It can be applied at the rate of 1/4 cup per 25 square feet of pile surface) or 1/4 cup per gallon of water to apply to pile. The larger the pile the more one need to apply.

Another common use for molasses is in making compost tea. The complex sugars and carbohydrates provide food for the microbes to grow rapidly and increase in density in the tea.

SUMMARY:
We are just beginning to understand the benefits of molasses and how it works. However, Molasses is a multi-purpose product for any serious gardener. It is easy to apply, safe for children and pets, inexpensive to use and has many benefits.

PROS:

- good source of carbon and trace elements
- inexpensive and readily available in most areas
- easily digested by soil microbes to make nutrients available
- stimulates microbial growth
- may function as a chelating agent increasing fertilizer efficacy
- good feedstock for earthworms in small amounts
- good ingredient for compost tea
- increases sweetness and flavor of some vegetables and fruits
- increase plant health (disease and pest resistance)
- increases leaf color for many species
- accelerates thatch breakdown

CONS:

- too much can injure or kill a plant
- nutrient content and density varies
- feed grade molasses often has preservatives, fungal inhibitors, and even antibiotics and extra sulfur to kill bacteria and fungus respectively
- may be sticky and messy if one gets it on them
- most grocery store molasses products do not work well
- low cost brands may be heavily diluted and one is just buying water
- sulfured molasses may cause problems.