Fertilizer Section SCRIPT

Food Forum ~ Soil Health & Fertilizers ~ March 14, 2021 3pm

Soil Health ~ Maureen [PS: …]

SLIDE #1 Now we'll move on to a discussion about fertilizer

What are they exactly

Why and how do we use them

SLIDE 2 Let's start with the definition …

- **Any material of natural or synthetic origin that is applied to soil or to plant tissues that supplies one or more of the nutrients essential for the growth of plants**

Management of soil fertility has preoccupied farmers for thousands of years. Egyptians, Romans, Babylonians, and early Germans have all been recorded as using minerals or manure to enhance the productivity of their farms

SLIDE 3 **But - Is it a fertilizer or an amendment?**

- **Fertilizers affect plant growth directly by improving the supply of available nutrients in the soil**
- **Amendments, on the other hand, influence plant growth indirectly by improving the soil's physical properties** such as: **decreased soil density and nutrient holding capacity or chemical properties** like **pH and salinity**

It is more difficult to distinguish between amendments and fertilizers when evaluating natural or organic products.

Animal manure, for example, easily falls into either category, Manures can be a source of readily available nutrients, but it can also supply significant quantities of organic matter, which improves soil tilth, soil aeration and water retention

Compost is similar as it adds nutrients for the plant and improves the soil quality

Keep in mind: Fertilizers just feed the plant; amendments feed the soil which then naturally feeds your plants. In fact, 90% of the nutrients taken up by plant roots are cycled through a soil organism before they becomes available to the plant.

SLIDE # 4 **So … Organic or Inorganic?**

- **Organic fertilizers are usually plant- or animal-derived matter**
  Fertilizers of an organic origin include animal wastes, plant wastes from agriculture and compost. Beyond manures, animal sources can include

products from the slaughter of animals like bloodmeal, bone meal and feather meal. Other sources come from the sea: Seaweeds provide primarily micro-nutrients while Fish Fertilizer provides more Macro components. Most of these products are less concentrated and the nutrients are not as easily quantified. Some unprocessed minerals are also considered organic.

Be aware that Animal Manures should always be very well aged or use commercial products which are pasteurized to kill soil-borne pathogens.

- **Inorganic fertilizers are sometimes called synthetic or chemical since various chemical treatments are required for their manufacture**

They are comprised of mined minerals and man-made chemical compounds that provide combinations of plant-essential nutrients. This processing in itself contributes to global warming. Common examples are urea, ammonium nitrate, ammonium sulfate, superphosphate, and potash.

- **How do you tell if a product is organic?**

The term "organic" can be used only if the product is derived entirely from either plant or animal sources containing nutrients essential for plant growth. If you see "organic **based"** that means just 50% or more of the product is from organic sources. A statement saying "This fertilizer product is allowed for use in organic production" it means it is OK for folks selling their produce as "organic" so that's a fairly safe indication. Regulations do vary from state to state

SLIDE # 5 When asked Which is better?

You might hear us as Master Gardeners say, **"It depends".** And there are some factors to consider. Traditional literature may advise using a combination. However recent research is showing that totally organic methods that feed and improve the soil are proving to give better long-term results not only for the home gardener but commercial agriculture as well.

Inorganic fertilizers are often faster acting and lower in cost. However, they can change the soil pH, contaminate the environment by leaching & runoff and potentially burn crops if overused. They cause your plants to become dependent on chemicals as the only way to get the nutrients they need, and they also lower soil fertility

Organic materials, especially compost, **will feed and build up the natural system of the soil and its organisms and the healthy interaction with your plants**. They also

contain many of the essential micronutrients required for plant growth and development.

Additionally, they improve **Soil tilth,** which is the physical condition of your soil, especially in relation to its suitability for planting or growing a crop. It's about those minerals Maureen discussed earlier.

This is why we now encourage organic regenerative methods of gardening that also help store carbon in our soil; called carbon sequestration. Plants take in CO2, store Carbon in the soil and their tissues then exhale Oxygen.

SLIDE # 6 A Transition to Organic

If you have been using primarily synthetic fertilizers [as I admit I have been] how do you switch? You may have noticed me using words like "dependent on synthetics" and this can actually be the case. If you haven't been using some other organic methods -- building back natural soil health can take some time, maybe as much as 3 to 5 years.

Start by gradually reducing use of synthetics 25% or so per year while you **also use the other good organic gardening practices**. Minimize disturbing the soil & do no double digging or tilling; Keep adding organic matter; practice crop rotation and keep your soil covered with compost as you work toward using no synthetic fertilizers or pesticides.

Remember - Better soil = healthier vegies that are more resistant to pests and diseases and more nutritious as well! The time is well worth it!

As a side note these same practices can also be applied to your lawn and other garden beds.

SLIDE # 7 Cover Crops/Green "Manure"

Here is a method you might have heard about recently but maybe don't quite know what it is. And no this isn't about animal poop.

- **Cover Crops or Green "Manure" add organic material below the surface without digging** or disturbing the soil **&** planting legumes like fava beans, a local MG favorite, **can naturally add Nitrogen to the soil. Here's how…**
- **Plant a cover crop in Fall after harvest or between growing crops.** Green manures include legumes such as vetch, clover, beans and peas; as well as some annual grasses and buckwheat. Water seeds in and be sure to protect

them from hungry birds or other 'varmints' with a row cover – I have good luck with old nursery flats. You may need to irrigate depending on the winter rains.

- **Cut the plants down when they are in half bloom; that's when most N is present.** Don't let it go to seed! Even before that you can cut it back halfway and use the clippings as mulch or compost. Cut down completely 3-6 weeks before your spring planting.
- **DON'T pull out those roots**. Cut off stems & foliage just above the roots and leave them right there in the soil to decompose. You can do this with your planted crops as well
- **Clip** the stems **into small pieces and just leave it on the soil.** When you are ready to plant - dig a small hole for transplants or move the residue aside for direct seeding. Then recover with the residue and add a thin layer of compost.

SLIDE # 8 Root Growth in 3 Soil Environments

Here's an experiment that shows root growth in three different types of soil environments:

- In one we see plant roots with no fertilizer used; just soil 'Au naturelle'
- Another shows the plant roots grown with composted manure added
- In the third we have a root system of a plant using chemical fertilizer

So which do you think is which?

SLIDE # 9

On the Left shows the roots of a plant using chemical fertilizer. It has the least well-formed root system….just the opposite of what you might think.

In the Middle: we see plant roots with no fertilizer used; soil in its natural state

And on the Right: we are seeing plant roots with composted manure added
Did you guess right?

Fertilizer is not how nature evolved for plants to digest food - It short circuits their digestive system & makes the plant lazy. Also, synthetic fertilizer application is self-fulfilling because once the soil-plant exchange system fails, the only way the plant can get nutrients is from the application of more fertilizer.

SLIDE # 10 Picture of Fertilizer containers showing the 3 numbers

So you are ready to buy your fertilizer. **Yikes what now!** Here are just a few examples of the many products available in nurseries and box stores You may also notice several formats … granules, liquid, spikes and powders. Oops how did the bag for Roses get in there 😊

SLIDE # 11

You will always see three numbers somewhere on all fertilizer packages, organic or synthetic, like 3-5-6, 12-5-7, 5-1-1. These represent the three major macronutrients Nitrogen, Phosphorous and Potassium and it's required by law. They will always be this order. The different nutrients provide different things:

Nitrogen (N): promotes vigorous leaf growth

Phosphorus (P): aids the development of roots, flowers, seeds, fruit

Potassium (K): Sometimes referred to as Potash helps build strong stem growth, aids in the movement of water in plants and the promotion of flowering and fruiting

SLIDE # 12 [shows rest of macro & micronutrients]

There are actually 17 elements that are all equally essential for plant growth and development, and 14 of these are derived from the soil. The 3 other essential elements are Carbon, Hydrogen and Oxygen - which come from the air and water.

SLIDE #13 Which one should you use ?

Vegetable crops primarily need nitrogen but most crops also benefit from a complete fertilizer also containing phosphorus and potassium.

Many packages will give you some hints about what numbers would be best for which vegetable; like Tomato Food, Fruit Trees & Citrus, etc.

But the thing to remember is … **those 3 macro nutrients and what result you are trying to achieve**...

If you are growing lettuce or chard; choose a fertilizer that is highest in Nitrogen and low in Phosphorus. You want healthy leaves and NOT bolting to flowers or seeds

If tomatoes are your passion; look for lower Nitrogen and higher Phosphorus & Potassium. That will encourage fruit production and not just a lot of leafy growth

Don't forget squashes and melons are also fruits

SLIDE #14 A few more hints …

Remember that broccoli and cauliflower are flowers [well buds actually] and peas & beans are seeds so they will need Phosphorus & Potassium

Carrots and radishes as roots want higher Phosphorus to help give you the results you want. Onions are heavy feeders and organic matter will be especially beneficial

Cane berries like raspberries & strawberries aren't super needy but a balanced formula would be appreciated

Fruit trees, once established, are often best served by compost and maybe additional N; Citrus trees will often need additional iron or zinc.

SLIDE #15 Next Steps

As you **first plant,-- place narrow bands** of fertilizer several inches to the side and/or below seeds & transplants and lightly dig into the soil. Your soil type, and the fertilizer you are using will determine whether bands are placed to the side and below or only directly below the seed or plant. Fertilizer placed too close may damage roots or inhibit seed germination. Most packages will give you more specific directions on how to use their product depending on their format.

Side dressing is appropriate at critical plant growth stages. It is the application of dry fertilizer beside actively growing plants to replace nutrients that have been leached or used up in the growth process. It can be applied right on top of the soil a few inches away from the row or plant.

Watering in is always needed after adding dry fertilizers and applying it where you water or irrigate will help ensure your plants can utilize the nutrients they need

Compost can – really should - always be applied to cover any bare soil. It will improve water retention and help build a healthy soil biota.

SLIDE #16

- Summary
  - Fertilizers are the nutrients your fruits & veggies require to grow and thrive
  - Organic fertilizers come from plant or animal matter and release nutrients slowly and enhance the soil. Inorganic products are manufactured & not recommended
  - Newer research shows the benefits of organic materials and practices
  - Look at the 3 numbers [N, Phosphorus & Potassium] to decide what each plant needs
  - Apply fertilizers correctly and water in well

- Keep the soil covered with compost

- Resources

  - **The Napa County Master Gardeners Website** is a wonderful place to start. It has links to a wealth of research-based information. You can look up the vegetables you want to grow for advice and problem solving.
  - A complete list of the references used will be listed at the end of the presentation

- Next Pat will be talking to you about what to do now in your garden