SOIL FERTILIZERS

also

LIME & Soil pH

Some questions you may be asking:

- What are organic compounds?
- How does using synthetic fertilizer affect food production and the environment?
- Is it true that chemical fertilizers can really be harmful to the body?
- What is organic fertilizer and how does it differ from the non organic?
- Is organic fertilizer better and safer to use on crops?
- What is soil pH?
- How do I know if I need fertilizer or lime?
- What effect does using lime have on my soil and my crops?

Here is a basic outline that should answer the above questions for you.

ORGANIC FERTILIZERS

Basically, inorganic fertilizers are made from synthetic, manufactured chemicals, and organic fertilizers are made from naturally occurring organic material. However, this is a bit of an oversimplification, and sometimes the line between organic and inorganic fertilizer can get a bit blurry. For example, naturally occurring minerals such as limestone, saltpetre, and mine rock phosphate, although technically inorganic (they come from rocks, after all), have been used as fertilizers for centuries and are just as safe as organic fertilizers.

Organic fertilizers are generally created as other organic material that rots and decays. As plant and animal matter rots, the organic material breaks down into its component water and minerals. The resulting biomass is very high in nutrient quality.

The very simple example of organic composition is compost. Compost is from organic wastes of natural living things such as animal manure, plants, leaves and fruit and vegetable waste. Many gardeners and and allotmenteers prefer to use animal manure, aside from different plants and leaves, as fertilizers for longer period of time because of its proven nutrient contents.

INORGANIC CHEMICAL FERTILIZERS

Many ***inorganic fertilizers contain synthesized chemicals that do not occur naturally in nature***, and thus can become harmful. The introduction of such chemicals, if used extensively over time, can throw off the local environment and ecosystem.

Chemicals used as fertilizers will extensively affect everything and everyone. This happens because when it rains and the chemicals are washing into the soil. As the rainwater flows through the varied bodies of water, more and more living things in and out of the water are

affected. The chemicals will also reach the groundwater, which is where drinking water comes from.

The worst thing about the synthetic fertilizers is the extent of chemicals on the crops and produces. When produce is grown with synthetic fertilizers, the produce will contain the chemicals in its flesh and once it is consumed by people, the chemicals can then enter and harm their bodies. Eating synthetically grown produces over a period of time can cause major health issues.

WHAT MAKES ORGANIC FERTILIZER BETTER?

When organic fertilizers are introduced and used by growers into the local environment the materials are naturally occurring plant and animal matter and they do not have the negative affect on the environment found with inorganic fertilizers.

When it comes to crop growth, organic fertilizers are good in encouraging growth. It take more organic fertilizer to do the job of a lesser amount of inorganic, however with organic fertilizer the soil absorbs the nutrients and essential substances more slowly thereby turning out rich crops that are far better than the crops from gardens that use synthetic fertilizers. As the soil continuously becomes enriched from the use of organic fertilizers, the growth cycle of crops yielded increases every harvest season.

According to a 32- year study performed in Sweden, the best thing about organic fertilizer is that it increased the yield rate of crops by 15%. The inorganic fertilizer only produced a 50% yield rate compared to the organic producing a phenomenal 65% yield rate.

It is hoped that the above has answered some of your questions about organic fertilizers, and it's uses in organic gardening.

Below explains how the soil pH and the use of lime are also intricate parts of the successful "growing" picture

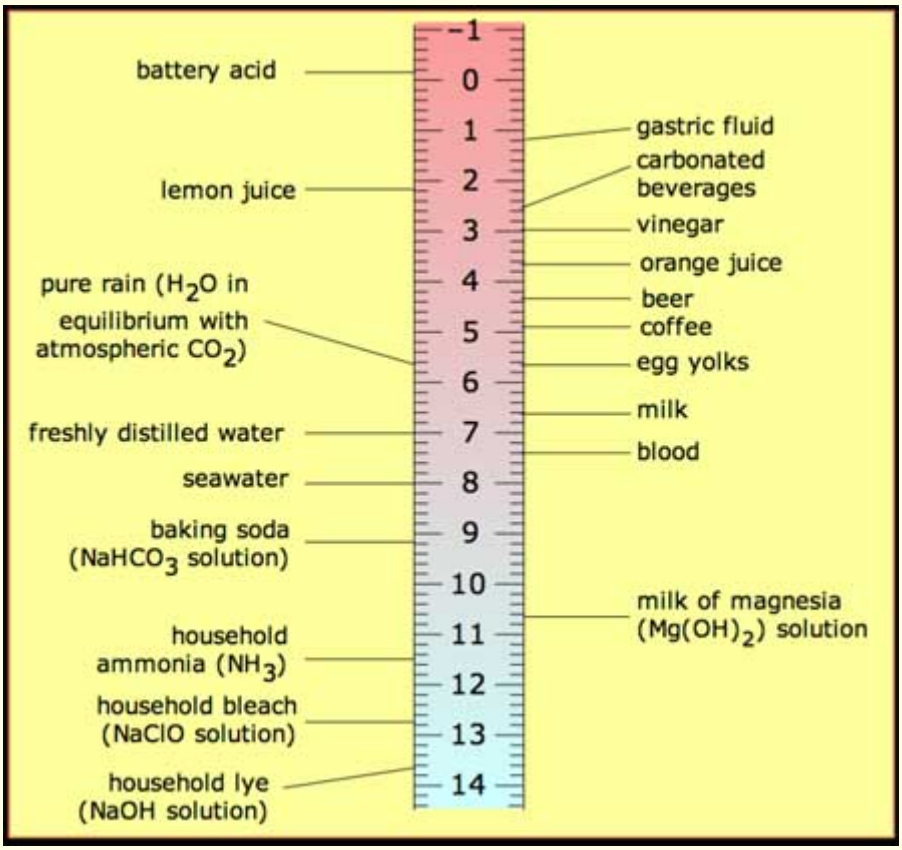
SOIL pH EXPLAINED

The pH (not PH) scale is used to measure the acidity or alkalinity of an aqueous solution and is determined by the hydrogen ion content (H^+). This scale was invented by a Danish scientist called Sorenson in 1909. The letters pH stand for "Power of Hydrogen" and is a measure of the molar concentration of hydrogen ions in the solution and as such is a measure of acidity (that's just for the chemistry anoraks!)

For us non-chemists and gardeners the scale generally runs from 4.00, which is highly acid in soil terms, through 7.00 which is neutral to 8.00 which is alkaline.

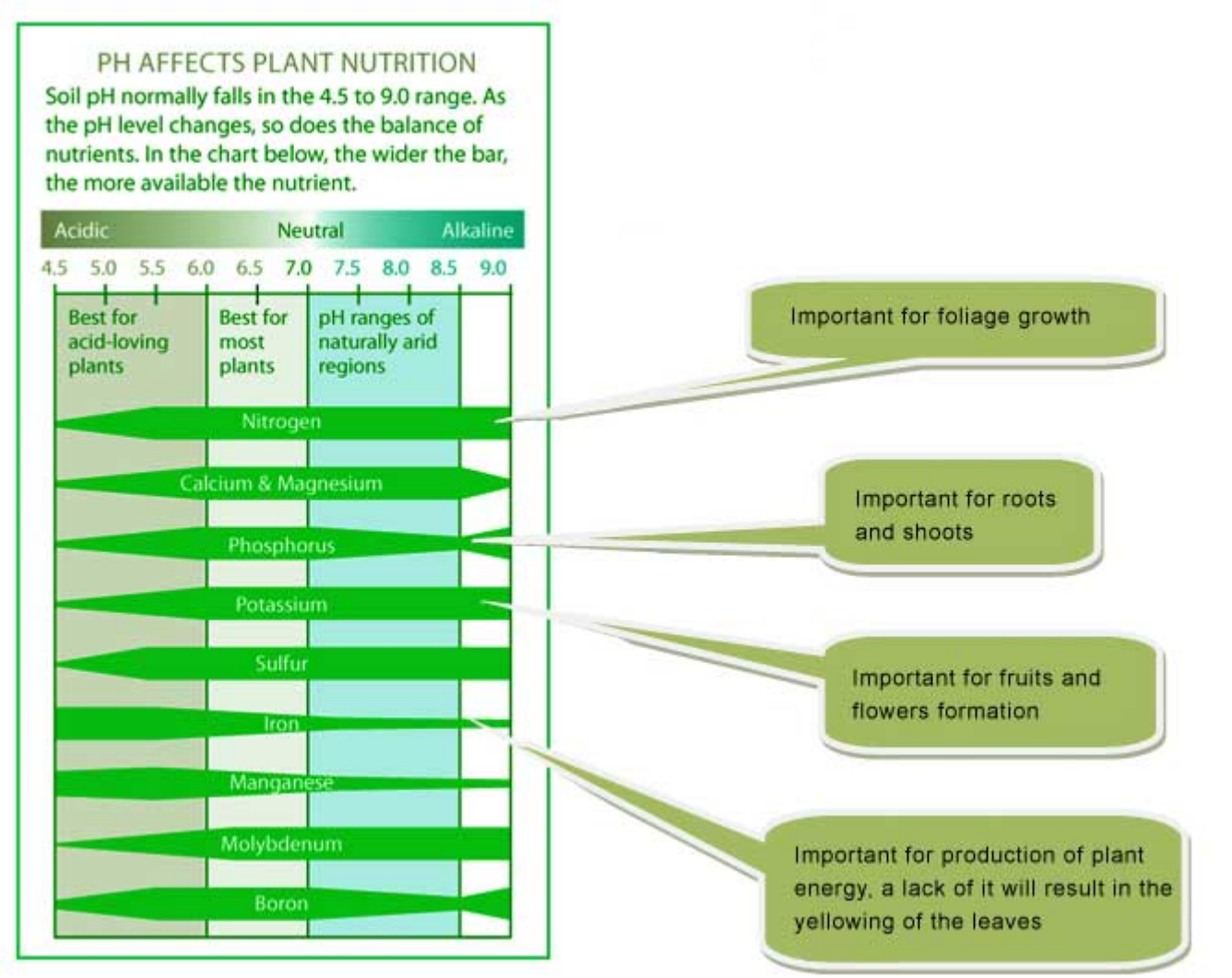
To put this in perspective. The pH scale ranges from 0, which is strongly acid, to 14 which is strongly alkaline, the scale point 7 being neutral. Examples of solutions with differing pH values include car battery acid (pH 1), lemon juice (pH 2), beer (pH 4), natural rain (pH 5-6), milk (pH 6), washing-up liquid (pH 7), seawater (pH 8), milk of magnesia (pH 10) and

ammonia (pH 12). The pH scale is logarithmic rather than linear, and so there is a **ten fold** increase in acidity with each pH unit, so, e.g. rainfall with pH 5 is ten times more acidic than pH 6, rainfall with pH 4 is 100 times more acidic than pH 6 and rainfall with pH 3 is 1000 times more acidic than pH 6.



To LOWER soil acidity we need to RAISE the pH value and vice versa

Keeping it simple, if your soil is too acid then nutrients will not be available to the plants even if they are present. To LOWER soil acidity we need to RAISE the pH value and vice versa.



Different plants require different levels of acidity – hence we have ericaceous composts for acid loving plants. Most vegetables thrive when the soil is slightly acid i.e. a pH level between 6.5 and 7, Potatoes tend to prefer a lower pH, more acid soil (they are classified as "lime haters"), and Brassicas prefer a slightly alkaline soil, pH of 7.0 or even slightly higher. That's why it is suggested to lime in the autumn ***after*** potatoes and to follow with Brassicas who like the high ph. Legumes (peas beans etc.) should be grown in between in a good crop rotation schedule.

Measuring Soil Acidity (pH level)

You can buy various types of soil pH test kits. Often you mix a soil sample with water then compare a colour change to a chart (see our video tutorial on soil testing), however this is rather tedious as you need to take more than a couple of samples. Cheap electronic testers are now available (often for as little as £5.00), which is much easier. You simply switch the pH meter on and insert two prongs into the earth you're testing and then wait approximately 1 minute for the reading to settle, which you then read on a scale of 4 - 8 on the meter's face (depending on your instrument).

Whichever kit you use, it will come with instructions and will give you a reading. Never make a

judgement on the basis of just one test. You may have hit a spot particularly high or low pH. Take samples or test from a number of spots and work out an average reading (add up the results and divide by the number of tests done) this will give you a much better general view of your soil's acidity level.

The acidity of the soil has a huge effect on fertility because the acidity of soil controls how available nutrients are to your crops.

Clay soils are also harder to work the more acid they are for some complicated chemical reason.

Different soil types will behave differently so one vital tool for the serious gardener is a tester for acidity levels. You can also judge the acidity of the soil by the types of weeds that grow and their behaviour.

Sorrel, creeping buttercup, nettle, dock and mare's tail are all signs your soil is becoming or is too acid. Reducing soil acidity will help deter some weeds – they were designed for acid soils unlike our edible garden crops that prefer something a little more alkaline.

Changing the acidity level of the soil

To raise the pH and lower acidity or "sweeten" the soil, we add lime. To lower pH and increase acidity you can add sulphate of ammonia or urea which are high nitrogen fertilizers.

From this you can see that adding manure will also lower pH and make the soil more acidic.

It's counter to what you expect, but adding loads of manure year after year will actually reduce soil fertility by making it too acidic so the plants cannot access the nutrients. They become locked up. So we need to balance that with the use of lime

Do you need to lime and how much to lime?

LIME

If the soil is not of a chalky nature it will tend to become acidic as the Calcium is leached out. When it becomes acidic (sour) with too low a pH level it will require lime to increase the pH level to make it more alkaline (sweet).

Never Mix Lime and Fertilizer

Mixing acid and alkaline chemicals produces unpleasant reactions e.g. bi-carbonate of soda and fizzy drinks or urine in a toilet with bleach in it - you will have noticed there is an unpleasant reaction. Just the same, if you mix your lime and fertilizer. They will at best cancel each other out in an undesirable reaction in the soil. So **never lime in the same year as you fertilize**.

Different Soils

Clay soils tend to become acid more quickly than sandy soils and the amount of organic matter has an effect as well. *Clay soils can also be slow to react to the addition of lime.*

Types of Lime

Agricultural Lime or Garden Lime

Agricultural Lime or Garden Lime is made from pulverized limestone or chalk. As well as raising the pH it will provide calcium for the crops and trace nutrients. Some recent experiments are indicating our soils may well benefit from the addition of rock dust, adding trace nutrients to the soil.

Dolomite Lime

Dolomite lime is similar to garden lime but contains a higher percentage of magnesium.

Quicklime and Slaked Lime

Quicklime is produced by burning rock limestone in kilns. It is highly caustic and cannot be applied directly to the soil. Quicklime reacts with water to produce slaked, or hydrated, lime, thus quicklime is spread around the land in heaps to absorb rain and form slaked lime, which is then spread on the soil. ***Their use is prohibited by the organic standards and while fast acting, the effect is short lived in comparison to garden lime.***

Recommended Amounts of Lime to Use

Below is a rough guide to how much lime to use to achieve the desired pH level of your growing medium (soil). The amounts needed are also dependant on which predominant soil type you have in your garden or allotment plot. Ideally you should test the pH of the soil before adding lime and then take a second reading in the same locations after the lime has had sufficient time to act (approximately a month or two - depending on the weather and the amount of rainfall after the application).

pH of soil	Sandy Soil Grams/sq Metre	Loamy Soil Grams/sq Metre	Clay Soil Grams/sq Metre
4.5	190	285	400
5.0	155	235	330
5.5	130	190	260
6.0	118	155	215