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NEWS FROM THE WONDERFUL WORLD OF SOIL AND PLANTS

By John Ferguson

Since I love soils I though I would share this with you. The heart of any successful gardening program is getting healthy soil as we have discussed numerous times. The link below connects one to a short 6-minute introduction to the soil food web which is the heart of an organic garden.

From the GMO/Toxin Free USA newsletter (info@gmofreeusa.org):

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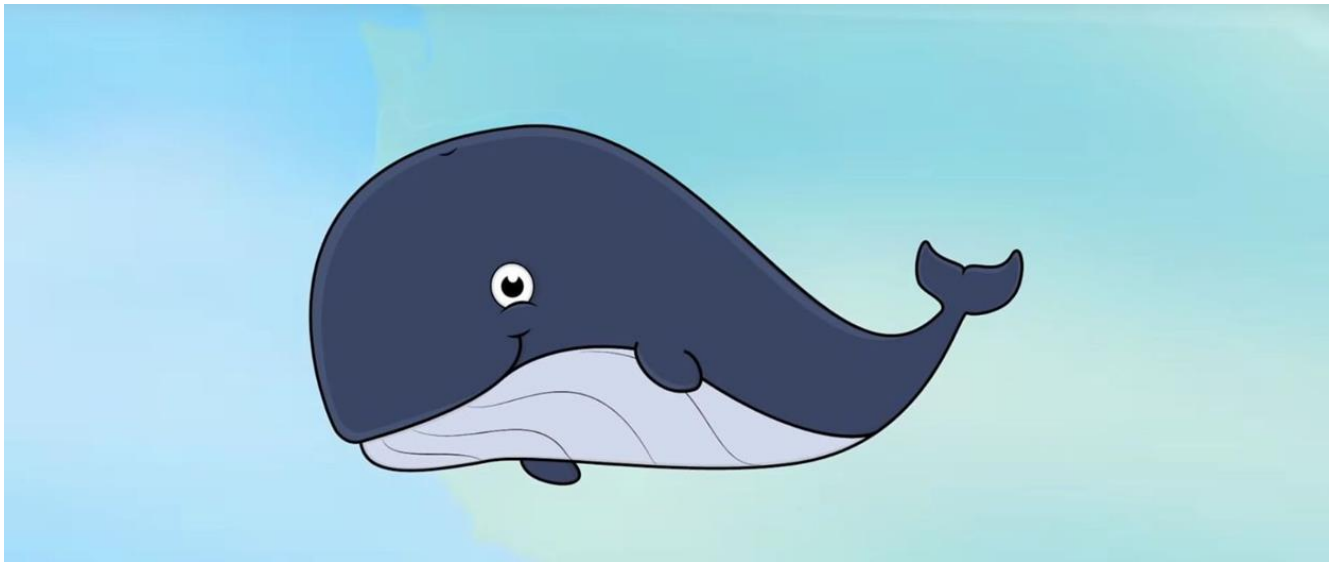
World Soil Day is an international day to celebrate soil. Held annually on December 5th, the day is meant to focus attention on the importance of healthy soil and to advocate for the sustainable management of soil resources.

We cannot celebrate World Soil Day without an understanding of the **Soil Food Web**.

So for this World Soil Day, we bring you an **Introduction to the Soil Food Web**. The information and short videos were created by Dr. Elaine Ingham, one of the world's top soil scientists and healthy soil advocates, and her Soil Food Web School.



What is the biggest living organism in the world? Nope. Not a whale. Find out what it is here: https://toxinfreeusa.org/education/soil-food-web

For those interested Dr. Elaine Ingham will be lecturing at an OHBA educational event on Friday April 14. For those that attend the seminar there will be an additional event on Saturday that will be available IF one attended the lecture on Friday. For additional information see www.ohbaonline.org

In a discussion the other day the subject of Boron (B) came up in two different conversations.

The first was a plant tissue analysis that showed the plant has a calcium deficiency, hence the person had been adding a lot of calcium amendments and the off color of the plant became worse.

The second was a person whom had a routine physical and the test showed a decrease in bone density and the blood test showed a lack on boron.

So how is boron linked and why is it important?

We will start with the second question. From our study of all the elements found in soil last year we know the following:

Boron has beneficial effects on bone and joint strength in humans and is essential to promoting strong healthy bones. It is estimated that 75% of the USA population is boron deficient. In humans, boron has an important role in mineral and hormone metabolism, cell membrane function, and enzyme's function. Boron affects osteoporosis, heart trouble, diabetes, and senility.

Its deficient effects are more marked when vitamin D_3 and magnesium (Mg) are also deficient. Studies have shown that it protects men against deadly prostate cancer (it

selectively kills prostate cancer cells while leaving healthy cells unharmed) as it lowers PSA (Prostate Specific Antigen), elevated PSA has been found to be causative factor in prostate cancer progression.

Boron has been found to fight inflammation and decrease joint swelling as it inhibits lipoxygenase (LOX) an enzyme that triggers the inflammatory cascade to increase inflammatory leukotrienes.

Most conventionally grown foods do not provide enough boron (Life Extension, November 2015 pp. 33-38). I looked at many artificial fertilizers on the internet and only one contained boron which explains the deficiency in our food supply.
An article in Life Extension (April 2018) summarizes studies that found boron also helps prevent lung and cervix cancers. Mice fed a boron deficient diet had 63% reduction in osteoblasts which are the bone making cells. Boron was found to help prevent many forms of cancer from getting started. A lack of boron is associated with osteoporosis, poor memory and concentration, weak muscles, and ageing skin.

A study from Turkey compared women living in areas of Turkey that have boron rich soil to areas that are boron poor. Women living in areas of Turkey that have boron rich soil did not have a single incident of cervical cancer. "Boron interferes with the life cycle of the human papillomavirus (HPV) which is a contributing factor to 95% of all cervical cancers."

A study by The University of Texas at the MD Anderson Cancer Center found increased boron intake was associated with a lower risk of lung cancer in postmenopausal women whom were taking hormone replacement therapy.

Boron regulates the absorption of calcium, and it is used in making estrogen. A lack of boron leads to increased menopause symptoms in women and a lack of testosterone in men.

The November 2021 issue of Life Extension has a nice summary of the benefits of adequate boron.

In the first question above on the plant tissue test, it was not interpreted correctly. There was plenty of calcium in the soil but it was not getting into the plant due to a lack of boron in the soil. Hence, applying more calcium rich amendments made the problem worse.

Boron is characterized as a metalloid which means it has properties between a metal and a non-metal. Many forms of boron minerals or ions are readily absorbable by plants. Boron is an essential element for microbial and plant growth; however, all the functions and relations are not fully understood.

Mycorrhizal plants (90% of all plants) have a greater need for boron than non-mycorrhizal plants. A shortage of boron in the soil is associated with increased insect and fungal damage, and stunting in some plant species while other species seem unaffected. Boron deficiency is often associated with the death of the terminal bud, light green coloring, splintering, or cracking of tubers, root tips swollen and discolored, leaves eventually become brittle and may curl with yellow spotting.

An adequate amount of available boron in the soil is a strong disease fighter since it helps the plants immune system and become more resistant to disease. It is associated

with the prevention of many plant problems; cracked stems in celery, internal cork in apples, black heart in beets and turnips, yellowing of alfalfa leaves, etc.

Other signs of boron deficiency are; tips of growing plant turn inward and dies, buds become light green, roots are brown in center, flowers do not form, leaves are small crinkled deformed with irregular areas of discoloration. Boron deficiency is most likely to occur on sandy soils, soils low in organic matter and in areas of high rainfall or frequent watering.

This element is involved with carbohydrate transportation, it is required for certain physiological processes such as enzyme and co-enzyme systems. Boron influences plant growth in many ways but they not fully understood. It also helps plants use nitrogen efficiently.

Studies have found that it is associated with the translocation of sugars in plants hence closely related to quality and taste of foods. Boron regulates flowering and fruiting, cell division, salt absorption, hormone movement and pollen germination, carbohydrate metabolism, water use, nitrogen assimilation and other aspects of plant growth.

Boron interacts in the uptake of other nutrients by plants (like calcium above) as it influences membrane permeability and cell colloids. This element is associated with energy transformation reactions, carbohydrate transport, blossom retention, and critical for root elongation.

Note: Most artificial fertilizers make the soil too acidic, hence conventional farmers use lime (calcium oxide) to neutralize the acidity. This greatly decreases the nutritional density of our food as too much calcium (lime) will induce boron deficiency in acid soils.

Boron is not found in nature in a pure form as it oxidizes rapidly. Boron is often found in nature as boric oxide (B_2O_3) or borate salts often formed by evaporating seawater or in ocean deposits like greensand.

Sources:

Sedimentary deposits of borate salts, in feldspars and micas, which are common minerals in some clay soils, igneous rock sands like granite and basalt.

Re-mineralizer is a good source as it is a blend of granite, basalt, and greensand.