Nutrient-Dense Crops

What does the term mean?
How do we produce them?

by **Dan Kittredge,** ***The Natural Farmer***, winter 2009

Nutrient Density is the end product of a highly functioning biological system, where the crop harvested has a measurably larger quantity of a broad spectrum of different minerals, vitamins, phytonutrients, and antioxidants than its counterparts. These components are also in healthy ratios with each other.

In relation to their same species counterparts, nutrient-dense crops have relatively

- More complex and intense flavor
- Longer shelf life
- Greater specific gravity, or density
- More tendency to desiccate instead of rot
- More disease and pest resistance in the growth phase
- Greater yield.

How can this apparently ideal list of objectives be accomplished? Is this fanciful "silver bullet" thinking that will fall flat in trials in the field? Why is this not already being done, if it is so possible, and apparently profitable?

The essential premise critical to producing nutrient dense crops is that maximum biological vitality should be the objective of our agricultural endeavors. This means in soil life, in crops, in animals, and in humans. By this we mean full realization of the DNA potential of the species. Essentially all we are working to do is remove the limiting factors to nutrition and production. On this basis the stage is set for nutrient density as the logical outcome.

The question of course is how.

The answer is by understanding the ideal environmental conditions for our crops, and creating them in our fields.

Plants have, essentially, an external digestive system, as opposed to animals, which have internal digestive systems. That external digestive system is still bacteria and fungi, like we animals have in our guts, just different species, and attached to the roots and leaves. Plants evolved with a symbiotic relationship to soil life, and can only achieve their potential when there is a soil life community that is feeding that plant what it wants, when it wants it.

The first step, then, is to feed the soil life that will feed our crops, so they can give the plant everything it needs. Although this may sound simple in principle, a number of parameters must be understood to achieve this. The first challenge is to determine what specific biological communities are symbiotic with the crops we are growing. Then, we need to understand what environmental conditions these biological communities need to thrive. Aeration, hydration, minerals, temperature—not to mention carbon levels—are a few critical factors to determine what biological communities dominate.

In animal and human nutrition, we understand the importance of establishing "healthy" biology in the gut to facilitate health—exactly what is critical to do in soil, if we want crops to thrive and produce the best nutrition for us.

Different soil life communities thrive in different environmental conditions, and plants that have symbiotic relationships with the soil life that is thriving will flourish. If we understand that what are referred to as weeds have different soil life symbiotes, then when we see weeds thriving, it can be easily determined that we have not established the proper soil life communities for our crops.

Besides increasing organic matter levels through cover cropping, composts and manure, one of the most critical steps in this process is mineral balancing. Our crop plants and their biological symbiotes have specific mineral ratio

Nutrient Density

Nutrient Density is a term used more and more these days. There are several ways to use the term, and some are more or less appropriate. Nutritionists use the term to compare different foods, such as blueberries versus watermelon—an example statement is that blueberries have more nutrition per unit volume than watermelon.

The problem with this distinction is that some blueberries have high levels of minerals, vitamins, anti-oxidants, and phytonutrients, and in others they are quite low. These are the basic testable variables that determine the nutritive level of a food, and the variation within individual crops is sometimes greater than the variation between crop species. Environmental (read soil) conditions are the general determining factor in the quality of a harvest, and these are conditions that a farmer or gardener can readily address.

What consumers are looking for is to purchase and feed their family blueberries with those high levels of nutrition, not just to know that some blueberries do. Numerous studies have been done to test the relative nutritional levels of organic versus conventional crops and the like, and while some show higher levels of nutrition in organic crops, many are inconclusive. The soil that a crop was grown in is the major factor determining its quality. Up until now there has been no way for consumers to determine what the quality is of the crops that they are buying. This is where the current excitement around nutrient density comes in.

and level desires to thrive, and if these minerals are not present in the soil, it will be a struggle to bring high quality crops to harvest until they are.

A soil test that shows minerals in biologically available format is usually helpful in this process. This is because it is the biologically available mineral levels and their balance which determines what soil life communities will dominate. Once the minerals needed in the soil are determined, it is necessary to amend the soil in a manner that will convert the usually unavailable rock minerals into a biologically available form. Coating the rock minerals with materials like humates, powdered fish, kelp, sugar or molasses, and adding biological inoculants can greatly facilitate the process of making these minerals available for the soil life and, ultimately, your crops.

This process of coating rock minerals with biological stimulants and inoculants is the most efficient way to get the minerals converted from crystalline to protoplasmic form because it is providing the food that the soil life will need to do the conversion process right on the materials that we want converted. Oftentimes rock minerals will be applied to a soil and available mineral levels will not change noticeably, because they have not been digested by the soil life so as to be available for the crop. This coating process is a nice way to facilitate that process.

Proper mineralization, then, and building soil life communities to support our plants, is the foundation to produce nutrient-dense crops. It must be remembered the objective of our farming ventures isn't to bring crops to market or table, but to make available in these crops all the nutrition our bodies need to thrive. Conventional analysis might say a crop can be brought to harvest through a solution of 12 or 16 minerals. But that neglects the basic fact that our bodies are shown to use up to 84 different minerals, if not more. This is well documented in ***Minerals for the Genetic Code*** by Charles Walters.

Most of these minerals are only used in extremely small quantities in our bodies for things like DNA replication, hormone management, glandular function, and in enzymes. These are not unimportant tasks, and often are the very factors that are causative in many of our chronic diseases.

After basic mineralization of soil, and inoculation of seeds and at transplant, nutrient-dense crop production is essentially a process of monitoring soil conductivity and crop brix, pH and conductivity. Through monitoring these factors, we can see in real time how the crop is doing, where—if anywhere—there are deficiencies or limiting factors beginning to affect the crop, what they are, and then, primarily through nutrient drenches and foliar sprays, mediate these issues before they become problems.

It is only when there are limitations to the function of the plant that diseases break out, or that insects attack. These basic facts are sacrilegious in conventional agriculture, but are well-documented and easily understood when a detailed explanation of the principles is given.

Insects, for instance, have simple digestive systems, and can only digest simple sugars and free amino acids, not complex sugars and complete proteins. Only when a plant is deficient in specific minerals will it have simple sugars and free amino acids in its sap. If a plant can access the minerals it needs, it creates complex sugars and complete proteins that insects are physiologically unable to digest.

Fungal diseases attack plants by puncturing cell walls with their hyphae and, essentially, sucking the protoplasm out of the plant cells. The strength of fungal hyphae is such that—only when cell walls are weak because they don't have the necessary minerals to be built well—are hyphae able to break through. A plant cell wall—when it has access to the minerals it wants—is extremely strong and can easily resist fungal attack.

With plant sap conductivity and pH readings easily taken by handheld tools, we can pro-actively see markers that signify specific deficiencies that predict disease or infestation. Then, if we understand how to mediate these deficiencies, we not only prevent the disease or infestation, but also bring the plant back to a greater level of balance, which corresponds with greater potential to yield.

There are a number of other parameters and factors that—when understood—can augment plant vitality, function and performance, but this basic outline gives a clear picture of the problem. We have been cropping, tilling and, generally disturbing our fields for centuries in some cases, and only when we bring the soil system to a high level of vitality and functionality can we expect to harvest the highest quality crops.

Every year that we harvest crops off of a field, we are basically mining the soil of the minerals that will feed our bodies. If we do not put back in, in some form, all of the minerals that have been removed, and do so to a level where everything that we want in our bodies is in our crops, we are not doing the job of crop production that we can. Consumers are beginning to understand that they can discern—through flavor and refractometers—the quality of the nutrition that they purchase and put into their bodies. We as farmers and gardeners need to understand how we can maximize the quality of the nutrition that we are producing. It is not only the best that we can do, it is also much more profitable and rewarding.

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