# The Vital Earth News

**Agricultural Edition**

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# Science Proves *Organically Grown* Best

**by Paul W. Syltie, Ph.D.**

For decades the mantra of modern food scientists has been that the way a farmer grows a crop has little effect on its nutritional value. This mantra has been loudly touted by the food industry at all levels. Indeed, published research studies in scientific journals seemed to verify this contention despite the fact that logic and common sense heard a hollow ring in those words.

It seems that logic and common sense are beginning to prevail. In recent years a steady trickle of studies has pointed towards superior contents of critical food components in organically grown crops. This is very good news on the heels of a recent study at the University of Texas —Austin by Dr. Donald Davis and coworkers that showed an alarming decline in nutrient values of major food crops in recent years. The study measured changes in 13 nutrients, of which protein, calcium, phosphorus, iron, riboflavin, and ascorbic acid declined from 6 to 38% over the 49 year period from 1950 to 1999.[1]

They concluded, "... the most likely explanation was changes in cultivated varieties used today ... that have greater yield or resistance to pests, or adoptability to different climates. But the dominant effort is for higher yields." In agronomic terms Dr. Davis is describing the "dilution effect", where the increased starch or water content dilutes the other components, especially extremely important micronutrients and vitamins.

***Organically grown kohl rabi is hard to beat, especially when fresh from the garden. Antioxidant levels of organic foods are also significantly superior.***

Studies presented in past issues of *The Vital Earth News* (Summer 1997, Spring 2002, Winter 2003, Summer 2004, and Winter 2005) have revealed the superiority of organically grown produce. New studies into some major and highly important food components — polyphenols and antioxidants — mostly coordinated by the Organic Center in Sandpoint, Idaho, under the direction of Dr. Charles Benbrook, have uncovered significant responses of these components to organic methods.[2]

Antioxidants are a diverse group of natural plant chemicals that are synthesized by plants in response to stress and pest attacks, likely generated to help cope with the trouble. When a biological function is found for such a secondary metabolite it is usually renamed as a vit-

*See Antioxidants Essential, page 2*

# The Glory of the Lowly Dung Beetle

**by Patricia and Dick Richardson**

Healthy soil is an extremely complex civilization of living organisms. We humans often ignore using soil organisms as a tool, because they are so small, so easily out of sight and out of mind. Yet, healthy soil is the cornerstone of diversity and health for both plants and animals.

On pasture and rangeland grazed by livestock, the dung beetle is a soil organism that is visible to humans, beneficial to soil health, and easily monitored. They are valuable as a soil restoration tool to increase organic matter, aerate, remove non-point source pollution, increase water infiltration, and help control pest insects. They work for free and love their work. The only consideration needed is to not use insecticides/parasiticides that poison them.

Our primary study site comprises 2,500 grazed acres (1,000 hectares) on the Davis Ranch in southern Oklahoma. Dung beetles were one of the surprise "tools" that appeared when Walt stopped using insecticides in 1975. About a year later, he began to notice that dung piles (cow pads) were looking "worked" (riddled with holes, spread out) and were disappearing. He also began to see small

*See Dung Beetles Attract, page 6*


# Antioxidants Essential for Health

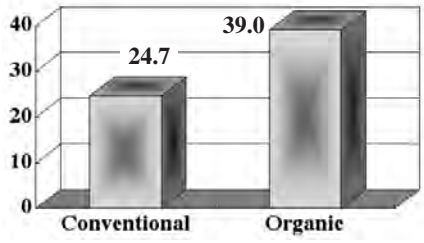
*Continued from page 1*

amin. Antioxidants include *polyphenols, flavonoids, lignans, stilbenes, cyanidins*, and others — and sometimes *glycosides* which contain these as side groups — all of which are highly effective in supplying the electrons needed for neutralizing "free radicals", the dangerous compounds generated in cells by chemicals, cigarette smoke, alcohol, air and water pollutants, and some fats. If left to freely react in the body, these free radicals attack cell membranes, mitochondria, and even the DNA that harbors our genetic code. According to Benbrook, benefits of antioxidants include combatting cancer, diabetes, heart disease, high blood pressure, and other syndromes.[2]

The benefits of organic farming on antioxidant and vitamin levels in some cases have been profound. Benbrook related that "Organic vegetables had 30% to 10-times higher levels of flavonoids compared to conventionally grown produce in a study carried out in Japan. The team also demonstrated that the organic vegetables had heightened antimutagenic activity — an important step toward proving that consumption of organic food can lead to health benefits."[2]

Of the studies comparing organic and conventional farming practices across the world, antioxidants are highly favored by organic practices. In western Switzerland, eight grape varieties showed a 32% increase in resveratrol, an antioxidant, versus the controls. In Italy, organic practices increased the vitamin

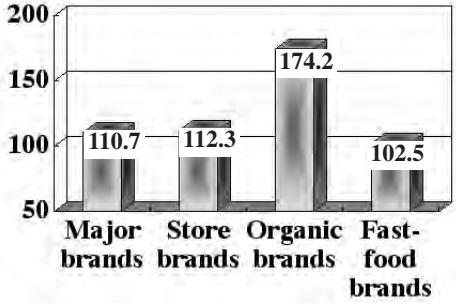
**Total Phenolics in Corn[3]**




C content of oranges by 12%, while nitrogen levels were 12 to 30% lower, depending on the variety.[4] Lower nitrogen reduces the formation of cancer-causing nitrosamines in the intestines.

A recent study reported in the *Journal of Agriculture and Food Chemistry*[5] revealed that organic catsup brands, using organically grown tomatoes, had 57% more trans-lycopene (a potent antioxidant) than did national catsup brands. The organic brands had a much deeper red color than did the others, indicating a higher lycopene content.

**Lycopene in Catsup[5]**




The study by Benbrook[2] concluded that "Organic farming has elevated antioxidant levels in about 85% of the cases studied to date and, on average, levels are about 30% higher compared to food grown conventionally." This change in such life-saving food components is a phenomenal testimony to the great value of organic farming practices. Food crops are raised for people's health and vitality, so it should be obvious that farmers ought to raise these crops using practices designed to achieve the highest possible nutritional value.

**"... levels [of antioxidants in organically grown food] are about 30% higher compared to food grown conventionally."**

It is interesting that in the late 1940s and early 1950s the per capita use of tobacco peaked; it has dropped ever since. Yet, the incidence of lung cancer today is *double* what it was 55 years ago.[6] The Japanese lead the industrialized world in cigarette consumption, yet have the lowest rate of lung cancer and cancer in general. How can this be? The Japanese diet is 10 to 20 times higher in folic acid (and many other important nutrients) than the standard American diet. In the same 55 years that the American lung cancer rate has skyrocketed, the per capita consumption of fresh fruits and vegetables — the only good source of folic acid — has declined 400%[6]. Research has shown that only 10 mg per day of folic acid will heal the lung lesions of two-pack-per-day smokers, even as they continue smoking[6].

It behooves American — and all people — to be sure they eat plenty of fresh fruits and vegetables to stay healthy. Moreover, it behooves them to eat foods produced organically, for then they can be assured of getting the maximum level of antioxidants and other nutritional goodies for staying abundantly healthy.

Farmers and gardeners also ought to consider the benefits of converting to organic and natural methods. Not only are these methods practical and economical, but they grant the satisfaction that the best possible food to foster health is being produced. ❐

**Foods Containing the Highest and Lowest Antioxidant Levels[2]**

| Food | ORAC units per calorie* |
|---|---|
| Blueberry, wild | 247 |
| Artichoke, cooked | 186 |
| Plum, black | 161 |
| Asparagus, raw | 150 |
| Broccoli, raw | 126 |
| Strawberry | 111 |
| Blueberry, cultivated | 108 |
| Cabbage, red, cooked | 107 |
| Lettuce, red leaf | 102 |
| Cucumber, with peel | 6 |
| Oats, quick | 5 |
| Corn, canned | 5 |
| Watermelon | 4 |
| Life cereal | 4 |
| Lima bean, canned | 1 |

*ORAC=Radical Absorbance Capacity

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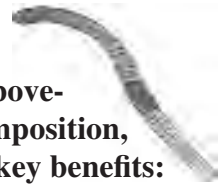
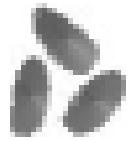
# The Most Important Advance ...



**The most important advance in the last 25 years is recognition that soil biodiversity is greater than the above-ground diversity, that soil species help regulate nutrient cycling, decomposition, carbon flux, and the hydrologic cycle on a global scale and provide us with key benefits: soil fertility, stabilization, aeration, and decay of dead matter. Given that global changes, including land-use change, will occur rapidly in the next 25 years, we have an urgent task ahead of us. We need to unravel how the species in soils interact to provide fertile and productive soils for our food supply and for the ecosystem processes that we depend on. ❐**



Diana H. Wall, Director, Natural Resource Ecology Laboratory, Colorado State University [*Discover*, April 2005]

# 76 Ways Sugar Can Ruin Your Health

**by Nancy Appleton, Ph.D**

*[Author of the book* Lick The Sugar Habit*; for references, see mercola.com.]*

In addition to throwing off the body's homeostasis, excess sugar may result in a number of other significant consequences. The following is a listing of some of sugar's metabolic consequences from a variety of medical journals and other scientific publications.

**1.** Sugar can suppress your immune system and impair your infection defenses.

**2.** Sugar upsets the mineral relationships in your body: causes chromium and copper deficiencies and interferes with absorption of calcium and magnesium.

**3.** Sugar can cause a rapid rise of adrenaline, hyperactivity, anxiety, difficulty concentrating, and crankiness.

**4.** Sugar can produce a significant rise in total cholesterol, triglycerides, and LDLP and a decrease in HDLP.

**5.** Sugar causes a loss of tissue elasticity and function.

**6.** Sugar feeds cancer cells and has been connected with the development of cancer of the breast, ovaries, prostate, rectum, pancreas, biliary tract, lung, gallbladder, and stomach.

**7.** Sugar can increase fasting levels of glucose and can cause hypoglycemia.

**8.** Sugar can weaken eyesight.

**9.** Sugar can cause many problems with the gastrointestinal tract including an acidic digestive tract, indigestion, malabsorption in patients with functional bowel disease, increased risk of Crohn's disease, and ulcerative colitis.

**10.** Sugar can cause premature aging.

**11.** Sugar can lead to alcoholism.

**12.** Sugar can cause your saliva to become acidic, and cause tooth decay, and periodontal disease.

**13.** Sugar contributes to obesity.

**14.** Sugar can cause autoimmune diseases such as arthritis, asthma, MS.

**15.** Sugar greatly assists the uncontrolled growth of Candida Albicans (yeast).

**16.** Sugar can cause gallstones.

**17.** Sugar can cause appendicitis.

**18.** Sugar can cause hemorrhoids.

**19.** Sugar can cause varicose veins.

**20.** Sugar can elevate glucose and insulin responses in oral contraceptive users.

**21.** Sugar can contribute to osteoporosis.

**22.** Sugar can cause a decrease in your insulin sensitivity, thereby causing abnormally high insulin levels and diabetes.

**23.** Sugar can lower Vitamin E levels.

**24.** Sugar can increase your systolic blood pressure.

**25.** Sugar can cause drowsiness and decreased activity in children.

**26.** High sugar intake increases advanced glycation end products (AGEs, sugar molecules attaching to and thereby damaging proteins in the body).

**27.** Sugar can interfere with your absorption of protein.

**28.** Sugar causes food allergies.

**29.** Sugar can cause toxemia during pregnancy.

**30.** Sugar can contribute to eczema.

**31.** Sugar can cause atherosclerosis and cardiovascular disease.

**32.** Sugar can impair the structure of your DNA.

**33.** Sugar can change the structure of protein and cause a permanent alteration of the way the proteins act in your body.

**34.** Sugar can make your skin age by changing the structure of collagen.

**35.** Sugar can cause cataracts and myopia.

**36.** Sugar can cause emphysema.

**37.** High sugar intake can impair the physiological homeostasis of many systems in your body.

**38.** Sugar lowers the ability of enzymes to function.

**39.** Sugar intake is higher in people with Parkinson's disease.

**40.** Sugar can increase the size of your liver by making your liver cells divide, and it can increase the amount of liver fat.

**41.** Sugar can increase kidney size and produce pathological changes in the kidney such as the formation of stones.

**42.** Sugar can damage your pancreas.

**43.** Sugar can increase your body's fluid retention.

**44.** Sugar is enemy #1 of your bowel movement.

**45.** Sugar can compromise the lining of your capillaries.

**46.** Sugar can make brittle tendons.

**47.** Sugar can cause headaches, including migraines.

**48.** Sugar can reduce the learning capacity, adversely affect school children's grades, and cause learning disorders.

**49.** Sugar can cause an increase in delta, alpha, and theta brain waves which can alter your mind's ability to think clearly.

*See Evils of Sugar, page 7*

# 15-Minute Soils Course

## Lesson 21:

# What It Takes to Grow a Crop

We will divert from a strictly soil-oriented course to one that emphasizes the plant ... namely, what comprises the plant. Keep in mind that the elements which comprise the plant must come from the soil or from the air or water.

### Let's Look At Corn

A 150-bushel per acre corn crop contains a vast array of carbohydrates, proteins, lipids, and other constituents which in turn are comprised of elements. In addition, water and air are needed to carry the crop through its full vegetative and reproduction cycle. The amounts of these requirements are in the bottom left table (adapted form *The Fertilizer Handbook,* The Fertilizer Institute, Washington, D.C., 1972).

Notice the great amounts of inputs needed to produce this 150 bu/acre corn crop. About 900,000 gallons of water are needed per acre to provide for the plants' needs, and over 14 tons of $CO_2$ per acre, plus 5 tons of oxygen. These "free" nutrients, provided from the air and rainfall (or irrigation), greatly exceed the nitrogen and mineral requirements. Yet, all nutrients combined are essential for growth of the plants.

***Nutrients Needed to Grow a Crop, in Pounds Per Acre***

| Crop | Yield | N | P | K | Ca | Mg | S | Cu | Mn | Fe |
|---|---|---|---|---|---|---|---|---|---|---|
| **Alfalfa** | 4 tons | 180 | 17 | 149 | 112 | 21 | 19 | 0.06 | 0.44 | 0.42 |
| **Apples (fruit)** | 500 bu | 30 | 4 | 37 | 8 | 5 | 10 | 0.03 | 0.03 | 0.03 |
| **Bermudagrass** | 8 tons | 300 | 31 | 224 | 59 | 24 | 35 | 0.21 | n.d. | n.d. |
| **Cabbage** | 20tons | 130 | 15 | 108 | 20 | 8 | 44 | 0.04 | 0.10 | 0.08 |
| **Potatoes (tubers)** | 400 bu | 80 | 13 | 125 | 3 | 6 | 6 | 0.04 | 0.09 | 0.05 |
| **Soybeans (grain)** | 40 bu | 150 | 15 | 46 | 7 | 7 | 4 | 0.04 | 0.05 | 0.04 |
| **Spinach** | 5 tons | 120 | 17 | 133 | 7 | 11 | 14 | 0.07 | 0.13 | 0.15 |
| **Tomatoes (fruit)** | 20 tons | 120 | 17 | 133 | 7 | 11 | 14 | 0.07 | 0.13 | 0.15 |
| **Wheat (grain+straw)** | 40 bu | 70 | 13 | 42 | 7 | 9 | 8 | 0.04 | 0.25 | 0.19 |

***Nutrients for a 150 bu/acre Corn Crop***

| Substance | Pounds/acre | Comments |
|---|---|---|
| **Water ($H_2O$)** | 6,450,000 to 8,250,000 | 29 to 36 inches of rain |
| **Oxygen ($O_2$)** | 10,200 | Air is 19% oxygen |
| **Carbon (C)** | 7,800 carbon (28,500 $CO_{2)}$ | The amount of carbon in 6 tons of coal. |
| **Nitrogen (N)** | 310 | Organic matter, fertilizer |
| **Phosphorus (P)** | 52 | Organic matter, minerals, and fertilizer |
| **Potassium (K)** | 205 | Minerals and fertilizer |
| **Calcium (Ca)** | 58 | 150 lb of agricultural lime |
| **Sulfur (S)** | 33 | 33 lb of elemental S |
| **Magnesium (Mg)** | 50 | 275 lb of $MgCO_3$ (dolomite) |
| **Iron (Fe)** | 3 | About 15 lb of $FeSO_4$ |
| **Manganese (Mn)** | 0.45 | About 1.3 lb of $MnSO_4$ |
| **Boron (B)** | 0.10 | About 1.0 lb of borax |
| **Zinc (Zn)** | trace | A small amount of $ZnSO_4$ |
| **Copper (Cu)** | trace | A small amount of $CuSO_4$ |
| **Molybdenum (Mo)** | trace | A trace of molybdate |

Other crops require different amounts of these essential nutrients. Notice the table above that gives a comparison of these amounts for different crops. A crop of apples needs only 30 lb/acre of N, while bermudagrass requires 10 times that much. Likewise, potatoes need but 3 lb/acre of Ca while alfalfa needs 112 lb/acre. Plants vary widely in their nutrient requirements, and their compositions relate directly to their value as food and feed.

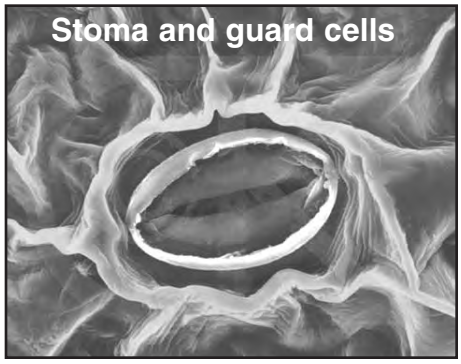
### The Work of Plants and Soils

To deliver the carbon, minerals, and nitrogen that plants require takes a coordinated effort of the leaves and the root-soil interface ... the "rhizosphere". Leaves contain *stomata*, mostly on the undersides of the leaves, which are opened or closed by *guard cells.* When these cells, at the openings of the stomata, are filled with water (as in the morning) they open and allow air to exchange between the outside

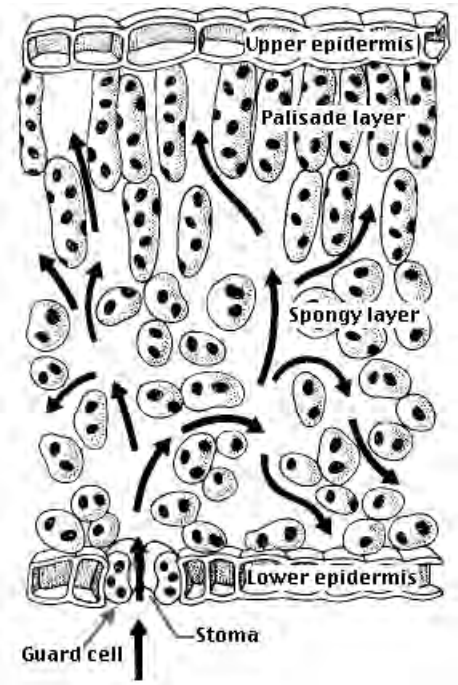
*Continued on the next page*

# 15-Minute Soils Course

air and the interior of the leaves. (See the figure at the bottom.) In doing so, $CO_2$ enters with the air and can become incorporated into cellular reactions that, together with sunlight energy, oxygen in the air, and water from the roots, generate carbohydrates, and from these initial carbon compounds the proteins and lipids needed for growth and structure are formed.




Meanwhile, below-ground the roots are busy imbibing water, and transporting that with dissolved minerals in xylem vessels through the stem and to the leaves. A solution stream rich in carbohydrates — moving in phloem vessels — moves from the leaves down through the stem and into the root system to provide energy for root growth, and for myriads of microbes along the root surfaces. Up to 40%, or even more, of the total energy moved from the leaves to the roots is exuded through root cells into the soil to make nutrients available, and especially to grow the symbiotic mycorrhizae that proliferate out from the roots. These fungi take up the entire array of essential nutrients — especially the immobile P, Cu, Zn, Fe, and Mn — and move them to the roots.




Water, and plenty of it, is absolutely essential for this entire system to operate effectively. A million gallons of water per acre is not too much for many crops, to carry nutrients from the roots to the leaves, to facilitate leaf reactions, and to cool the leaves during evaporation. A 16,000 lb/acre bermudagrass yield produces great amounts of sugars, protein, cellulose, lignin, and other essential nutrients for grazing cattle, horses, or sheep. The 310 lb of nitrogen needed for a 150 bu/acre corn crop must come from decaying organic matter, nitrogen-fixing organisms, or fertilizers like urea, ammonium nitrate, or ammonia solutions.

The mechanisms by which plants obtain their essential nutrients are profoundly complex. Only a brief summary of these processes has been given here; previous lessons give more details. It is imperative that farmers in today's competitive world minimize off-farm inputs by encouraging natural soil mechanisms to release native elements and generate free nitrogen. Reducing soil nutrient and organic matter loss by erosion control and minimizing tillage can assist plants in reaping needed nutrients at a minimum cost without "mining" our soils.

### See How Much You Learned

1. A 150 bu/acre corn crop needs around a million gallons of water. T or F
2. Up to _____% or more of a plant's total energy stores are secreted into the rhizospere to feed microbes, making nutrients available.
3. Mycorrhizae are extremely important in taking up which of the following elements?
a. Phosphorus; b. Iron; c. Copper; d. Carbon
4. Farmers should use management practices that encourage plants to use free _____.
5. Plants vary a lot in their nutrient requirements. T or F
6. The _____ on leaf undersides allow gases to move into and out of the leaf interiors.
7. Which of the following contain more than 100 lb/acre of nitrogen in the crop annually?
a. Corn; b. Alfalfa; c. Bermudagrass; d. Apples

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Answers: 1. T. 2. 40%. 3. a, b, c. 4. nitrogen. 5. T. 6. stomata. 7. a, b, c.

# Dung Beetles Increase Infiltration!

*Continued from page 1*

brown beetles flying to and from cow pads, particularly at dawn and dusk. They were identified as *Onthophagus gazella*, a tropical species of dung beetle introduced by the U. S. Department of Agriculture in the mid-1970's for bio-control of face and horn flies.

***A dung beetles works feverishly to move a dung-ball to its burrow.***

Over the years, the Davis ranch dung beetle population (currently five identified species) has grown to such numbers, that when rainfall is normal and stock density is at peak levels, Walt estimates that where the herd is, the beetles bury a ton of wet manure per acre per day (2 metric tons/ha), and remove 90% of the surface material.... Dung beetles sequester and bury manure to use as both incubator and food source for their young. The adults feed by removing nutrient laden liquids from fresh dung. Walt has dug as deep as 18 inches in his pastures and still found no end to their tunnels (sandy clay loam soil). In drought times they desiccate cow pads, but do not bury as much as in favorable rainfall times.

In 1998 at the Davis ranch there was a late freeze (April 17-18) which reduced *O. gazella* numbers, followed by a long, dry, hot spell lasting through summer. We spent a week at the ranch in July in above 100°F temperatures (> 40°C) studying dung beetle activity. One evening at dark, from an average cow pad, I counted 206 dung beetles exiting in 6 minutes. I could hear the activity in that cow pad (lots of snaps, crackles, pops). Cow pads were being spread out and desiccated within 48 hours, but dry manure was still mixed with undigested plant material. In contrast, we have watched a horse pile, plopped on a south Texas ranch during a lush spring, disappear underground in 24 hours, leaving only a soft fluffy layer of undigested plant material. John Feehan of Australia has counted as many as 1000 dung beetles in a cow pad, effecting complete burial in several hours (personal communication)....

**"... water infiltration rates where a cow pad has been buried ... [gives] on average a 129% increase in [soil] infiltration rate ...."**

*O. gazella* is the work horse so far at the Davis ranch, but the ranch is near the northern limit of its range. Multiple species of dung beetles are important for more uniform distribution and burial of dung (directly below the pad at different depths and rolled away), and also to have dependable activity throughout each 24 hour period (day and night fliers) and over more of the year (warm and cold tolerant).

We have compared water infiltration rates where a cow pad has been buried by dung beetles vs. no cow pad on a variety of pasture and soil conditions. We find on average a 129% increase in infiltration rate over control. An extra inch (25 mm) of rainfall absorbed per acre means the addition of 27,225 gallons/acre (254,530 l/ha) of water in the soil, reducing the detrimental effects of either drought or flood years.

***Dozens of dung beetles work upon a dung patty to bury the fertile organics.***

In 1975, Walt could find no earthworms in his pasture soils. Over the next decade, in areas where he observed concentrated dung beetle activity, he also began to see earthworm castings. At a 1996 field day at the ranch, he dug large core soil samples from a number of these pastures and counted 12 to 30 earthworms per cubic foot. Today, at several sites on the ranch, harvester ants have built their mounds out of earthworm castings. We think of this reuse as an elegant sign of rangeland health.❐

# Understanding the C:N Ratio

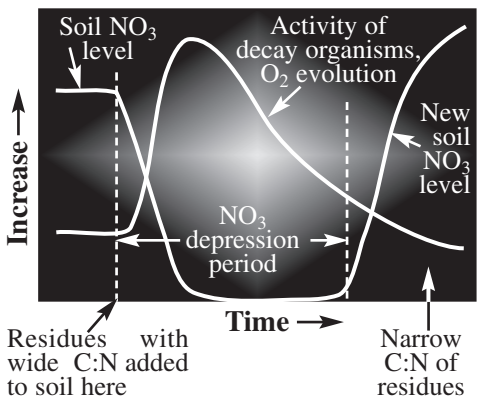
**by Paul W. Syltie, Ph.D.**

One of the most important concepts of soil to understand is the ***Carbon-Nitrogen Ratio***. This rather simple ratio compares the total carbon content of the soil to the total nitrogen content ... as determined by chemical analyses. Then, the nitrogen content is divided into the carbon content to give a ratio, with nitrogen being 1.

This ratio varies considerably:

**Soils: 8:1 to 15:1** (higher in humid and cool regions)

**Plant material: 20 to 30:1** (legumes and manure) **to 90:1 or highe**r (straw, wood)




**Microbes: 4:1 to 9:1** (higher in bacteria than fungi)

The C:N is important in many ways, but especially because competition for nitrogen results when residues having a high C:N are added to the soil. Soil microbes "eat at the first table"; they are more competitive than are roots for available nitrogen. Thus, the residue must first be decomposed by microbes before nitrogen is released to roots. Give time for residues to break down before planting, or add supplemental nitrogen to avoid a deficiency. ❐

# Soybean Rust Is Here!

**by Paul W. Syltie, Ph.D.**

*Phakopsora pachyrhizi* and *Phakopsora meibomia*e, soybean rust species, have been found in several locations in the southern U.S., and have the potential to spread throughout many parts of the nation this year. Affected plants are quickly defoliated, resulting in reduced yields and seed quality. Soybean rust has devastated soybean crops in many parts of the world, with reported yield losses as high as 80 percent in some afflicted areas of Africa and South America.


Rust on a soybean leaf

Soybean rust is spread primarily by windborne spores that can be transported over long distances. Clouds of spores are released if infected plants are disturbed by wind or by individuals walking through rust-infested areas.

The pathogen can infect and reproduce on 90 known plant species, including kudzu. The extent of the fungi's impact on the 2005 cop is yet to be determined, but could be substantial. Fungicides, resistant varieties, and alternative crops are options to deal with the disease. ❐

**WHAT I WANT TO BE ...**

***This I would like to be: braver and bolder,***
***Just a bit wiser because I am older,***
***Just a bit kindlier to those I meet,***
***Just a bit tougher in taking defeat.***

***This I would like to be: just a bit finer,***
***More of a smiler and less of a whiner,***
***Just a bit quicker to stretch out my hand,***
***Helping another who's struggling to stand.***

***This I would like to be: just a bit truer,***
***Less of a wisher and more of a doer,***
***Broader and bigger, more willing to give,***
***Living and helping my neighbor to live.***

*Leadership*, July 9, 1991.

# Evils of Sugar

*Continued from page 3*

**50.** Sugar can cause depression.
**51.** Sugar can increase your risk of gout.
**52.** Sugar can increase your risk of Alzheimer's disease.
**53.** Sugar can cause hormonal imbalances such as: increasing estrogen in men, exacerbating PMS, and decreasing HGH.
**54.** Sugar can lead to dizziness.
**55.** Diets high in sugar will increase free radicals and oxidative stress.
**56.** High sucrose diets of subjects with peripheral vascular disease significantly increase platelet adhesion.
**57.** High sugar consumption of pregnant adolescents can lead to substantial decrease in gestation duration, and leads to a twofold increased risk for delivering a small-for-gestational-age (SGA) infant.
**58.** Sugar is an addictive substance.
**59.** Sugar can be intoxicating like alcohol.
**60.** Sugar given to premature babies can affect the amount of carbon dioxide they produce.
**61.** Decrease in sugar intake can increase emotional stability.
**62.** Your body changes sugar into two to five times more fat in the bloodstream than it does starch.
**63.** The rapid absorption of sugar promotes excessive food intake in obese subjects.
**64.** Sugar can worsen the symptoms of children with attention deficit hyperactivity disorder (ADHD).
**65.** Sugar adversely affects urinary electrolyte composition.
**66.** Sugar can slow down the ability of your adrenal glands to function.
**67.** Sugar has the potential of inducing abnormal metabolic processes in a normal healthy individual, and of promoting chronic degenerative diseases.
**68.** I.V.s (intravenous feedings) of sugar water can cut off oxygen to your brain.
**69.** Sugar increases your risk of polio.
**70.** High sugar intake can cause epileptic seizures.
**71.** Sugar causes high blood pressure in obese people.
**72.** In intensive care units, limiting sugar saves lives.
**73.** Sugar may induce cell death.
**74.** In juvenile rehabilitation camps, when children were put on a low sugar diet, antisocial behavior dropped 44 percent.
**75.** Sugar dehydrates newborns.
**76.** Sugar can cause gum disease. ❐

## Statement of Purpose

Vital Earth Resources is a for-profit private corporation dedicated to the development, production, and sale of top-quality, ecologically sound horticultural and agricultural products. *The Vital Earth News* is a periodic publication of Vital Earth Resources to inform customers and other interested parties about our products and programs, and to educate our readership on critical issues facing growers today and in the future. If you would like to receive future issues of this newsletter or product information, simply fill out the form on the right and mail it to us.

***Yes!* Send me a subscription to *The Vital Earth News* and/or product information!**

- ❑ *The Vital Earth News Agricultural Edition* (two issues per year)
- ❑ Carl Pool water soluble fertilizers
- ❑ Potting soils, mulches, and compost
- ❑ Vitazyme, Aqua-Min, and Odor-X
- ❑ I am an ( ) individual, ( ) retailer, ( ) grower.

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**Vitazyme has consistently improved potato production and profits in trials across the U.S. In Maine and Colorado in 2004, income was increased by up to $735/acre, and the tubers were more uniform, with greater numbers in the more valuable mid-size categories.**


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