

Factory Farming: Do We Really Want It? Is It Even Necessary Despite Today's Technology?

by Paul W. Syltie, Ph.D.

Moving to South Dakota from eastern Texas has greatly helped refocus my mind to the major problems and prospects of modern American agriculture. Living on the rich prairie Chernozem soils amongst endless corn, soybean, and wheat fields, and watching the big green and red tractors and implements working this highly productive ground—and also having met many of the farmers in the area—gives me a renewed attachment to this “fairer portion of the earth” which America has inherited, due to no worthiness of our own.

The issue of “inheritance” is a monumental one. It necessarily implies responsibility to carefully care for what one has been given, which certainly includes the soil upon which we grow the food, feed, and fiber that supports our nation. Soil, that most critical of all natural resources, is the most cherished inheritance of any people, and really fer-

tile, well-watered soil is an awesome gift on top of that inheritance.

This brings me to the major point of this short article: factory farming, do we really want it? That question may seem illogical in the midst of a very mature Industrial Revolution, where factories, mass production, mega-corporations, and the petrochemicals that fuel them are now essentially dictating the lives and methods of American farmers. The machines that man has made are now ruling man! The Amish must be exempted here, since they shun the use of tractors and electricity¹.

First of all we must ask the question, what do farmers and people in general want in life? People today, as in ages past, hope to live in comfort, relatively free of pain and upset, having peace and prosperity, food a-plenty and, in most cases, a home with an acreage to raise a family. These are not inordinate desires. They are reasonable, and actually built into mankind by their

Creator, who wants the best for all of us.

Wendell Berry in his book published in 1977, *The Unsettling of America*², went on to describe farmers as largely victims of the forces around them.

“That one American farmer can now



The Amish shun the use of tractors and electricity in order to maintain control of their culture, rooted in closely held historical values.

feed himself and 56 other people [in 1977] may be, within the narrow view of the specialists, a triumph of economics and technology; by no stretch of reason

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The Four Major Threats With Industrialized Agriculture

by Fred Kirschenmann, Ph.D.

[Fred Kirschenmann is a pioneer organic farmer from North Dakota who is Distinguished Fellow for the Leopold Center for Sustainable Agriculture at Iowa State University in Ames, Iowa.]

1. Energy Constraints

The question to challenge policy makers today is this: “What kind of system will we need when crude costs \$300 per barrel?” Since our current industrial agriculture model is based upon cheap energy, this is his number one concern. Fertilizers, pesti-

cides, equipment manufacturing and operation, all rely upon cheap fossil fuels. When the cost of fossil fuels goes



The rising price of oil will drastically affect the means of food production.

up, farming costs skyrocket. In Iowa, anhydrous ammonia went from \$200 per ton to more than \$1,000 per ton almost overnight when energy prices peaked in 2008. Farmers cannot operate profitably under such high input cost conditions. The Leopold Center expects crude oil to cost \$200 per barrel in 4 to 5 years and \$400 in 5 to 10 years.

Increases in energy costs are also a factor in local food production. This is a complex issue since a small farmer driving his produce fifty miles to his nearest farmer's market can use relatively

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Industry and Biology Not Compatible

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can it be considered a triumph of agriculture or culture. It has been made possible by the substitution of energy for knowledge, of methodology for care, of technology for morality. This ‘accomplishment’ is not primarily the work of farm-



The advent of modern agriculture and its penchant for bigness has improved output greatly, but has not increased contentment of the farmers.

ers ... but of a collaboration of corporations, university specialists, and government agencies. It is therefore an agricultural development not motivated by agricultural aims or disciplines, but by the ambition of merchants, industrialists, bureaucrats, and academics careerists. We should not be surprised to find that its effect on both the farmland and the farm people has been ruinous³.”

Wendell Berry goes on to make clear that the care of the earth is our most ancient, worthy, and pleasing responsibility, and to care for what remains of it, and to foster its renewal, is our “only legitimate hope”⁴. Mankind indeed was given the mandate to “subdue and have dominion over” the earth⁵, which means not to pummel and destroy it, but to serve the created environment that sustains him, and to make it highly productive through creativity and sweat.

Industry Thrust Upon Biology

Throughout the centuries mankind has always remained just a step ahead of famine. Foods in general are perishable, and must be grown each season to replenish dwindling stocks as people live and eat. Many societies survived by hunting wild game and gathering berries and wild

plants—the American Indians, for example—while others nurtured domesticated animals and cultivated crops. All of the major world empires—Babylon, Assyria, Persia, Rome, Greece, and so on—pursued the latter course, since it fit naturally with strong centralized government which exercised controls and taxation upon the population. It also enabled the development of major urban centers that depended upon the production of food nearby which was transported and sold within nearby cities.

There is nothing new under the sun, as King Solomon said⁶, and here in the 21st Century our civilization is repeating the quests of past empires ... only this time our farming techniques have been powered by the fruits of the Industrial Revolution. This revolution is unprecedented in its scope and its brutality to the natural world, where unthinking machines have been pitted against fragile prairie and forest ecosystems. The soils of these once-stable environments were first plundered by mouldboard plows, then beaten and compacted by heavy tractors and tillage equipment, and often-times left unprotected for pounding rains to wash away tons of topsoil into streams ... or for winds to rip away the topsoil of whole counties as during the Dust Bowl days of the 1930s. Soil structure, so critical for the intake of soil water rains, has been seriously compacted by machine traffic and the use of pes-

have hastened the degradation of physical, chemical, and biological properties⁷. Industrial, non-organic practices cannot for long be imposed upon biological systems; the two are incompatible. As the ancient adage says, “You can chase nature out with a pitchfork, but she will keep coming back”⁸.

Enter Modern Economics

Modern economic theory teaches that profit is king, and to maximize it short-term is morally acceptable. Forget greed, for in the world of profit maximization greed has no moral stigma. Yet, seeking after the windfall today while neglecting tomorrow’s return has consequences. For farmers and most others in a competitive business environment, survival depends on this year’s profits. Without them most everything else seems irrelevant. This motivation leads farmers to push soils to the limit, and to add those extra pounds of nitrogen fertilizer and herbicide to insure maximum yields, and often-times adding restless nights and stress. After all, most farmers have considerable debt; one bad year and the game is over.

Yet, with input costs—fertilizer, pesticides, seed, machinery, fuel, rent, taxes, and labor—expensive and getting more so, the advice for survivors of the competitive economic farm model is to get bigger and more efficient. There seems to be no limit to this mantra, one that the huge grain farms of the Bonanza days in the Red River Valley of the North exploited to the full ... that is, until sanity of farm scale returned to the high-minded owners of these 100,000-acre spreads⁹.

The Safety Factor

Of all occupations in the United States today, farming is one of the most dangerous¹⁰. Tractor rollovers, livestock altercations, cancer from toxic chemicals, and other dangers make farming especially hazardous. Long days and nights on the tractor during planting and harvest can dull the senses and lead to accidents and sickness, and worry over the weather hindering crop yields can further bring on illness.

One cannot claim that farming has

Industrial, non-organic practices cannot for long be imposed upon biological systems; the two are incompatible. As the ancient adage says, “You can chase nature out with a pitchfork, but she will keep coming back.”

ticides and fertilizers, which slow the action of structure-building organisms.

The chemical industry has synthesized herbicides, insecticides, and other -cides which kill weeds and pests, replace labor, and taint the food supply. Commercial fertilizers, also based largely on petrochemicals—in particular nitrogen—have replaced barnyard manure and legumes in providing essential crop nutrients. The constant stress upon soils by these assaults of the Industrial Revolution

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Kirschenmann, the Farmer-Philosopher

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more energy than a full semi-truck of produce driving half-way across this country.

2. Water Availability

We have been drawing down our water supplies at an unsustainable rate. We have aggravated the water availability problem by ignoring soil health using industrialized systems. There are four main areas on the planet which are growing grain using rainfed agriculture. They are the central U.S., Brazil, Argentina, and edges of China. Often, the population density matches these same rainfed agricultural regions; see the figures on the right.

The two main population centers, China and India, are drawing down their water quickly. China, which relies upon irrigation for 80 percent of its grain production, draws its aquifers down about ten feet per year and is drawing at depths of 1,000 feet in some places. India depends upon irrigation for 60 percent of its grain production, and is drawing down aquifers at twenty feet per year to depths of 2,000 feet some places.

According to Kirschenmann, in the U.S., where 20 percent of our grain production is dependent upon irrigation, we have depleted our Ogallala aquifer by one-half since 1960. We are drawing it down at a rate 1.3 trillion gallons faster than it can be replaced. His water challenge is to use half as much water as we do now and refocus on soil health so we farm in healthy, water-retaining soils.

3. Climate Change

The latest thinking is that changes in climate probably won't be gradual. Local eating will not solve extreme weather effects upon agricultural production. To learn more, he encourages us to read the book, *The End of the Long Summer: Why We Must Remake Our Civilization to Survive on a Volatile Earth* by Dianne Dumanoski.

4. Ecological Degradation

Under this category is concern about

the destruction of biodiversity, especially of previously healthy soils. The Rodale Institute tested water retention of soils according to content of organic matter and mulch, and found that healthy soils containing organic matter retain much greater volumes of water. According to the Rodale Institute, soil containing 1% organic matter absorbs 33 pounds of water, while 5% organic matter soil retains 135 pounds of water. He compared this to the irony of Monsanto wanting drought resistant seeds when the answer is in the soil quality, which same soil has been destroyed through the system embraced by Monsanto. Kirschenmann referenced *Dirt! The Movie* for learning more about soil.

Due to industrial agriculture systems, we have lost 75% of crop diversity over one-hundred years, and we've lost 33% of our animal species. To learn more, Kirschenmann recommends the book, *Where Our Food Comes From: Retracing Nikolay Vavilov's Quest to End Famine* by Gary Paul Nabhan.

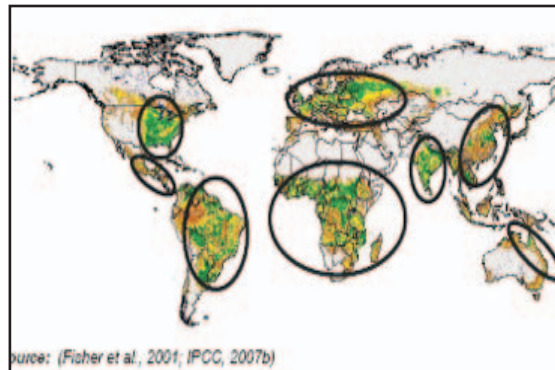
Also, he emphasizes population stress with the prediction of 9 billion people by 2050, as well as the loss of human capital in farming in industrialized areas, which are now comprised of overwhelmingly aged farmers.

Hope On Ahead

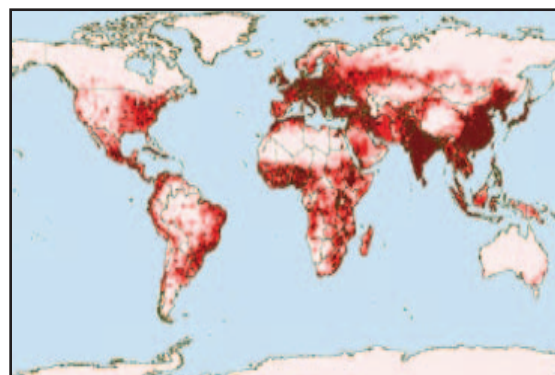
Dr. Kirschenmann sees much hope looking beyond the present clouds in our fight to feed the world. **We are in a food revolution.** The next generation sees the world differently. The older people alive today want to control the world. The new generation wants to work with it. The problem is in the system, not the desire of the people. Everyone now accepts the

fact that government is dysfunctional, so any change will happen from a grass roots level, and that is indeed happening in the agriculture and food movement.

In solving these serious problems in agriculture, Kirschenmann says, "Neither



Natural rainfed areas of the world provide the most optimum soils and growing conditions for sustaining populations. These are mainly in the eastern U.S., Brazil and Argentina, Europe, central Africa, eastern China, and India.



Human populations across the globe closely reflect the natural rainfed areas of the map above, showing that the proximity of food resources is critical for maintaining high populations.

optimists nor pessimists help. Optimists think everything will turn out OK. Pessimists assume it won't. It's the hopeful people that we need." □

This article was extracted, with editings, from an article by Kay McDonald, author of the online site big picture agriculture.

We all need to be tactful. A new family moved into the neighborhood, and the wife baked a pie and presented it to the nearby neighbors as a gift. The pie turned out to be inedible, so they threw it in the garbage. A few days later the newly arrived lady met with the neighbors, whereupon the lady of the house exclaimed, "Thank you for being

so kind and thoughtful for dropping by with the pie. A pie like that never lasts long in our house!" What great tact the receiver of this nefarious gift displayed. Tact is kindness with brains. It's a way of putting one's best foot forward without stepping on anyone's toes. It stems from the Latin word *tactus*, which means *touch*. It is a delicate, sensitive touch that soothes and uplifts despite our flaws. [Soundings, January 22, 1991.]

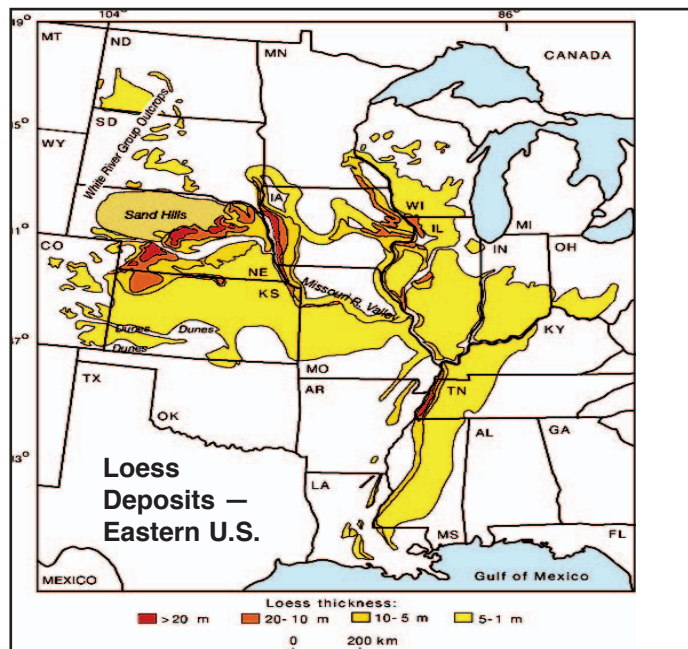
15-Minute Soils Course

Lesson 37:

Soil Wind Erosion

While water erosion is usually considered the most serious cause of soil loss (see Lesson 11 in the summer 2000 issue of *The Vital Earth News—Agricultural Edition*), wind erosion is also a very serious matter, especially on dry soils. Possibly 12% of the continental U.S. is somewhat affected by wind erosion, with 8% of that total moderately affected, and 2 to 3% severely affected.

The seriousness of wind erosion is under-

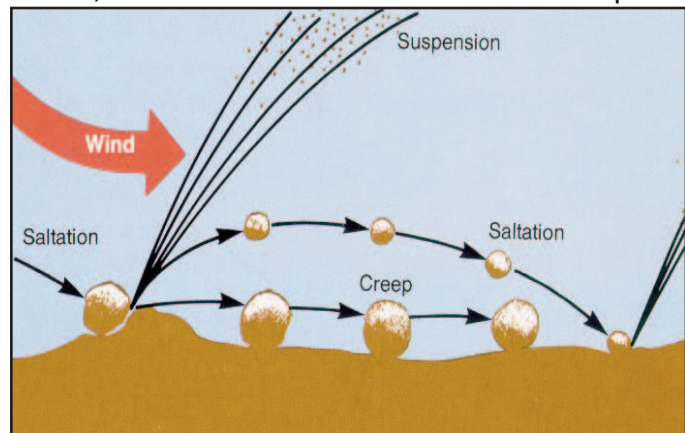


Hugh H. Bennet, a vocal promoter of soil conservation, was its first director.

Nations that forsake proper protection of their soil resources, especially those prone to arid conditions, are apt to repeat the mistakes of civilizations throughout history. The loss of soil means the loss of national strength and wealth. However, in prehistoric times wind erosion played a big part in laying down **loess** (wind-blown, silt-sized particles) over huge areas of the most productive areas of the U.S. Corn Belt, and in other parts of the world such as China and southern Europe.

How Wind Erosion Works

A dry and uncovered soil, whipped by strong winds, first suffers **detachment** of a few parti-



scored by the terrible dust storms of the “Dust Bowl” days of the 1930s in regions of eastern New Mexico, western Texas, Oklahoma, Kansas, and Nebraska, as well as areas of the Dakotas, and Montana. The very dry conditions of the 1930s, coupled with overgrazing and clean tillage of Plains soils, allowed fierce winds to kick up ominous clouds of dust that sometimes stretched for hundreds of miles. The great dust storm of May 12, 1934, created a spectacular dust cloud that blotted out the sun in much of the East, when silt sifted into the windows of far-off New York skyscrapers.

This historic storm rallied concern across the nation to eventually result in the passage of the Soil Conservation Act of 1935, and the formation of soil conservation districts nationwide.

15-Minute Soils Course

cles. These soil particles then move by a process of **saltation**, which involves the spinning of the particle to give an “antigravity” lift. The particle then descends and kicks up many more particles, much like one high-energy ping pong ball in a room full of other ping pong balls. Soon a multitude of soil particles are moving, and can be whipped up by vortices in the air to a distance of several feet to several miles, depending on the severity and gustiness of the wind. Fifty to 75% of total soil movement occurs in this way. Dust storms in China have been known to cloud the air of the western U. S.!

Loosened soil, especially sand and heavier silt particles, roll and slide along by **surface creep**. This movement accounts for 5 to 25% of total soil movement. **Suspension**, though spectacular, accounts for 3 to 40% of soil transport.

The damage to cropland is not due just to loss of precious topsoil, but to the cutting of plant tissue, especially of small, newly emerged plants. Sometimes entire fields must be replanted, even under center pivot irrigation if soils are sandy. Wind erosion can also occur on light and fluffy peat soils, where winds may viciously blow the peat and damage crops.



Controlling and Stopping Wind Erosion

There is a lot that farmers can do to stop wind erosion. Remember that a natural ecosphere always has plants covering the soil surface and stopping erosion, except, of course, in arid regions too dry to support vegetation.

1. Maintain vegetative cover on the soil.

2. Leave trash on the surface. This can be accomplished through minimum tillage, chisel plowing, and stubble mulching, any practice that leaves trash on the surface to reduce saltation and surface creep.

3. Strip crop if using summer fallow.

4. Build good soil structure through the judicious return of organic matter to the soil, minimal tillage, and optimum microbial activity. A well-structured soil resists blowing.

5. Grow shelter belts to break the wind.

6. Till at right angles to the prevailing wind direction to produce clods and furrows.



See How Much You Learned

1. Soil particles jumping along the soil surface is called _____.
2. Suspended dust from dust storms is usually the most important type of soil loss. T or F
3. Which of these is a way to reduce wind erosion? a. Strip tillage; b. Keep soils covered with growth; c. Shelter belts; d. Remove crop residue
4. Crops can be hurt by blowing soil. T or F
5. Windblown silt in ages past has created fertile soils, called _____.
6. Which of these is a means of wind erosion? a. Suspension; b. Surface creep; c. Saltation.
7. About ____% of the continental U.S. is prone to wind erosion.

Answers: 1. saltation; 2. F; 3. a, b, c; 4. T; 5. loess; 6. a, b, c; 7. 12.

Cultivate a Landscape of Perennials

Continued from page 2.

ever been totally safe and free of stress. No occupation ever has been. Yet, can we say that the industrial, high-tech model upon which modern agriculture has been built is acceptable, or even necessary? Do we really want it, or is this question moot because it is beyond our control?

My brother-in-law farms in southwestern Minnesota on a spread of about 1,000 acres—fairly small by today's standards. He does a good job, employing modern machinery and chemicals—a factory farm but on a small scale. He has stated for the last few years that there is not much joy in farming anymore, more drudgery and slavery than uplift and fulfillment. That belief is echoed by many Western farmers faced with escalating fertilizer, herbicide, fuel, machinery, rent, and tax costs, while grain, produce, and livestock prices, though high, remain volatile.

What Are the Alternatives?

In 1989, the National Academy of Sciences published the monumental work *Alternative Agriculture*¹¹, a book that showed organic farmers can supply the food, feed, and fiber needs of the United States. Compared to conventional farms, these organic farms produced as well and were about as profitable, though higher management standards were required. That study proved what modern technological-advanced farm advocates have not wanted to believe: highly mechanized and chemicalized factory farms are not superior to organic commercial farms in terms of yield and income potential. In fact, these organic farms treat soils much better, having higher soil organic matter and less runoff. They also tend to be family-oriented, the acreages smaller and often husband-wife operations¹².

Industry and its innovations—computers, engines, machinery, chemicals, and communications—have enabled the American farmer to increase the size of his operation greatly, while boosting

production enormously. However, I have shown that such changes from the small farms of early America, to the present-day mega-farms, have taken their toll.

- Peace and contentment are at a premium on the land.
- Few families remain on the land, less than 2% of the total population.
- The investment to farmers today is staggering, causing many prospective young farmers to reconsider their dreams.
- Farming is among the riskiest of all vocations.

Perhaps the Amish can teach us certain things, that strong families based upon immovable spiritual values hold a key to our direction. Yet, even their animal powered system falls short of the ideal farming structure one can picture.

It will be impossible to build a sus-

Nature's Seven Immutable Laws

1. Mixed farming is the rule; plants and animals are always found together.
2. The soil is always protected from the direct action of sun, rain, and wind.
3. Rainfall is carefully preserved in surface layers and subsoil.
4. The forest and prairie manure themselves, making their own humus and supplying their own minerals.
5. Mineral matter added by trees, undergrowth, grasses, and broadleaves is obtained from the soil.
6. The soil always carries a large fertilizer reserve.
7. Crops and livestock look after themselves and maintain health due to internal vitality imparted by the soil.

tainable, peaceable rural social structure based on today's paradigms, currently dictated by Monsanto and other international corporations, commodity markets, and government meddling. To construct a vibrant rural society of prosperous family farms, rather than mega-farms across countless deserted acres, will require major changes within government and businesses. To eliminate the chemical treadmill will take pioneering spirits of those educated in how to grow crops using open-pollinated and perennial varieties, natural fertilizers and fertility cycling, soil management without tillage, and power sources free of petroleum. That is a huge order, but one that can begin in small ways.

Laws of Nature

Coming into harmony with the laws of nature¹³ is a necessary beginning to replace factory farming with a sustainable rural-based system. We must first learn them, then observe them on our own acres. We have some of the answers, such as recently developed no-till organic systems and perennial varieties. Maybe horses or oxen as power sources are not out of the question.

You need to explore how non-factory farming might fit into your future. The advent of modern factory farming is a consequence of people and their government losing sight of what are the really important qualities of life, and then allowing greed to influence their decisions. This need not be the direction we take, for the good of our families and our nation. The choice is up to us. □

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The best way to cheer yourself up is to cheer everybody else up. Mark Twain

In Defence of the Dandelion

by Paul W. Syltie, Ph.D.

The dandelion (*Taraxacum officinale*, which means “official remedy for disorders”) is the bane of most homeowners, who detest the plant as an eyesore upon the lawn. Yet, despite its



The humble dandelion is scorned by many, but is actually a good soil enhancer and a powerful herb.



Few of us have seen the potential of size and soil penetration of a dandelion root, as shown in this photo.

being a persistent nuisance, the humble dandelion is an impressive plant from several perspectives.

It is a member of a large genus of flowering plants in the family *Asteraceae*. There are many species of plants similar to *T. officinale*, but they are inferior in terms of value as food and medicine.

Early European immigrants brought this species of plant to North America, and it has also been transported throughout the world.

A Soil Enhancer

The tap root of the dandelion can penetrate deeply into the soil, as far as 15 feet if conditions permit, where it extracts minerals such as calcium, iron, and other major and minor elements, and deposits them near the surface. In fact, high populations of the plants are an indication that the soil is calcium deficient and in need of high calcium lime.

An Impressive Food and Health Aid

In his booklet *Nature's Big 12* (The Association of the Covenant People, Vancouver, B.C.), John W. Shenton lists the dandelion as “a much despised blessing—a wonder weed” that is excellent as a food and as a medicine. The fresh leaves make excellent salads, and contain taraxacerin, asparagine, inulin, glycosides, tannins, terpenoids, carotenoids, choline, resins, salts, vitamins A, B, C, and D, and high levels of potassium, calcium, magnesium, iron, copper, cobalt, boron, molybdenum, zinc, phosphorus, sulfur, silicon, and chlorine. It rates only behind cod liver oil and beef liver as a source of vitamin A!

The herb appears in the U.S. National Formulary, and in the Pharmacopias of Hungary, Poland, Switzerland, and Russia. It is also among the top six herbs of the Chinese herbal medicine chest. Its use can be traced far into antiquity, and was used by the Persians and Romans,

Not surprisingly, dandelion components do a lot of good for the body, as touted by Penelope Ode in *The Complete Medical Herbal* (Dorling Kindersley, London, 1993), The leaves are a strong diuretic, and the liver is benefitted along with digestion. The roots are also beneficial to the liver, promote bile flow, are diuretic, mildly laxative, and antirheumatic. The whole plant may be consumed, and has proven to be highly effective against diabetes and even cancer.

As related by Peter Gail in www.leaf lady.org/health_benefits_of_dandelions.htm, Robert Stickle, an internationally famous architect, contracted malignant melanoma, had radical surgery, but still the tumor progressed. After discovering that the long-lived rural Italian Paesanos eat dandelions, he began to eat dandelion salad every day. His improvement confounded the doctors, and he totally recovered from the cancer.

Not to be slighted is the value of dandelions as a livestock food. So, if you have developed a deep-seated hatred for dandelions over the years, perhaps you ought to step back and reevaluate your position, and make a batch of dandelion wine to reignite your love for these amazing plants! □

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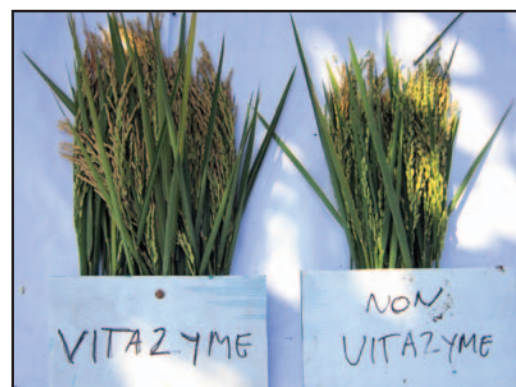
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Vitazyme on rice, the most widely grown grain crop in the world, has once again proven itself in Myanmar (Burma). A recent study at

Y a n g o n
Rice Farm

showed a 22% yield increase with two 1 liter/ha applications of Vitazyme, at 50 and 85 days after planting. Tilling was also increased, by 58%.



Rice grown with Vitazyme in Myanmar produced an excellent yield increase of 22%.