The Vital Earth News
RESOURCES
Agricultural Edition
Volume XXI, Number 1 Vital Earth Resources • Gladewater, Texas Winter, 2015

Alternative Agriculture Can Feed Us!

Are We Ready for the Change?

By Paul W. Syltie, Ph.D.

It has been 26 years since the National Research Council came out with its earthshaking report entitled *Alternative Agriculture*, in which the authors asserted,

"Well-managed alternative farming systems nearly always use less synthetic chemical pesticides, fertilizers, and antibiotics per unit of production than comparable conventional farms. Reduced use of these inputs lowers production costs and lessens agriculture's potential for adverse environmental and health effects without necessarily decreasing—and in some cases increasing—per acre crop yields and the productivity of livestock management systems"[1]

This statement is not foreign to the many farmers who have jumped on the organic bandwagon these past years. In 1992 there were 935,450 organically certified farmland acres, while by 2011 that number had grown to 5,383,119 acres, a 575% increase in 19 years.[2]

With organic—and other—alternative types of farming increasing as the years pass, the question arises as to whether these acres can truly provide the needed food for our burgeoning population in most countries. Ed Hamer and Mark Anslow, writing in *The Ecologist*, believe that organic farms have the potential to become energy exporters, whereas today's conventional farms are grossly energy-inefficient and consume much more than they produce.[3]

Food grown by alternative methods, including organic, will fill our tables in the future, and we will be much better off for it!

Where you Farm Makes a Difference

Switching to organic or sustainable farming would have different effects according to where in the world you live, and how you currently farm. Studies show that the less industrialized world stands to benefit the most from more ecologically-friendly farming. For example, in southern Brazil maize and wheat yields doubled on farms that changed to green manures and nitrogen fixing leguminous vegetables instead of chemical fertilizers. In Mexico, coffee growers who chose to utilize organic production methods realized 50% increases in the weight of beans harvested. In fact, in an analysis of more than 286 organic conversions in 57 countries, the average yield increase was found to be an impressive 64 per cent.[4]

The situation is more complex in the

See The Way We Grow, page 2

"Peak Food" Has Been Reached

Future Increases in Yields Are Unlikely

By Tom Bawden

The world has entered an era of "peak food" production with an array of staples from corn and rice to wheat and chicken slowing in growth – with potentially disastrous consequences for feeding the planet.

New research finds that the supply of 21 staples, such as eggs, meat, vegetables and soybeans is already beginning to run out of momentum, while the global population continues to soar.

Peak chicken was in 2006, while milk and wheat both peaked in 2004 and rice peaked way back in 1988, according to new research from Yale University, Michigan State University, and the Helmholtz Centre for Environmental Research in Germany.

What makes the report particularly alarming is that so many crucial sources of food have peaked in a relatively short period of history, the researchers said.

"People often talk of substitution. If we run out of one substance we just substitute another. But if multiple resources are running out, we've got a problem. Mankind needs to accept that renewable raw materials are

Nearly all food crops and livestock have reached their maximum productivity in terms of per unit yield, and that yield will decrease in coming years.

See Corn Reached Peak Yield, page 3

The Way We Grow Our Food Will Change

Continued from page 1

industrialized world, where farms are large, intensive, industrial operations, and opinions are divided on how organic yields would compare, this in spite of the National Research Council's 1989 conclusions. Research by the University of Essex in 1999 found that, although yields on US farms that converted to organic initially dropped by between 10 and 15 per cent, they soon recovered, and the farms became more productive than their all-chemical counterparts. In the UK, however, a study by the Elm Farm Research Center predicted that a national transition to all-organic farming would see cereal, canola, and sugar beet yields fall by between 30 and 60 per cent.[5]

Energy Efficiency

Currently, we use around 10 calories of fossil energy to produce one calorie of food energy. This situation is untenable for long-term food production efficiency and needs to change.

Studies by the Department for Environment, Food, and Rural Affairs in England have shown that, on average, organically grown crops use 25 per cent less energy to produce than their commercial counterparts. Certain crops achieve even better reductions, including organic leeks (58% less energy) and broccoli (49% less energy).[6]

When these savings are combined with stringent energy conservation and local distribution and consumption, energy efficiency of food production rises markedly. Alternative farming methods can move the energy equation much closer to input equaling output, or even to yielding a surplus of energy. For example, for each unit of fossil fuel energy the American farmer puts into the system, he receives back about 0.2 units of energy. In contrast, the Chinese wet rice farmer has been estimated to produce as much as 53.3 British thermal units (BTUs) of energy for each BTU of human energy he puts in.[7] Alternative systems move towards higher efficiency even without animal power.

Localized Production

The globalization of our food supply, which gives us Chilean grapes in winter and Brazilian oranges in August, has seen our food reduced to a commodity in an increasingly volatile global marketplace. Although year-round availability makes for good marketing in the eyes of the biggest retailers, the costs to the environment are immense.

In England, Friends of the Earth estimates that the average meal travels 1,000 miles from field to plate.[8] The organic movement was born out of a commitment to provide local food for local people, so it is logical that organic marketing encourages localization of the food supply. While the "organic" or "alternative" labels may ultimately be hijacked by giant business concerns that produce organically but still use large field production and cross-country transport, "organic and local" represents a solution with which the global players can simply never compete.

While the "organic" or "alternative" labels may ultimately be hijacked by giant business concerns that produce organically ... "organic and local" represents a solution with which the global players can simply never compete.

Pesticide Use

It is a shocking testimony to the power of the agrochemical industry that in the 45 years since Rachel Carson published her pesticide warning in *Silent Spring,* the number of commercially available synthetic pesticides has risen from 22 to well over 450.[9] There has been a continuing spiral of dependence on pesticides that has resulted in numerous side-effects like insect and weed resistance, disease susceptibility, damage to beneficial insect populations, and reduced nutrient cycling.

Alternative and organic farmers, on the other hand, believe that a healthy plant grown in a healthy soil will ultimately be more resistant to pest damage. This reality has been proven time and again, and is well documented in the literature.[10] Organically oriented systems encourage a variety of natural methods to enhance soil and plant health, in turn reducing incidences of pests, weeds and diseases.

Naturally-grown plants have thicker cell walls, which provide a tougher natural barrier to pests. Rotations provide a break in pest and disease life cycles by removing host crops from a given plot for extended periods. Superior fertility management is essential within these systems, which lends itself towards rapid plant growth and highly active rhizosphere microbe populations. These practices favor natural predators of the pests that attack leaves and roots. Any pesticides used are of natural origin and are strictly screened so that the crop and the environment are not poisoned. The National Organic Program of the United States puts strict limits on what can and cannot be used by growers of organically certified crops.

Ecosystem and Other Impacts

While it is well known that conventional farming methods reduce ecosystem biodiversity, alternative and organic methods actively encourage biodiversity in order to maintain soil fertility and aid natural pest control. Mixed farming systems ensure that a diversity of food and niches for wildlife are available throughout the year.

Organic production systems are designed to respect the "balance of nature" we note in natural ecosystems. It is widely accepted that controlling or

Alternative farming methods oftentimes are more labor-intensive than are conventional systems, but energy efficiency is greatly improved.

See Alternative Methods Boost, page 7

Corn Reached Peak Yield in 1985

Continued from page 1

reaching their yield limits worldwide," said Jianguo "Jack" Liu, of Michigan State University.

"This is a strong reason for integration ... rather than searching for a one-for-one substitution to offset shortages," he added.

Peak production refers to the point at which the growth in a crop, animal or other food source begins to slow down, rather than the point at which production actually declines. However, it is regarded as a key signal that the momentum is being lost and it is typically only a matter of time before production plateaus and, in some cases, begins to fall – although it is unclear how long the process could take.

"Just nine or 10 plants species feed the world. But we found there's a peak for all these resources. Even renewable resources won't last forever," said Ralf Seppelt, of the Helmholtz Centre.

The research, published in the journal *Ecology and Society*, finds that 16 of the 21 foods examined reached peak production between 1988 and 2008.

This synchronization of peak years is all the more worrying because it suggests the whole food system is becoming overwhelmed, making it extremely difficult to resurrect the fortunes of any one foodstuff, let alone all of them, the report suggested.

The simultaneous peaking of the world's basic foodstuffs is largely down to the competing demands of a mushrooming population, which is putting ever-greater strain on the land for housing, agriculture, business, and infrastructure. At the same time, producing more of any one staple requires the use of extra land and water, which increases their scarcity and makes it harder to increase food production in the future.

Finally, increases in production tend to push up pollution, which exacerbates shortages of resources and slows the growth in output.

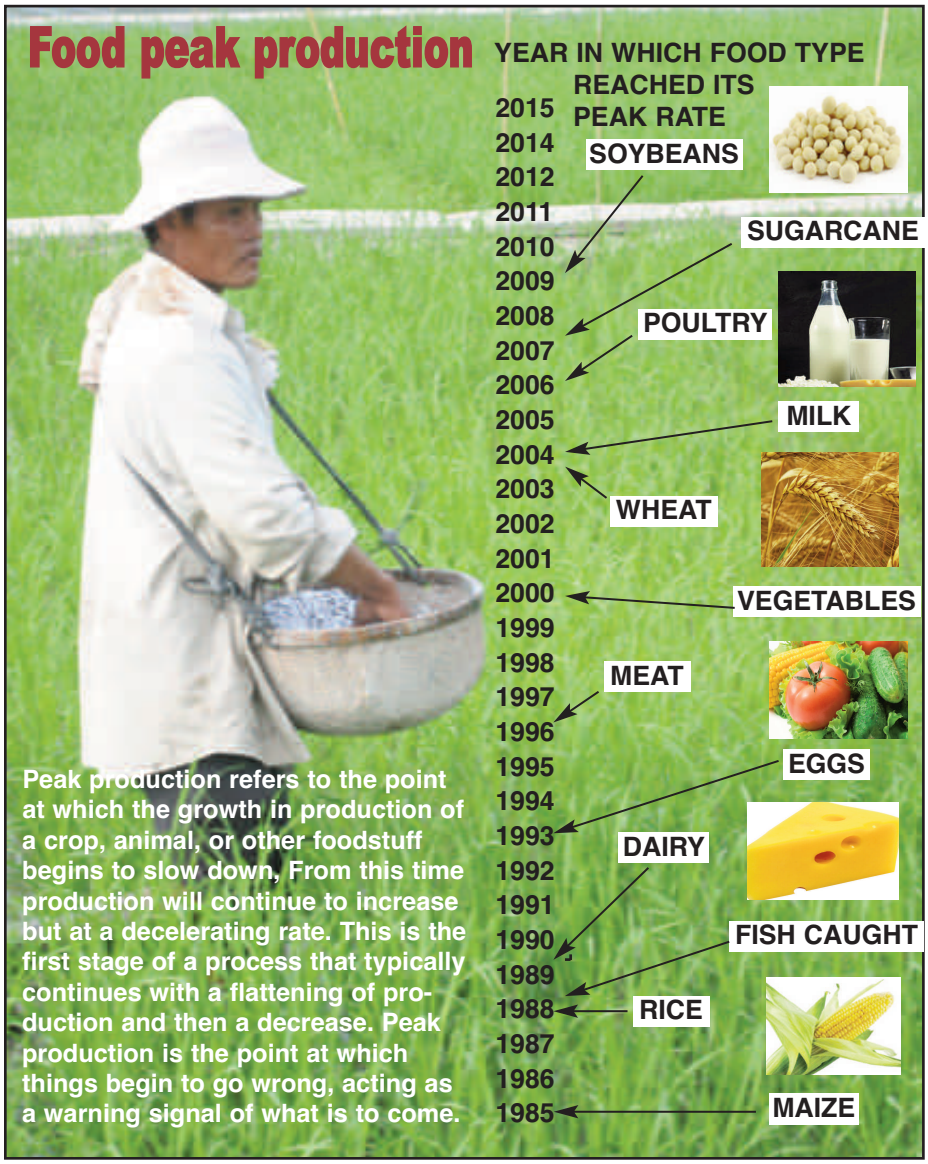
The simultaneous peaking of crops and livestock comes against a backdrop of a growing population, which is expected to reach nine billion by 2050, requiring the world to produce twice as much food by then as it does now, according to a separate study by the California Academy of Sciences. The problems caused by the growing population have been compounded by the growth of wealthy middle-class populations in countries such as China and India which are demanding a meatier diet. This is problematic because meat and dairy use up a lot more resources than if a comparable level of nutrition were provided by crops, grown direct for human consumption.

"That trajectory [of needing to double food production] is not a given but more of a warning. It means we have to change how we eat and use food," said Jonathan Foley, the director of the California Academy of Sciences.

While the peak production study suggests a doubling of food output could well be impossible, Dr Foley points out that, since 30 to 40 per cent of the food grown globally for human consumption never gets eaten, eliminating waste would go a long way to feeding the growing population.

Among the basic foodstuffs examined, only the relatively undeveloped farmed fish – or aquaculture – industry has yet to reach peak production. ❐

[From *The Independent,* January 29, 2015. www,independent.co.uk.]



Humility Always Wins

One day a friend of Samuel Morse, inventor of the telegraph, said to him, "Professor, when you were making your experiments did you ever come to a place not knowing what to do next?"

"More than once," Morse replied, "and whenever I could not see my way clearly, I knelt down and prayed to God for light and understanding."

Then Morse added, "When flattering honors came to me from America and Europe on account of the invention which bears my name, I never felt I deserved them. I had made a valuable application of electricity, not because I was superior to other men, but solely because God, who meant it for mankind, must reveal it to someone, and was pleased to reveal it to me."

Bits and Pieces, December,1974.

15-Minute Soils Course

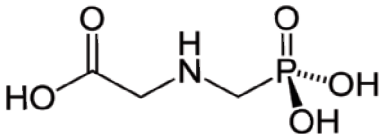
Lesson 40:

Disarming Toxic Residues in Soils

The heavy use of agricultural chemicals is a fact of life for most farmland in the United States, and in many other countries. Only organically certified acres are immune from this assault. These pesticides are without exception harmful to soil, animal, and human life.

Soils are affected in various ways by these chemicals, be they herbicides, fungicides, insecticides, or other pesticides. All such chemicals are, by definition, killers of living organisms, and they operate by interfering with the metabolic cycles of cells through enzyme poisoning, chelation of critical elements, or other means.

Pesticides reach soils through direct spray contact, or through translocation of the compound from plant leaves down into the soil, as is the case with glyphosate (Roundup). The compound can have several fates once it reaches the soil:



Glyphosate (Roundup)

1. Adsorption. The chemical structure binds to the organic matter, clay, silt, and sand particles, the amount and strength of adsorption depending on the type of pesticide, the texture, soil pH, soil moisture, and organic matter levels

High absorption: much clay, especially 2:1 (smectile) types, much organic matter

Low adsorption: much sand, or much 1:1 clay types, little organic matter

2. Leaching. Pesticides can move through the soil profile if they are not readily adsorbed, and can reach ground water depths in some cases.

More leaching: water-soluble compounds, sandy soil, low soil adsorption characteristics, heavy rain soon after application

Less leaching: non-water-soluble compounds, high soil adsorption

3. Runoff. Water runoff from heavy rains can move pesticides through or away from the soil.

High runoff loss: sloping soil, coarse texture, high soil moisture, heavy rain, water-soluble compounds

Low runoff loss: nearly level soil, fine texture, good structure and infiltration, non-water soluble compounds

4. Volatilization. Some pesticides, like 2,4-D, will evaporate easily into the air, especially from sandy soils under wet conditions.

5. Crop removal. Pesticides that remain in the crop tissue will be removed during the harvest of that plant part (seed, forage, or roots).

Fate in The Soil

Those pesticides that reach the soil and are adsorbed are the residues that are addresses in this lesson. These pesticides can persist for a very short time (nonpersistent) or a very long period of time (persistent), sometimes for years or decades. In one case, a biostimulant was sprayed on a field of corn that over ten years before had received heptachlor; heptachlor was released from the soil, and silage from that corn picked up residues of heptachlor high enough to cause the milk to be rejected from cows that ate the silage.


Bacteria on fungi of root surfaces

The Key: Microbial Activity

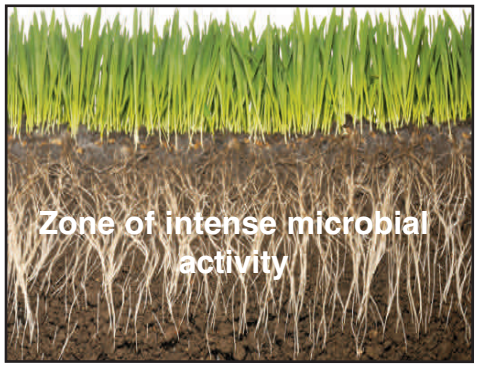
The time pesticides persist in the soil is related directly to the chemical structure of the

15-Minute Soils Course

Persistent Pesticides (most are banned)	
Aldrin	PCBs
Chlordane	Dioxins
DDT	Lindane
Toxaphene	Heptachlor
Nonpersistent Pesticides	
Pyrethroids	Repellants
Organophosphates	Herbicides
Carbamates	Fungicides

compound—persistent or nonpersistent—and the degree of microbial action that is in the soil, especially in the rhizosphere (root zone) where the microbial activity is most intense. Bacteria, fungi, algae, actinomycetes, and other microorganisms will feed on most any available carbon source, and convert it to CO_2 and water. The more intense the turnover of microbes the faster the adsorbed residues will be broken down. Some microbes are even being developed that will prefer to degrade certain of these pesticides.

Soil microorganisms will adapt to specific chemicals that are applied to the soil. Certain species of bacteria or fungi that are able to survive the pesticide and beak it down will be selectively encouraged, and will be waiting for the next application. If the compound that has been adapted to is a herbicide, the spray may be quickly broken down and the weed kill less effective as a result.



How to Reduce Toxic Soil Residues

To reduce pesticide residues in the soil, try any of the following.

1. Reduce or eliminate the application of the pesticide. Use a non-toxic substitute, or some management technique that removes the need for the pesticide, such as regular or flame cultivating. Non-toxic *Bacillus thuringiensis* bacterial sprays will replace Malathion for worm control.

2. Add manure, compost, crop residues, or other organic materials that will stimulate microbial activity.

3. Grow aggressively rooting cover crops or forages like rye, forage radish, clover, or alfalfa that produce intense rhizosphere activity.

4. Apply rhizosphere and residue breakdown enhancers like Vitazyme that will intensify rhizosphere and organic breakdown activity.

By reducing soil pesticide residues, the crops you are growing will yield more, they will be healthier for people and animals, and your ground and surface water will be cleaner and safer. ❒

See How Much You Learned

1.Pesticide residues in soils are broken down by _____.

2. Nonpersistent pesticides are not toxic to people, animals, and the environment. T of F

3.Which of the following are ways to reduce soil pesticide levels. a. Grow cover crops; b. Apply Vitazyme; c. Reduce microbial activity; d. Spread compost.

4. Some persistent pesticides, like DDT, can persist in the soil for many _____.

5. Glyphosate (Roundup) is very widely used for weed control, even by homeowners, so it is surely a safe herbicide. T or F

6. After a pesticide reaches the soil it can a. Volatilize; b. Leach into the soil; c. Be adsorbed on soil particles; d. Run off in surface water; e. All four (a to d)

7. Pesticides that cling to the soil are said to be _____ by the soil.

Answers: 1. soil microorganisms; 2. F;3. a, b, d; 4. years or decades; 5. F; 6. e; 7. adsorbed.

Nutritional Research Confirms That Organically Grown Food Is Superior!

by Paul W. Syltie, Ph.D.

For several decades the battle has raged between those who claim that "food is food", and it does not matter how you grow it—the nutritional value will be the same— and those who say organically grown foods are superior. Intuition might say that naturally grown is better, but the evidence has in many cases been lacking.

As the years have passed, and field designs and analytical techniques have improved, there is growing body of evidence that it does indeed matter how food is grown, and that "naturally" or organically grown foods are better tasting, and better for your health, than are foods which are conventionally grown.

Take, for instance, a major study conducted by The Organic Center entitled "New evidence confirms the nutritional superiority of plant-based organic foods" by Charles Benbrook, Xin Zhao, Jaime Yáñez, Neal Davies, and Preston Andrews (March 2008; www.organic-center.org). Based on the findings reported. it can be confidently stated that organic plant-based foods are, on average, more nutritious in terms of their nutrient density for compounds validated by this study's rigorous methodology.

The conclusions state, "The significant margins in favor of organic food in several of the most important nutrients, and modest margins in favor of conventional samples for less important nutrients, strengthens the evidence for this conclusion.

"The average serving of organic plant-based food contains about 25% more of the nutrients encompassed in this study than a comparable-sized serving of the same food produced by conventional farming methods. This is roughly the same margin in favor of organic food reported in the Organic Center's 2005 State of Science Review on antioxidants.

"The number of valid studies and matched pairs is still too limited to quantify with a high level of confidence the differences for four or five of the individual 11 nutrients, although the evidence in published studies seems to be reasonably consistent in the case of Vitamin C, antioxidant capacity, nitrates, some individual polyphenols, and protein.

"Because of the significant increase in the number of high quality studies over the last few years, there are now enough high- quality studies on an ample diversity of foods to support the above general conclusions regarding nutrient content, at least for several important nutrients and on average across multiple fields and production regions.

"We believe that the conclusions supported by this study are generally applicable to most fresh and lightly processed organic and conventional plant-based food products currently on the market. Our inferences and conclusions must be limited to plant-based foods because the vast majority of existing studies focuses on foods of plant origin.

"There is strong evidence, however, that poultry and livestock that consume animal feeds and pastures grown using organic methods actually produce meat, milk, and eggs that has –

- Modestly higher levels of protein,
- More of some vitamins and minerals, and
- Elevated levels of heart-healthy omega-3 and conjugated linoleic acid (CLA) fats.

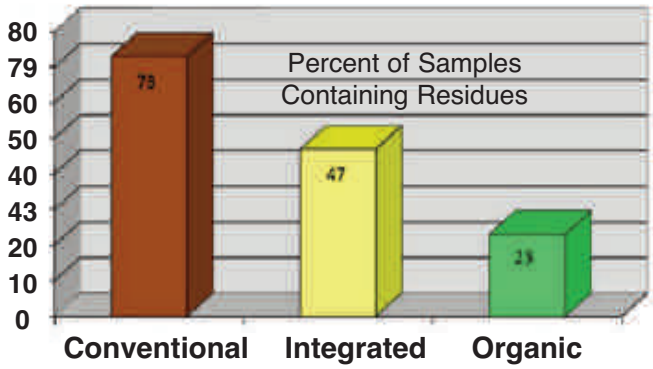
"The Union of Concerned Scientists recently published an in-depth review of several pertinent studies on the impact of organic farming on the fatty acids in animal products (Clancy, 2007).

"The FQH Network, a consortium of European Union research teams focusing on organic food, have also just published a provocative assessment of how organic feed for poultry improves chicken health, and in many cases the nutritional quality of poultry products (Huber, 2007).

"The impact of organic farming methods and organic feed on the nutritional quality of animal products is just beginning to receive the scientific attention it deserves. For now, we limit our conclusions regarding the nutritional superiority of organic foods to those of plant origin."

Many other studies could be quoted in this short article to support the conclusions of this study by Charles Benbrook and his coworkers. As the years pass more and more evidence will accumulate that proves the superiority of naturally grown foods, be they of plant or animal origin.

The important issue for all of us, the consumers of these fruits of the earth, is whether or not we will internalize and act on this knowledge, and either grow our own food by these organic principles or purchase and consume such quality fare. The choice is up to us, and our health and longevity lie in the balance! ❐



Pesticide residues in organically grown foods are considerably lower than in conventionally grown foods, as is shown in these analyses for restricted pesticides.

Organic Versus Conventional Mineral Levels (Meq)

	Ca	Mg	K	Mn	Fe	Cu
SNAP BEANS						
Organic	41	60	100	80	227	69
Conventional	16	15	29	2	10	3
CABBAGE						
Organic	60	43	148	13	94	48
Conventional	18	16	54	2	20	0.4
LETTUCE						
Organic	71	49	177	196	516	60
Conventional	16	13	54	1	1	3
TOMATOES						
Organic	23	59	148	68	1938	53
Conventional	5	5	59	1	1	0

The elemental levels of four vegetables are shown to be much higher when grown under organic conditions, especially the micronutrients. [Firman E. Bear, Rutgers, University]

Alternative Methods Boost Nutritional Value

Continued from page 2

suppressing one element of nature, even if it is a pest, will have unpredictable impacts on the rest of the food chain. Organic producers regard a healthy ecosystem as essential to a healthy farm, rather than a barrier to production.

In 2005, a report by English Nature and the RSPB on the impacts of organic farming on biodiversity reviewed more than 70 independent studies of flora, invertebrates, birds, and mammals within organic and conventional farming systems. It concluded that biodiversity is enhanced at every level of the food chain under natural management practices, from soil microbiota right through to farmland birds and the largest mammals.[11]

Nutritional Benefits

Even if alternative farming systems may yield a bit less that conventional systems—which I have shown is unlikely—the food produced is superior. In 2001, a study in the *Journal of Complementary Medicine* found that organic crops contained higher levels of 21 essential nutrients than their conventionally grown counterparts, including iron, magnesium, phosphorus and vitamin C. The organic crops also contained lower levels of nitrates, which can be toxic.[12]

Other studies have found significantly higher levels of vitamins—as well as polyphenols and antioxidants—in organic fruits and vegetables, both of which are thought to play a role in cancer-prevention within the body.

Milk from organically fed cows has been found to contain higher levels of nutrients, including omega-3 fatty acids, vitamin E, and beta-carotene, all of which help prevent cancer. One experiment discovered that levels of omega-3 in organic milk were on average 68 per cent higher than in non-organic alternatives.[13]

Indeed it is possible for alternative methods of crop production to feed the world. These methods of crop and livestock production are the wave of the future, and the world as a results will be much better off in terms of life of the soil, diversity of plants, animals, and microbes, nutrition of the food supply, and even the employment and land tenure system that will develop because of these fundamental changes.

We have a lot to look forward to as the food production system of this earth changes. The only question that remains is, how soon will it come? ❒

Bibliography

1. National Research Council, *Alternative Agriculture*, National Academy Press, Washington, D.C., 1989.
2. USDA/ERS, Organic production:U.S. certified organic farmland, 1992-2011, *ers.usda.gov*.
3, 4, 5, 6. E. Hamer and M. Anslow, Ten reasons why organic can feed the world, *The Ecologist*, March 1, 2008.
7. P. Syltie, *The New Eden*, Triumph Publishing, Altadena, California, 1981.
8, 9. See 3 above.
10. H. Marschner, *Mineral Nutrition of Higher Plants*, 2nd Edition, Academic Press, 1995.
11.See 3 above.

Iridium, a Wonder Element?

Iridium is a white, hard, and brittle element that is usually associated with other Group 9 (VIIIB) elements such as platinum and indium, "noble metals" that react very little with even strong acids and bases. It is the most corrosion resistant metal known, and also very dense, weighing 22.42 g/cc, melting at 4,435 F, and boiling at 8,002 F. Crustal rocks contain only about 1.0 ppb (part per billion), which is 40 times less common than gold.

The *North American Journal of Homeopathy,* Series 3, Volume 18 (1903), printed an article by W. Christian, M.D., who trialed a solution of iridium with several patients, and also performed microbial and plant studies. Patients were cured of intestinal infections, syphilis, Bright's disease, sprains, insomnia, and other ailments. Plants grew faster and produced more fruit, while microbes displayed much greater activity and considerably greater longevity. Perhaps iridium deserves a closer look from physicians, farmers, and those intent on living a long, disease-free life. ❒

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 or Email it to us.

***Yes!* Send me a subscription, or send a digital copy, of *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 a ( ) farmer or grower, ( ) retailer, ( ) other interested party.

Name _____

Address _____

City/State/Zip/email _____

Telephone and/or fax (optional) _____

Mail to: **Vital Earth Resources, P.O. Box 1148, Gladewater, Texas 75647**

Vitazyme on Cherries

Seven cherry trials conducted in central Washington State in 2014 proved that *Vitazyme* is a consistent and powerful aid to higher cherry yield, quality, and profits. Note these results of fruit quality.