The Vital Earth News

Agricultural Edition

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By-Products or Waste Products?

4,000 Years Ago to Now

by Eric Eweson

The common concept of our soils, the basic source of all life, remains sadly unrealistic. From the first build-up when the earth was young, soil humus continued to accumulate by natural recycling of the by-products of proliferating animal and plant life. This gave man the impression that Nature would forever provide, as Nature had provided for tens of thousands of years. Eventually, however, the pressure of growing populations became too much for the land. Man was forced to create a higher-yielding and more permanent agriculture.

It was thus that great agriculture-based civilizations were born. Beginning with China some four thousand years ago, these included Persia and Arabia at some thousand year intervals, with the final and highest development during the Arab rule in Spain, 650-1500 A.D.

The glamour of the accomplishments in art, science, trade and warfare by these people has obscured what made it possible, namely food enough for the growing populations, with time to spare for other activities, century after century, without impoverishing the land. It has never been done since, except on a very smaller scale, as in this century by the Hunzas in Northern India.

It is fortunate that about a thousand years ago, during the peak of its development in Spain, this system of permanent, high-yielding agriculture was recorded in writing, in great detail, by the owner of a farm, "El Doctor Excellence Abu Zacharia", of Seveilla, Spain. The Arabic manuscript was translated into French and published in 1862. It has also been widely quoted by English writers.

Agricultural Revolution 4,000 Years Ago

There is really no need for details on the method used, as they are well known,

See Ancient Farming, page 2

The Hunzas of Kashmir grow much of their food on step-like terraced fields in the Himalaya Mountains, which were engineered mostly from human labor many centuries ago (Taylor, Come Along to Hunza, Denison, 1974).

The Vitazyme Program

Pathway to a More Stable and Productive Agriculture

By Paul W. Syltie, Ph.D.

People can live a month without food, five days without water, five minutes without air, but hardly a moment without hope. We tend not to worry much about water and air because they are plentiful, and hope springs eternal from man's inner being. Food, however, presents a different picture.

Millions of hungry and starving souls inhabit this earth. We hear or see them in fleeting glimpses during newscasts and in news clips from time to time...in Rwanda, Sudan, China, Bangladesh, or Haiti. Some of the food shortfalls may be due to poor infrastructure within the country, to desolation due to warfare, or to persistent drought or periodic floods and storms. At times a disease epidemic may strike vulnerable crop varieties and decimate a staple crop.

Whatever the cause for food shortages — war, politics, weather, or genetics — the problem is real and mind-bending. It is a crisis facing everyone each day: you either have enough to eat or you don't. If you don't the crisis is immediate and serious, and won't go away until stomachs are full once again.

Against such a backdrop of rising population and stagnating crop yield increases, agronomists and soil scientists are exploring many possible solutions to satisfying the burgeoning food requirements

See Vitazyme, page 3

Note the bigger, healthier leaf on the right from a Vitazyme treatment on cotton.

Ancient Farming Methods Still Work!

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although apparently of little interest to modern chemicalized agriculture. The ancient practices were, of course, 100% organic, based on the return to the land of the by-products of life for the growth of new life. The methods were born out of necessity. As a population grows, the pressure on the land for more food becomes too great for the soil to "make" both the fertilizer and grow crops. With no source for "imports", ancient farmers invented pile composting, whereby the land could be relieved of "making the fertilizer" for more and better crops.

From Abu Zacharia's descriptions, there can be no mystery why their compost fertilizer, "Kimawiah" in Arabic, was of such high quality and effectiveness. Some of the "art" deserves our particular interest. Without anything then known about soil microbes, it was pointed out that when building a composting pile it would be "seeded" with material from an older pile, a practice which is a prerequisite for modern fermentation technology. Zacharia also emphasized that manures, of which the human variety was preferred, should never be applied alone, either to the land or to the piles for composting. Rather, manure should always by mixed with plant materials. Now we know why. Manures, in contrast to plants, are deficient in carbon, and carbon is the basic element of life.

If this simple fact were to be recognized by our regulatory authorities, it would inevitably lead them to encourage a more rapid development of co-composting. Solid waste provides authentic compost, while sewage sludge provides the necessary large amounts of nitrogen for the breakdown of the materials.

Mechanization has allowed modern composters to utilize long windrows that are machine turned. Quality and effectiveness of this compost rivals anything that the Spaniards could have produced centuries ago (Minnnich, The Rodale Guide To Composting, Rodale Press, 1979).

Plant disease was not a problem for ancient farmers. When plant disease did occur, the cause was believed to be "sick" soil, and the cure was to add more compost. Zacharia's treatment for an ailing tree was thus to loosen the soil around the drip line and mix it with compost, much as this writer has been doing with startling success for the last thirty years. Zacharia makes no mention of weed problems. We must therefore assume that with his fertile and well balanced soil it was not a problem. Nor does he have anything to say about

See Lessons, page 8

Nature Assisted Agriculture

By Larry Finn

One of those inalienable rights guaranteed to us by the Constitution of the United States is the right to have an opinion, the right to take sides on any issue. In agriculture, there are many philosophies on how best to maximize yields or to maximize profits. One can strive to be on the cutting edge with all the latest herbicides, pesticides, and other tools from the petrochemical industry's arsenal. Other farmers are less aggressive and tend to rely on tradition and methods used successfully for years by others in their area. A method less popular, but also successful, is looking to the natural systems of soil and plant growth, trying to get in tune with nature, and then using those techniques or chemicals that are most friendly to the existing eco-system.

It is this thought that most accurately embodies Vital Earth's hope for the survival of the agricultural community. Farmers have been trapped by the seeming need for ever-increasing inputs to a cropping program in order to get the yields desired. Vendors of these weapons, if you will, have paid little attention to the margin between farm costs and income. Of course, it is always gratifying to have the highest yield in the county, but

Modern agricultural methods have filled our bins to overflowing for many years, but have all of the costs been counted? (National Research Council, Alternative Agriculture, National Academy Press, 1989).

See Let Nature Teach, page 12

Vitazyme Triggers Soil Life!

Continued from page 1

of the hungry masses. Whereas for decades the traditional agrichemical approach to food production has served a purpose — much food at low cost — the recent revelations of pesticide dangers to man and the environment, commercial fertilizers polluting soils, lakes, streams, and ground-water, and monoculture systems reducing organic matter and exacerbating erosion have opened the eyes of many for the need to change direction. Changes have been needed to salvage the health and vitality of the soil and the crops that grow on them...and ultimately to help restore the health of the people who have suffered nutritional deficits due to impaired food quality from crops grown on mineral and organic matter - deficient or imbalanced soils.

As a result of these understandings that show a need for a change in agriculture's direction, great interest has been shown in what we call **sustainable agriculture**, or practices with crops and soils that limit off-farm inputs and build soil quality, especially organic matter, while maintaining or increasing crop yields and profit. Others have embraced **organic** or **natural farming**, a system that adheres strictly to natural principles and entirely avoids the use of pesticides and man-altered fertility sources. Novel practices and products that a few years ago were shunned due to their newness or unbelievability are now open to renewed scrutiny and potential use.

Amidst this genesis of a renewed agriculture in America, an inventor in Texas, named William Cobble, worked quietly to develop a substance that would assist the rejuvenation of the soil, and benefit the yields and quality of crops growing on that soil. He successfully developed a liquid biostimulant — later trade-named Vitazyme — in the early 1990's that proved highly useful in stimulating crop growth. Early field work showed excellent successes on a variety of agricultural and horticultural crops. Yet, it was not until formal field trials began in 1995 that crop results finally began to be documented. The results were at the least quite good, and at the best astounding! These results will be discussed later, but first what about the Vitazyme program?

How Vitazyme Works

Vitazyme biostimulant complements and improves both conventional and organic production systems. It is a supplement to enable all production systems to work better, and should never be used as a "cure-all." It will enhance root and leaf growth, increase chlorophyll and photosynthesis in leaves, improve drought tolerance, enhance the efficiency of nitrogen utilization, increase yields and profits, and improve soil structure and tilth.

These effects are obtained through the stimulation of rhizosphere microbiota, which increase the uptake of essential nutrients and growth stimulants. Vitazyme contains "metabolic triggers" that stimulate the plant to photosynthesize better, fixing more sunlight energy in the form of carbon compounds to increase the transfer of carbohydrates, proteins, and other growth substances into the root zone (a plant may exude up to 25% of its fixed energy into the root zone). These active agents may enter the plant through either the leaves or the roots. Root growth and exudation are both enhanced. This enhancement activates the metabolism of the teeming population of rhizosphere organisms to a higher level, triggering a greater synthesis of growth-benefiting compounds and a faster release of minerals for plant uptake. The plant-microbial symbiosis is stimulated.

Very small amounts of these metabolic triggers in Vitazyme are needed to greatly improve plant and rhizosphere microbe response. This is because of the **enzyme cascade effect.** Successive tiers of enzymes are activated in plant and microbial tissues to yield a large physiological response from very little applied activator. In short, Vitazyme enables the plant to better express its genetic potential by reducing the stresses that repress that expression.

How Vitazyme Is Used

A typical program of use for a non-legume such as corn or cotton is as follows:

1 Test the soil, if possible, and discover any deficiencies or imbalances. Collect at least 10 subsamples from each uniform soil area (each sample from an area no larger than about 25 acres), combine them, and send them to a reputable soil laboratory. Fertilize as required according to expert consultation, but treat nitrogen separately (see point 2).

2 Reduce nitrogen fertilizer applications to 30 to 80% of amounts required for an optimum yield potential. Vitazyme will allow plants to make more efficient use of available nitrogen. **Obtain a score for each of the four parameters:** *(See the chart below.)*

Soil Organic Matter			Previous Crop		Compaction		Soil NO_3-N Test		
Low(<1.5%)	Medium(1.5-3%)	High(>3%)	Non-legume	Legume	Much	Little	Low	Medium	High
1	2	3	1	3	1	3	2	4	6

Total additive score:	15	14	13	12	11	10	9	8	7	6	5
Apply this much N:	← 30-40% →				← 40-60% →				← 60-80% →		

3 Apply Vitazyme, if possible, to the seeds at or before planting. Treat the seeds with a dilute Vitazyme solution, such as 1 liter of a 5% solution for every 50 kg of seed. Mix the seeds and solution together thoroughly in a seed or cement mixer, on a tarp, or in a seeding attachment. It is best to dry the seeds well before planting to avoid bridging in the planter. Alternatively, apply the product directly in the seed row at planting (see point 4).

4 Apply Vitazyme to the soil and/or foliage. Use one of the following schedules:

Best: Apply Vitazyme directly on the seeds at planting at 1 liter/ha (13 oz/acre) using a planter attachment. At midseason or early bloom, spray 750 ml/ha (10 oz/acre) Vitazyme over the plants and soil.

Second best: Spray Vitazyme on the soil after planting, but before emergence, at 1 liter/ha (13 oz/acre). At midseason or early bloom, spray Vitazyme at 750 ml/ha (10 oz/acre) over the plants and soil.

Good: Spray 1.5 liters/he over the plants and soil at midseason or early bloom.

5 Integrate other sound, sustainable management practices into the total program, such as soil conservation practices, minimum tillage, and crop rotations with legumes.

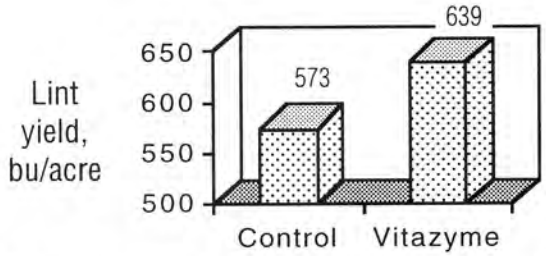
Legumes such as soybeans require no supplemental nitrogen, They generally receive a seed application at planting (13 oz/acre) and a second soil and foliar appli-

See Vitazyme Test Results, page 4

Vitazyme Test Results for 1995

COTTON

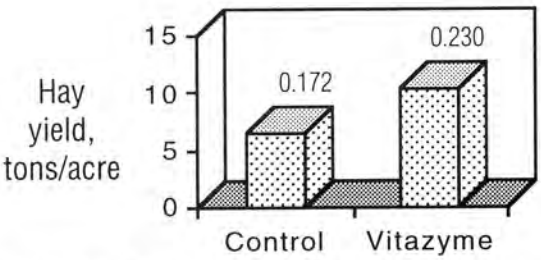
Littlefield, Texas
Organically grown, irrigated



These samples of cotton bolls from west Texas cotton plots display the improved boll set and yield of the Vitazyme treatment.

ALFALFA

Appleton, New York
First cutting, baled for hay



Note the considerally improved rooting and nodulation for alfalfa with a Vitazyme application.

Continued from page 3

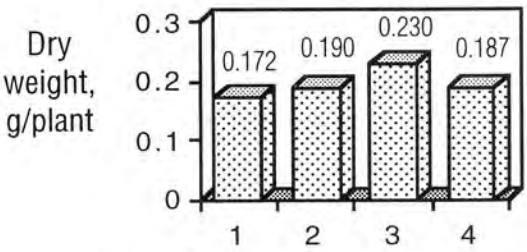
cation (13 oz/acre) at early bloom. Hay crops — legumes or legume-grass mixes — receive a 13 oz/acre application at spring greenup, and then 7 to 10 oz/acre after each cutting.

Vitazyme's First Year of Testing

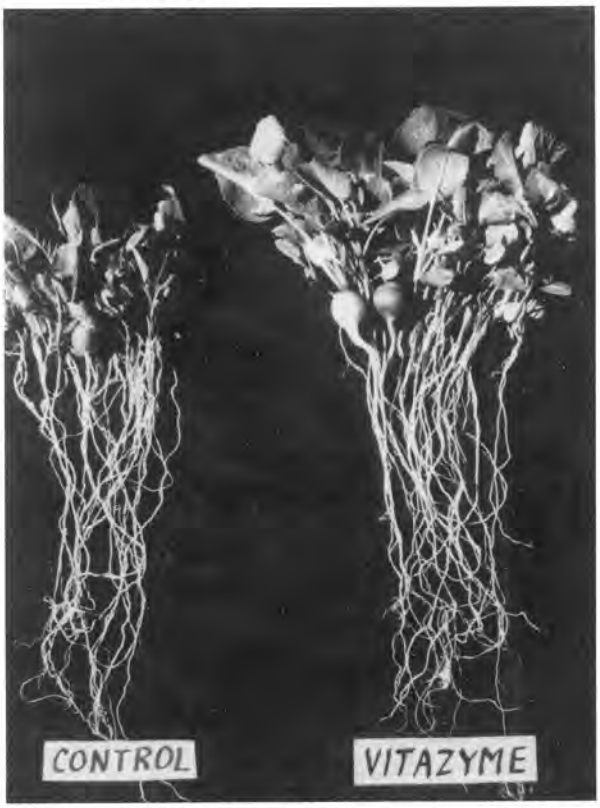
The first year of significant testing for Vitazyme was 1995, with most research centered in New York and western Texas. Results were very encouraging, a sample of which is in the following bar graphs. *(An asterisk by the number indicates a significant increase in replicated plot work.)*

RADISHES

Fredericksburg, Texas



1. Control
2. Miracle-Grow
3. Miracle-Grow + Vitazyme
4. Vitazyme



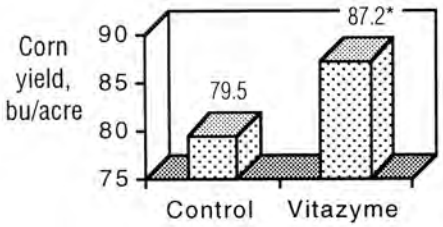
Vitazyme-treated radishes developed bigger roots and tops, with faster maturity.

Vitazyme Test Results for 1995

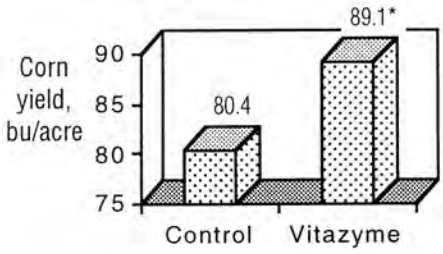
CORN

ACRES Research
Cedar Falls, Iowa

Low Nitrogen (80 lb/acre)



High Nitrogen (120 lb/acre)

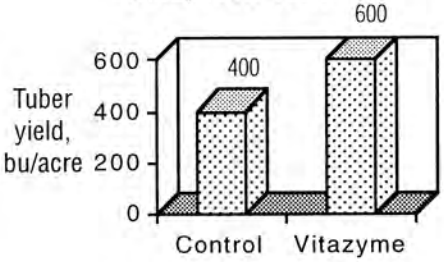


Tests with Vitazyme on field crops are being conducted at many locations in 1996, most of which are indicated below:

Florida: Tomatoes, ornamentals, sugarcane
Indiana: Corn, soybeans
Iowa: Corn, soybeans, oats, alfalfa
Kentucky: Corn, soybeans, hay, other crops
Louisiana: Tree nurseries, sugarcane
Maine: Potatoes, broccoli, hay
Michigan: Corn, soybeans, other crops
Minnesota: Turf
Nebraska: Corn, soybeans
North Carolina: Ornamentals
New York: Onions, cabbage, corn, soybeans, lima/kidney beans, tomatoes, alfalfa, potatoes, other crops
Ohio: Corn, soybeans, other crops
Oklahoma: Fruit tree nursery
Oregon: Alfalfa
South Carolina: Cotton
Tennessee: Tomatoes, beans
Texas: Cotton, bermudagrass (forage/hay), turf, peanuts

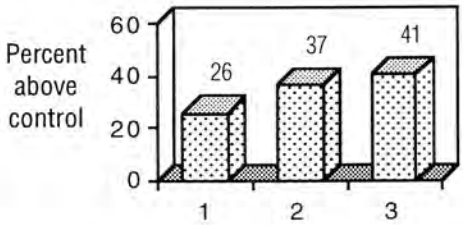
POTATOES

Elba, New York



CORN

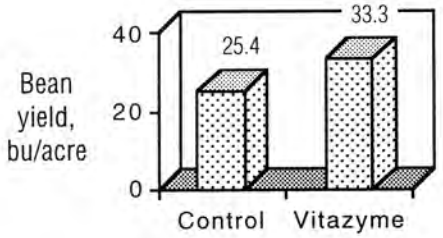
Gladewater, Texas



1. Chlorophyll in leaves
2. Leaf length
3. Dry weight

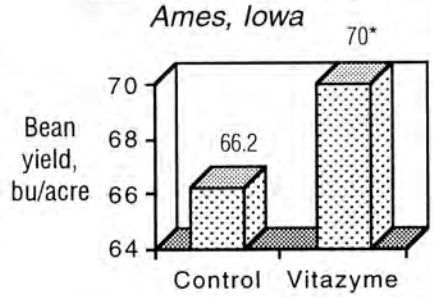
KIDNEY BEANS

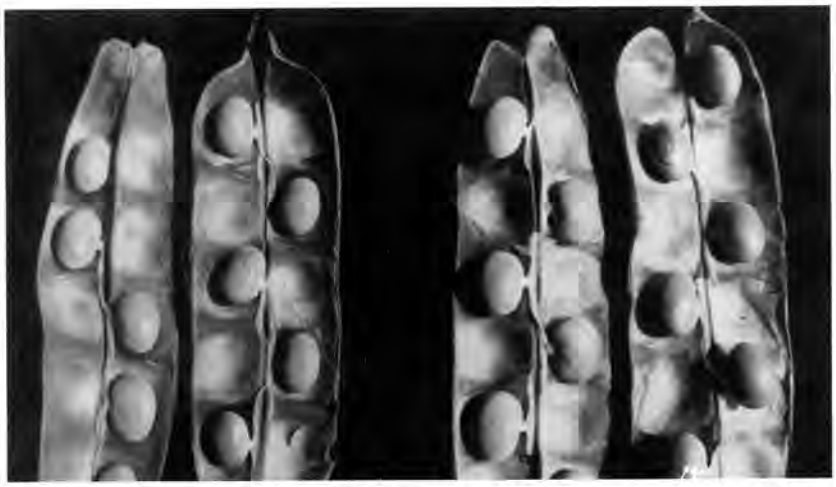
Big Flats, New York



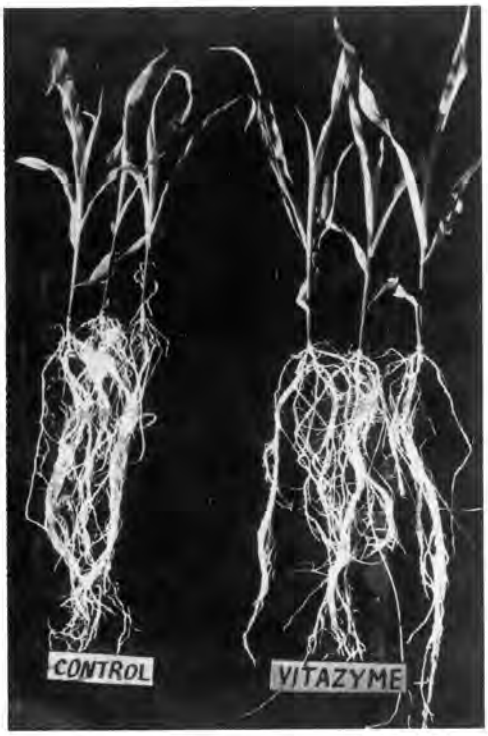
SOYBEANS

Iowa State University
Ames, Iowa





Kidney beans grown with Vitazyme in New York had larger beans and faster maturity than untreated controls.



In a greenhouse study, corn treated with Vitazyme grew faster with greater height, leaf area, and chlorophyll content.

Why Is Healthy Soil Vital to Your Health?

Part 1 - *How the Soil Under Your Feet Affects the Survival of Our Society*

By Harold Willis, Ph.D.

In times when Americans are generally well-fed, we don't like to hear about the millions of Africans and people in the Orient and lesser-developed countries that are starving and malnourished. The pictures of children with soul-piercing eyes and bellies distended from hunger are not pleasant to view.

We feel lucky and safe in "the land of plenty." It could never happen here, we think.

Yet it not only can happen, it is already beginning to happen in most developed countries. Doctors are finding, much to their surprise, that millions are suffering from "hidden hunger" — actual malnutrition.

Now, there are comparatively few people in developed countries who do not have enough to eat (slum dwellers and the chronically unemployed are exceptions), but is the food we eat really healthful, or is it "foodless food"? Is our food rich in all the minerals, vitamins, protein, and other nutrients we need? And is it free of EDB, DDT, dioxin, PCB, aflatoxin, and the dozens of other poisons and carcinogens with which we so carelessly drench our environment?

If you have seen recent news stories about these subjects, your confidence in our food supply might (and should) be shaken. For our lives and health are hanging by a very thin thread, which seems ready to break. That thread is the soil, where our food is produced. We all know that, but do we realize that vital importance of good, healthy soil to OUR health and well-being?

George Briggs, Professor of Nutrition at the University of California (Berkeley), said in a 1972 statement before the U.S. Senate Select Committee on Nutrition and Human Needs that malnutrition and food abuse account for about 30% of health care costs in America. Such modern killer diseases as coronary heart disease, diabetes, cancer of the colon, and high blood pressure are now known to have major dietary factors that contribute to their occurrence.

The Soil-Food Connection

"You are what you eat" says the old adage — and it's true. Our health and the health of our domestic animals is directly dependent on the food we eat (plus proper exercise and a healthful environment). And our food comes from the soil. Sick soil, sick people. It's that simple.

In order for your meat and potatoes to contain your "minimum daily requirement" of calcium, zinc, vitamin B1, niacin, lysine, tryptophan, and the dozens of other vital nutrients, proper nutrients must be present in the soil in which the crops grow (or in the food the steer ate). And the plants must be in good health in order to absorb the nutrients from the soil.

Growing food isn't easy. It's not just a matter of sticking a seed in the ground and coming back at harvest time. Plants and their growth activities are very complex. And the soil, its organisms and chemical properties and interactions, are just as complex, if not more so. Let's take a brief look at that murky world that our life depends on — the soil — and gain a better understanding of its intricacies.

What Is Soil?

Soil is a complex mixture of several components. The basic parts of a typical topsoil are about 45% mineral particles (sand, silt, clay), 25% water, 25% air, and 5% organic matter, which includes the living organisms and the nonliving humus that they help to produce. But it's not that simple. Each of these parts of the soil has its own story.

Minerals

The mineral particles forming much of the soil originally came from the rocks of the earth's crust. They give the soil bulk and form a storehouse of certain nutrients (calcium, potassium, magnesium). Also, the smaller particles (clay) have a large surface area and hold other nutrients on their surfaces by an electrical attraction (ammonium, phosphate, etc.). The various nutrients are not all equally available to a plant's roots, even though some (phosphorus, potassium) may be present by the tons per acre. Some are chemically tied up in the makeup of the mineral particles, and some are too tightly held by electrical forces. Some can be made much more available if the soil is treated right, as we shall see later.

Water

The water of the soil is needed to form the largest part of plant cells and tissues (60-95%), to carry water-soluble nutrients into the plant's roots, and to sustain the life of soil organisms. Too little water in the soil also leads to stunting or death of the plant. But too much water is also bad because it displaces the vital air, leading to suffocation of roots and growth of harmful soil bacteria. These bacteria can produce toxins and release soil nitrogen.

Air

The presence of air and the oxygen it contains is vital to healthy soil. Roots need oxygen and so do the beneficial soil organisms. A well-aerated soil, one with plenty of air, has a loose, crumbly texture, or good tilth, as it is sometimes called.

Humus

The importance of adequate humus in the soil is very great. The pioneer of humus study, Selman Waksman, called humus "the most important source of human wealth on this planet." Humus is formed when soil organisms decompose fresh organic matter, such as animal manures and plant roots, stems, and leaves. Humus is a variable mixture of simple and complex organic substances, including proteins, fats, carbohydrates, organic acids, and lignin.

The contributions of humus to soil fertility are immense. It is a storehouse of many plant nutrients, especially nitrogen, phosphorus, and sulfur. It changes nutrients into forms that are more available to plants and supplies them to roots slowly, as the plant needs them. It also contains growth-stimulating substances (hormones, vitamins) and disease-fighting factors, and protects against toxins, salts, and extremes of pH (acidity and alkalinity). Humus contributes to good tilth, allowing air and water penetration and reducing erosion. It soaks up and holds water, preventing runoff and flooding, and protecting crops from drought. Now can you see why humus is worth its weight in gold?

Life

One of the most vital parts of the soil, but probably the most overlooked is the multitude of living organisms that inhabit healthy soil.

Fertile soil is alive, teeming with an amazing variety of plant and animal life, mostly microscopic. They are a "volunteer army," performing many important functions. The most abundant are bacteria and fungi (there may be several billion in a lump of good soil). Others such as earth-

Continued on the next page

A Healthy Soil Builds a Healthy Society!

Continued from the previous page

worms, insects, mites, protozoa, nematodes, and algae are less numerous.

Their functions include decomposing fresh organic matter into humus, trapping (fixing) nitrogen from the air, transforming unavailable nutrients into available forms, temporarily holding certain nutrients so they won't leach into the groundwater (nitrates, sulfates), producing growth-stimulating and disease-fighting substances, "feeding" nutrients to roots, and secreting a "glue" that helps hold soil particles together and produce good tilth. Earthworms and insects also help aerate the soil by burrowing. WHEW! That's keeping busy!

When Things Go Wrong

Now why would anyone want to cripple this volunteer army or destroy the valuable humus it produces? Soil organisms are instrumental in growing healthy, nutritious crops which are naturally resistant to diseases and pests.

Yet, that is exactly what most farmers are unknowingly doing these days by many of the practices they are following. Not all of the much-promoted modern agricultural technology is really beneficial in the long run. It aims for the short-term goal of higher yields, but ignores crop quality and possible environmental damage. In other words, the basic approach is greed. Who cares whether our grandchildren will have good soil and nutritious food? Thousands of square miles of sterile, poisoned land and dust-bowl conditions are the result in the once-fertile Plains, dead, salt-encrusted, parking lot soil in the West, and five to 200 tons per acre of topsoil erode yearly in hilly areas of the East.

In the last 40 years, the percent of protein in Kansas wheat has dropped from nearly 19% (1940) to 10.5% (1969). The protein content of corn in 1956 was only half what it was in 1911. Livestock raisers now have to supplement their feeds to supply the vitamins and minerals that the crops are lacking, and still they are having trouble even keeping the animals alive.

The use of synthetic commercial fertilizers has skyrocketed since World War II (from less than ten to over fifty million tons per year). At the same time there has been an overwhelming trend toward larger farms and fewer farmers.

Weed and pest problems are worse now than most previous decades, in spite of ever-increasing use of herbicides and insecticides. More and more species of weeds and pests are becoming resistant to the most powerful poisons we can throw at them. Groundwater in most agricultural areas is now polluted by pesticide residues.

Why all these problems? It all traces back to depleted and poisoned soil and the modern agricultural system that led us into this mess. The present system works like this. The country extension agents, farm magazines, and fertilizer/chemical dealers feed you the recommendations of the state universities and U.S. Department of Agriculture. Those recommendations are based on university and U.S.D.A. research. The researchers were educated at the universities. So were the textbook writers. The universities receive grants from fertilizer and chemical companies to do research, especially on their products (otherwise grant money is cut off).

The U.S.D.A. was founded partly to insure the public a reliable supply of food at low price. This "cheap food policy" influences government agricultural policies, along with the greed of bankers and industry. Thus, farm market prices are manipulated and government programs are designed to increase farm output while paying farmers as little as possible and reducing the number of farms in the name of efficiency. Much of the production is exported overseas and cries of "surplus" are sounded to keep the market price low. Economic policy is set by politicians, businessmen, bankers, and scholars — NOT farmers.

The modern agricultural system, with its "science-can-save-us" approach, is causing problems at every turn. Just about every new technology and product eventually boomerangs on us, creating more problems than they solve.

No-Till

Take, for example, the much-promoted methods of reduced tillage (called no-till, conservation-till, minimum-till, etc.). They sound pretty good at first glance, and they are promised to reduce soil erosion, which no patriotic American could be against. They also are said to build organic matter, save precious fuel, and still produce yields that are "the same or higher" than with conventional tillage, according to a recent news release.

What the farmer does is leave the remains of the previous crop (plant residue) on the surface of the soil rather than plowing them under. The mulch thus formed protects the soil from erosion and conserves moisture. Planting is done through the mulch with special planters. Trips over the field are reduced, saving fuel.

But listen to the rest of the story. The mulch harbors insect pests and weeds, keeps the soil too cool in the spring (in northern climates), and produces little humus for the soil. Yields are not "the same or higher" in cool, moist, dense soils. Because of the increased threat of weeds and pests very large amounts of herbicides and insecticides must be applied. These poisons can upset or harm the delicate balance of beneficial soil organisms. Thus, less humus is produced and soil tilth becomes worse, leading to hard, compacted soil. Roots then begin to suffocate from a lack of oxygen and the plant becomes stressed. Harmful bacteria in compacted soil produce toxins, adding more stress. Pests and diseases generally attack unhealthy plants. And most weeds grow best in compacted, out-of-balance soil.

Are we going around in circles? You bet! The sad fact is that most of the desirable results of reduced tillage (erosion control, better tilth, increased water retention, reduced weeds and pests, high yields) can be obtained by using other common-sense methods that do not use heavy applications of toxic pesticides and do not harm beneficial soil life.

To be continued in the next issue of *The Vital Earth News, Agricultural Edition*

Lessons of the Ancients

Continued from page 2

nitrogen problems, no doubt as in their soils it was taken care of by nitrogen-fixing microbes. After all, it was not until the twentieth century that chemical nitrogen fertilizers came into common use.

The End of It - A Lesson For Now

Why did these agriculture-based and highly developed civilizations eventually decline and die? Ambitious wars have been given as one reason, but the basic reason was quite possibly that the prosperity and general affluence of the people led to neglect of the labors needed to properly maintain the land. While neglect of the land does not have much effect for a generation or two, eventually the land will wear out. For example, by having depended on conquests rather than on its own agriculture, the Roman Empire declined very fast. On the other hand, Egyptian civilization, with its land kept fertile by the Nile River, lasted longer than any other. Impoverished soil, even in the best endowed countries, must now be recognized as the number one problem for this and future generations.

Reconstruction By Way of the Soil

It should be of particular interest that ancient farmers knew what we seem to have missed, namely how to rehabilitate soil worn out or rendered desert-like by abusive farming. This is exactly what was accomplished by the Arab farmers in Spain over a larger area than had ever been done before or since, and today considered practically impossible. The area was the southeastern part of Spain, which had been laid waste by a century or more of Roman grain growing. It was rehabilitated about 500 years later and then maintained as the most productive part of the Arab empire for another 600 years.

There is not the slightest doubt that the same would be both practical and economical today. It was confirmed by the writer's experiments in the same area of southern Spain, now desert-like again, using the same thousand-year old method. Recycling enough by-products of life to the land as compost is all that is needed to bring the soil back to life, productivity, and to natural resistance against pests and disease. An official test of this in the United States should certainly be on the priority list of our environmental regulators.

It is long overdue that we recognize that plants cannot grow on the three elements in our so-called "complete" NPK chemical fertilizers. Plants need some thirty other elements, of which carbon is the basic, yet almost totally neglected one. Attempts to counter declining yields with more chemicals increase the need for carbon. The prevailing concept that this can go on is a tragic illusion, having led to the abandonment of once-good farmland, if not already eroded or blown away, on a more and more frightening scale. Great credit and deep appreciation are due to the few farmers of our times who have recognized that there is no substitute for humus with its carbon, and therefore have converted to "organic farming". Their prosperous farms are their well-earned reward.

It is inconceivable that present farming practices can prevail much longer. Neither money nor lower interest rates can solve the problem. To prevent inevitable chaos, the land has to be rehabilitated to at least what it was some 50 years ago. How it can be done was shown a thousand years ago by the Arabs in Spain, where deserts left by a century of Roman grain-growing were brought back and maintained for more than six centuries, at unsurpassed productivity . The method was simplicity itself, namely enough good compost from judicious recycling of the by-products of life.

Unbalanced Soil is a Serious Health Hazard

Blinded by our superb technology in other fields, the concept has grown that a process like farming is just another chemo-mechanical process like making paper or textiles. Maintaining the soil, which is the basic prerequisite for permanent farming, needs more than chemicals, although they may be used too where there is enough carbon in the soil. Soil is alive by being the habitat of millions of microbes per ounce. These microbes must be kept alive and reproducing for plant life and animal life and human life to prosper. The basic element for all this is carbon, which makes up about 50% of the protein, about 40% of the carbohydrates, about 70% of the fats, as well as about 30% of our troublesome garbage.

The disastrous effects of carbon deficiency are not limited to the structure and fertility of the soil, but carry over to the crops. Carbon deficiency is particularly serious where chemical nitrogen fertilizers are used. Where there is not enough carbon for the protein buildup in the soil, excess nitrogen is absorbed by the plants as nitrate, a substance which is detrimental to humans and animals.

Another negative effect of carbon deficiency in soil is the steadily worsening pest problem, despite stronger and more deadly poisons. It would be well to recognize that agricultural pests are almost as much a part of the natural system as the plants. Their role in nature is to destroy plant life which is deficient and thereby unfit to reproduce. Agriculture did very well without modern pesticides. Now, however, our soils have become so poor and chemicalized that deficient plants are normal instead of exceptional. The pests

See Land Recovers, page 10

The Farmer

A farmer is a man
who works out in the sun,
Wearing out two pairs of britches,
growing crops enough for one.

He milks his cows or slops the hogs,
or feeds his steers too fat,
He starts each year with nothin'
and loses most of that.

At planting time or harvest,
checking weather by his nose;
What isn't lost to drought or flood
is eaten by the cows.

Gamblin' is illegal,
whether racing horse or a hound,
But day by day he'll get away
with gamblin' on the ground.

A boxcar full of fertilizer,
herbicide and seed
Couldn't make the best corn plant
outgrow the poorest weed.

The horses have the colic,
he buys a sterile bull,
A coyote got the last chicken,
his ewes lost all their wool.

But the only lines you'll see
upon his wrinkled face
Are those that are caused from grinnin'
at the whole danged human race.

The smartest man would starve
out on the family farm,
But his wife thinks he's a genius,
it doesn't do much harm.

The kids all help their papa
in the "work for nothing" stage,
Then they all drive 50 miles to church
to hear sermons on minimum wage.

Heaven help the family
that lives off the fat of the land.
Heaven help the nation
that doesn't understand.

Anonymous

A Vitazyme Program Success Story

By Robert M. Hudak, President, Ag Biotech, Inc.

Many of us who have been through the land grant college system or have been exposed to recommendations by land grant colleges have been conditioned to view the soil as merely a prop to hold plants upright, while we supply all of the needs of the crop with chemical fertilizers, primarily nitrogen, phosphorus, and potassium. While at first glance this might seem like a fail-safe method, exposure to high concentrations of salt-based fertilizers causes stress to crops.

Crops under stress have a low sugar content and high free amino acid content. This condition invites a wide array of insects and pathogens which requires the farmer to employ expensive toxic rescue chemicals. This approach to soil fertility, namely using high rates of NPK fertilizers, is not only expensive, but leads to the excessive use of toxic chemicals and a decrease in the quality of our food supply.

Another approach to food production that has become popular recently is organic farming. The disciples of organic farming eschew chemical fertilizers and toxic rescue chemicals, instead relying on high levels of organic matter in the soil to provide nutrients to the crop and to stimulate beneficial microorganisms in the soil which will solubilize nutrients that would otherwise be unavailable. This method works fine for small farms but is not practical for large operations that are not blessed with a cheap source of organic material in close proximity. Also, many fine products are excluded from use by organic certifying boards because of narrow definitions of "organic" or the refusal of manufacturers to disclose exact formulation procedures.

"We have two goals...

(1) Grow the best crop that can be grown with the least input cost.

(2) Improve long-term soil fertility and structure."

In an effort to marry chemical farming and organic farming into an effective means of production for mainline farming practices, we use the term "biological farming". We have two goals when we formulate fertility recommendations: first, to grow the best crop that can be grown with the least input cost; and second, to improve long-term soil fertility and structure. Starting with a soil audit, we first determine the mineral ratios and make recommendations for the addition of various elements to bring these ratios into balance. The balance of nutrients in the soil is more important than the amount of nutrients. When nutrients are imbalanced many nutrients are locked up or unavailable. Bringing nutrients into balance releases many of these previously unavailable nutrients. When proper nutrient balance is achieved, the natural fertility of the soil is released.

After the mineral ratios are balanced we use a combination of food grade fertilizers and organic materials, including Vitazyme, to create a starter solution that is placed directly on the seeds, or roots of transplanted material. This rich mixture of nutrients — in a very available form — and biostimulants produces vigorous root growth even before emergence; transplanted crops such as tomatoes and cabbages root much faster and withstand drying conditions much better.

For many crops we begin a foliar feeding program within a few weeks after emergence/transplanting. Vitazyme is often included, usually about a month or six weeks after the initial application. For crops that flower, a special nutrient mix plus Vitazyme is applied at early blossom to "trip" or accelerate blossoming. This insures maximum blossoming even when environmental conditions are unfavorable, and more uniform maturity at harvest.

Even under the different soil conditions of this New York cabbage field, Vitazyme helped push the crop towards an excellent yield.

Fall residue management is an important part of our program. Establishing a good rot cycle is essential to maximizing the fertility potential of a field. This is accomplished by applying carbohydrate-based products, various mineral compounds, and Vitazyme to crop residues. The result is more efficient breakdown of organic material into humus by an increased number of beneficial microorganisms. This releases nutrients the following spring for use by the next crop.

This spring in the Northeast, conditions

See Vitazyme, page 12

A PRECIOUS COMMODITY

If you had a bank that credited your account each morning with $86,400, that carried over no balance from day to day, and allowed you to keep no cash in your account, and every evening canceled whatever part of the amount you had failed to use during the day, what would you do?

Draw out every cent, of course!

Well, you do have such a bank. Its name is "Time." Every morning it credits you with 86,400 seconds. Every night it rules off as lost whatever of this you have failed to invest to good purpose. It carries over no balance. It allows no overdrafts. If you fail to use the day's deposits, the loss is yours.

Land O'Lakes Mirror, January, 1985

Land Recovers When Compost is Added!

Continued from page 8

not only proliferate in proportion but become increasingly resistant to the poisons. With millions of tons of extremely toxic pesticides, herbicides and nitrates entering our soil, food, water, and air, where can we expect to be headed?

Also, mineral deficiencies caused by soil impoverishment have greatly added to the health problems of our times. Correcting them as part of present chemical fertilizer methods is extremely complex, costly and hazardous. Some thirty elements are also trace minerals like boron and molybdenum, of which four ounces per acre may be enough, but a pound an acre too much. With modern industrial-type composting, such as is done with the Eweson Digester System, it is simple to correct such soil deficiencies. A better understanding of this would render mandatory the co-composting of our increasingly polluting municipal garbage and sewage.

The Big Question

With increasing awareness of the problems associated with soil impoverishment, why have the simple means of correction been overlooked by most agronomist and farmers? The principle reasons are probably (1) failure to recognize that there are no real "wastes" in the natural system, but only by-products, on which other forms of life (like soil microorganisms) must depend, and on which, in turn, all higher forms of life must also depend, and (2) failure to recognize that municipal garbage and sewage, like all other matter, are indestructible. Unless re-cycled to the soil, as Nature intended, they will always "come back" in one form or another to pollute the eco-system. When garbage is burned, for example, what does not remain as ash must go into the air, as toxic soot and gas.

With the Eweson composting technology, soil rehabilitation is both simple and economical, and pollutive municipal waste is converted to humus, totally free of pollution. Carbon-rich garbage and nitrogen-rich sewage sludge complement each other to perfection as raw materials for compost. The entire process is less than half as costly as incineration, and is competitive in cost with new landfills. Composting in the Eweson system can be accompanied by salvage and recycling of paper and metals, further relieving the strain on diminishing natural resources.

Conclusion

The astounding effectiveness of compost is very poorly understood. Above all, compost must not be compared with chemical fertilizers. Normally, these days, a quarter to a half of the chemical fertilizers applied to the land is lost by leaching. The least of the attributes of compost is that none of it leaches. To the contrary, it holds chemicals and prevents them from leaching, when chemical fertilizer is combined with compost in the application to the land. Chemical fertilizer contains no carbon. Unless there is sufficient carbon in the soil for the plants to draw on, chemicals will be useless. Compost is rich in carbon, and in addition has all the thirty or more elements needed for healthy plant life.

Applying two tons of compost per acre on fair soil will be of more immediate benefit to the land than applying eight to 10 tons per acre of cow manure. Furthermore, compost goes to work immediately, whereas raw manure must be converted to humus to be of any appreciable value to the land.

There is no mystery about present agricultural surpluses. They are not the result of sound farming, but of "mining" soil of its humus by increasing applications of stimulating chemicals. While this seems effective for a time, despite the growing pest and weed problems, it is at the final cost of destroying the very life of the soil and its humus. When land becomes worn out, chemical fertilizers become ineffective. The danger of our times is the idea that, though much is wrong with what we are doing to our land, water, and air, modern science will somehow come to our rescue. Unless our municipal wastes are recycled to the land, there may be no rescue. ■

THE VALUE OF A SMILE

It costs nothing, yet creates much.

It enriches those who receive, without impoverishing those who give.

It happens in a flash and the memory of it sometimes lasts forever.

No one is so rich he can get along without it, and no one is so poor that he is not richer for its benefits.

It creates happiness in the home, fosters good will in business, and is the countersign of friends.

It is rest to the weary, daylight to the discouraged, sunshine to the sad, and nature's best antidote for trouble.

And if in the hurry and rush of the day, you meet someone who is too weary to give you a smile—leave one of yours.

For no one needs a smile so much as those who have none left to give.

Land O'Lakes Mirror, January, 1985

Rain and Snow Caused by Bacteria?

By Paul W. Syltie Ph.D.

An article in *National Wildlife* (December-January, 1985), entitled "Crystallizing the Truth", describes some recent work done by scientists in the field of atmospheric research. Aside from discussing the mysteries of why no two snowflakes are alike, or why they oftentimes form from liquid water below -40 degrees F, scientists have found that snowflake crystals seldom form around specks of dust as once thought. When Charles Knight, a physicist at the National Center for Atmospheric Research in Boulder, Colorado, measured the number of ice nuclei in a cloud he found that there were about a thousand times more ice crystals than nuclei!

In the 1950's scientists found a correlation between meteorite showers and rainfall, but no evidence was forthcoming that meteorite dust induced ice crystals. Then more recently Russell Schnell of the University of Colorado came up with the statement that "all rain and snow is probably biologically initiated." Two very common species of bacteria, *Pseudomonas syringae* and *Erwinia herbicola,* contain a molecule which has the best affinity for water of any observed so far. In a cloud chamber Schnell can inject these bacteria and immediately turn the vapor into snow. He and other researchers have calculated that enough bacteria are blown off plants and thrown into the air by ocean waves to account for a high percentage of the earth's rain and snow. There are other ways as well in which raindrops or snowflakes can form which are discussed in the article, though they

See Rain, page 12

Building Fertility With Animal Manures

By Neal Kinsey

Even if you presently cannot or do not use manures in your agricultural operations, reading the material here at least once could help considerably if you should ever be faced with such a possibility.

In the recent past it has generally been considered as nothing more than a low-value fertilizer — a liability rather than an asset. Manure should not be valued only on the basis of what nutrients an analysis will show to be present. If you can apply manure at the cost of the nutrients it contains or less, that is a bargain if P and K are shown to be needed by a soil test. When phosphate (P) and/or potassium (K) needs are great, the use of manure is an excellent method to increase their availability. And as a detailed soil analysis can show, when calcium and magnesium levels are correct, levels of P and K will benefit by more than the amounts shown to be present in the manure.

Neal Kinsey is a soil and crop consultant based at Charleston, Missouri. He is the author of *Hands-On Agronomy,* published by Acres, U.S.A., P.O. Box 8800, Metairie, Louisiana 70011.

In order to better explain how this happens, consider that different types of tests are available which can show various measurements of the elements that are present in the soil. The tests generally used are those concerned with measuring plant nutrient availability for the crops to be grown. This is the standard soil test, such as the ones we commonly use, which measures major (N-P-K-S), secondary (calcium and magnesium), and trace elements (boron, iron, manganese, copper, zinc, and sometimes molybdenum or chloride).

But another test which can be made is called a total nutrient analysis. It shows that soils vary widely in their makeup of nutrients. This analysis measures all the nutrients in a soil, including the portion available for the plants to use, and the amounts present in the soil in forms which are not able to be utilized by the growing crops. The total amount of a nutrient present in a soil can be many times that amount available in the form which plants must have to grow and produce. For example, an average topsoil from the Corn Belt can have 30,000 to 50,000 lb/acre of potassium, but all except 200 to 600 lb/acre will normally be present in forms which the plants that grow there cannot utilize. Phosphate, calcium, magnesium, sodium, and certain trace elements are also found in much higher amounts than what is there in the forms which plants can utilize.

When manure is applied to a soil, it certainly adds the nutrients contained in it. But while stimulating the microbial activity in that soil, mild organic acids are formed in the process which work on and break down the nutrients plants need.

Manures have been used for centuries to maintain and build soil fertility in all areas of the world. There is no reason that modern farmers should limit their use of this most valuable resource whenever it is available (U.S.D.A., Soil, The 1957 Yearbook of Agriculture).

> ***"Manure and compost, used when and where needed, can provide tremendous overall benefits to the soil and crops grown there."***

These can be converted in this way from the unavailable forms into those forms needed by the crops. In soils that contain reasonable calcium and magnesium levels, this is a process which can be seen by use of a detailed soil analysis. In soils without reasonable calcium and magnesium levels, this build-up can be harder to detect.

In addition, manure can contribute considerably to the soil's organic matter content. For example, a ton of beef manure containing 80% moisture will contain almost 400 pounds of organic material. The organic matter in the manure helps control the slow release of the nitrogen bound in that organic matter. Nitrogen bound in the organic matter must be converted to ammonium before it can be used. As a result, only about 50% of the nitrogen in the manure is available for the crops to be grown there the first year. On soils with naturally high organic matter levels, increases in crop yields at the outset from an application of livestock manure generally begin small. But in shallow or leached soils the response of crops to manure is generally very good.

In terms of effectiveness and availability, manure should be incorporated quickly. Its relative value in increasing crop yields is reduced by about 50% after four days' exposure under field conditions.

Manure and compost, used when and where needed, can provide tremendous overall benefits to the soil and crops grown there. But the tendency to put everything on the dry areas closest to the barn, to "pile it on" the garden every year, and to otherwise overapply manure and compost in various locations around the farm, can cause problems. To what degree problems will result depends on what shape the soil is in to start with, and what it requires or has the ability to withstand. The only sure way to know is to use a soil analysis that accurately reflects the needs of the soil. ■

Rain and Snow Caused by Bacteria?

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may be minor when compared to the biological mechanism.

Once again science is discovering the beautiful designs of nature which operate in synchronous unity with the whole of the parts. If certain portions of nature's cycles are short-circuited, then other aspects of the workings of nature cannot be expected to operate as well...if at all. Nature has a remarkable way of forgiving man's physical abuses thrown at her, and either repairs the breaches or finds a way to circumvent the problem.

Yet, there comes a time when the cause is too great to hide the effect. Can it possibly be that by reducing the world's forest and year-long vegetative cover we are reducing the number of microorganisms that can take flight through wind dispersal? How might herbicides, insecticides, and other pesticides sprayed over the earth in prodigious amounts each year reduce total bacteria numbers in the soil and on plants... and thus reduce rain and snowfall proportionately?

Perhaps the earth might in some way communicate its need for rain to the air above through releasing more bacteria into the air when soil conditions are dry. As scientists and other perceptive observers uncover the truths of the natural world, the creation appears more and more profound to us. ■

Let Nature Teach Us the Way to Treat Our Soils

Continued from page 2

shouldn't we maybe be looking at the greatest profit per acre, not whether or not our yields are maximized? In recent years, sustainable agriculture has gained some popularity, and its major tenet is to use farming methods that aren't used at the expense of future crop productivity.

Nature Assisted Agriculture — the thrust of Vital Earth Resources

We at Vital Earth are dedicated to becoming avid students of the natural system, finding out how soil chemistry really works, and then fine-tuning the cropping program so that it works in perfect harmony with what nature is already doing. This does not mean that we are against the use of fertilizers, pesticides, and herbicides. We only suggest that a farmer consider carefully the impact of each crop input on soil structure, chemistry or microbiology.

Long before we arrived on this continent the natural systems were at work, and vegetation abounded in the form of timber or prairie grasses. This vegetative cover left behind years' worth of life-supporting topsoil and crop-boosting humus, but have we considered that this is a finite resource? When the topsoil and humus are gone, so will be our ability to make a living off the land.

With these thoughts on our minds, we therefore dedicate our efforts to preserving these resources and promoting **Nature Assisted Agriculture.** ■

Vitazyme: Increases Production, Decreases Cost!

Continued from page 9

started out wet and stayed wet well into summer. Particularly hard hit in our area were the onion growers on organic or muck soils. All of our customers who used Vitazyme in their seed-placed drench noticed better germination and populations in the wet spots. I looked at many Vitazyme treated fields this year where I could see some retardation of growth in wet areas, but plant population was not affected. Adjacent untreated fields were bare in the wet areas. All the onions had died. This may be due to disease suppression by Vitazyme or increased vigor, or both.

"It [Vitazyme] is... the least expensive biostimulant on the market, and in my opinion the best."

Vitazyme has come to be a pivotal part of our fertility program for two reasons: effectiveness and cost. Vitazyme seems to synergize well with our other organic and food grade nutrients and works well toward the long-term balancing of soil nutrients. It is also the least expensive biostimulant on the market, and in my opinion the best.

Our main goal for our customers is to increase net income. This is accomplished in three ways: reducing input costs, increasing production, and improving quality. Vitazyme is very important to all three of these objectives. ■

"Always forgive your enemies; nothing annoys them as much."

Oscar Wilde

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, Agricultural Edition* is a periodic publication of Vital Earth Resources to inform primarily our agricultural customers and other interested parties about agricultural products and programs, and to educate our readership on the critical issues facing today's and tomorrow's food production. If you would like to receive future editions of this newsletter, please write Vital Earth Resources, P.O. Box 1148, Gladewater, Texas, 75647