The Anatomy of . . .

Life & Energy in Agriculture

Arden B. Andersen

THE ANATOMY OF LIFE & ENERGY IN AGRICULTURE

COVER: USDA Photo. Successful control of erosion is seated in fertility management, sound tillage practices, and knowledge of life and energy in agriculture.

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Dedication and Thanks

This book is dedicated to the ascension of mankind, to those who choose to eat to *live* over mere survival or existence, to those who wish to experience the joy of eating the truly high quality food which God intended for us to enjoy, to those who choose to coexist with planet Earth rather than co-destruct, and, most of all, to the greatest miracles of all, *the children*, both those present and those yet unborn. One of the greatest expressions of our love is to provide them with healthy, healthful, *life*-giving food in accordance to God's divine blueprint. A healthy, vibrant, happy child is indeed the manifestation of love.

In addition, I convey my love and deepest appreciation to my father for the many hours of exchanging ideas and practical advice into practice; to my mother for her patience and enthusiasm; to my many friends for their support, enthusiasm, and insightful evaluations—especially Cynthia Dunster; Ted and Rose Baroody; Gene and Margie Logue; Asparita; and Jackie Woods. Special thanks go to Christopher D. Walters, whose editorial skills conferred upon this book a professional literary tone it otherwise would not have enjoyed.

Finally, I give my thanks, respect, and deepest appreciation to the person who conveyed to me the basic foundation of my development in this work and posed the many initial challenges which have fueled my curiosity. I shall never forget his favorite statement, "See what you look at." He was Dr. Carey Reams.

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FOR THE RECORD

I first met Arden Andersen a few years ago at an *Acres U.S.A.* conference. We had lunch together and he outlined his philosophy of farming for me. I was impressed by Arden's knowledge of the living soil. I suggested that as a research project he obtain from Bartington Instrument Company in Oxford, England a magnetic susceptibility meter to study the paramagnetic properties of soil. He did so and in short time demonstrated that the cgs (centimeters/grams/per second) reading of the soil varies over time (24 hour cycle). The same phenomenon of course, happens to rock from which soil derives.

Unlike the magnetic susceptibility meter, which we understand, Arden also utilizes, and gets results, with that mysterious box we call a *radionics* instrument. Arden calls it an *electronic scanner*, which in my opinion is a better term for it than either *radionics* or the *eloptic energy* term used by Galen Hieronymus. Incidentally, there are almost 200 terms used internationally for the energy measured by Anderson.

Radionics was invented by Albert Abrams at the turn of the century. The best known developers in the U.S. have been Galen Hieronymus and Pete Kelly. As in all new discoveries, more than one person has been involved. Surely, no man is an island unto himself! In the final analysis, however—whatever the instrument ends up being called—it should be admitted that it measures a series of electronic *tuned circuits* hooked to an *antenna* at one end and an *oscillator* (the human body) at the other end. How do I know? Because Arden let me take his in-

strument apart, which vouches for his intellectual honesty. The tuned circuit and antenna was invented, as is well documented in patents, by Nikola Tesla, so he is the real father of the radionics instrument in its present state as marketed in the U.S.A.

I believe that utilized by a trained and *sensitive operator*, this instrument works. The key words are *sensitive operator*, for not everyone can run the 440 in record time. Some will do better than others. In my opinion, the three pentode tuned circuits serve as an inpedence matching device between the antenna (soil in the input well) and the oscillator (the human being).

Regardless of whether or not one believes in the electronic scanner instrument, Arden's book is a marvelous treatise on how to prepare the soil. His philosophy is summarized in one phrase quoted from this well written book, "chlorophyll energy over wires."

He demonstrated in detail the fallacy of the agribusiness method of nurturing soil and put a "hammerlock" on the insane recommendations coming out of many University Experiment Stations and Government Laboratories.

The chemistry that Arden outlines is not a quick-fix-drug-for-soil chemistry, but a gentle, love-and-feed-for-soil chemistry, based on solid biochemical and biophysical processes.

I recommend that gardeners and farmers read the first four chapters carefully. They outline in detail the difference between deadly slow kill agribusiness farming and farming as it should be. Thank you, Arden, for a well written and informative book—a book for all who love country and soil, and strive to keep farming a partnership with God.

Philip S. Callahan
Gainesville, Florida

FOREWORD

We have the fortune of inhabiting a beautiful miracle of nature. Where else can one find the ideal circumstances for sustaining life? Unfortunately, our planet is dying. It is becoming less and less fit to sustain life. The fertile soils are disappearing. The fresh, clean waters are becoming polluted and poisoned. Vast forests are dying or being stripped. People and animals are dying of widespread starvation and many are dying due to malnutrition even though their stomachs are full. The food is deficient because the soil is deficient.

Agricultural practices prevalent for the past 100 years are based upon invalid theory by the simple fact that they do not work. If they were valid, we would not have the polluted streams, rivers, underground aquifers, lakes, soils, foods, animals, and human beings. According to the May 3, 1985, issue of *Minnesota Land Magazine*, the U.S. has lost approximately half of its topsoil in the last 100 years. All for what? Facts are facts. They do not change. Theories can be changed and so can the destruction of our environment. That is a fact. Have you ever wondered for what or why some of the most deadly chemicals are invented? Try *agriculture*. How much of industry's pollution is a result of producing something for agriculture? And what about energy consumption? The agricultural industry is the second largest consumer of energy in this country. Where have we placed our priorities? When soil degenerates, the growing plants degenerate and the consumers degenerate. This in turn creates a demand for the production and sale of products to combat the symptoms degenerate soil creates. There are chemicals to fumigate the soil for insects and diseases, chemicals for weeds, and finally chemicals for doctors to give sick consumers to cover up new

maladies and diseases. Are short term profits worth long term bankruptcy? The September 27, 1984 issue of *New Scientist* stated that between 1960 and 1979 Czech farmers tripled their fertilizer use. Yet crop yields increased by only 52%. The soil was damaged, and now yields are diminishing with no decrease in fertilizer usage. The U.S., considered the world leader in agricultural technology, exported this technology to Czechoslovakia. How humane.

Consider a statistic closer to home. According to the *Statistical Abstract of the U.S. 1985*, 105th edition, U.S. Department of Commerce, Bureau of the Census, page 668, the U.S. exported 312 billion pounds of beef but *imported* 1,931 billion pounds of beef, or over six times what was exported that year. The government then turns around and claims that we have surpluses because the American farmer is overproducing. The irony of it all is that people who are profiting financially are as sick or more sick than anyone else. Their profits can't buy health.

The mass media, the FDA, and the National Cancer Institute would like the public to believe that human health and longevity has improved over the past 35 years. Cancer is a $60 billion business annually, and growing.

According to a recent report in the *New England Journal of Medicine* of the statistics compiled by the U.S. Department of Commerce, Bureau of Census over a 24-year period, there has been no significant increase in overall survival rates for cancer patients. One in every three Americans is ill with cancer versus one in seven ten years ago. Health in America has been and is declining, and this decline directly parallels agriculture. Revitalize the health of the soils and crops will be revitalized. As a consequence they will become nutritionally healthful for consumers.

There is a way out and up. This book outlines the beginning steps one can take to make this ascension. Good health is no accident. It is a *natural* phenomenon. The first place to begin is with education. You must first know the facts. Seek and you shall find. Enjoy your journey. Truth is ever simple. Falsity is ever complex.

1

LIFE AND ENERGY

I prefer to define life as love. In love there is progression. It is very difficult to progress mentally, emotionally, or spiritually if one is not in the best possible health physically. Life should be a celebration. Growing your own food should be a celebration. After all, it should be teeming with life. Since we are what we eat, our body is only as vital as the food we eat.

The basis of life is God. (If this infringes upon your belief system, insert Creator, Universal Life Force, or whatever you are comfortable with.) God supplies the life force energy; everything is energy, whether it be thought, soil, air, water, or some chemical. What makes each thing different is the energy pattern and frequency at which it resonates. Some patterns and frequencies are detrimental to biological life and some are beneficial. Our goal is to minimize the detrimental and maximize the beneficial.

Most people are familiar with electrical energy at least to the degree that they understand AC/DC current. It enables us to use electrical appliances such as lights and computers, and can cause great bodily harm if misused. This energy is only a very special case of the universal energy I am referring to; in fact, the electrical energy we use every day is actually quite primitive

and even more primitively and inefficiently generated. According to Professor Shirrichi Seike, Director of the Gravity Research Laboratory in Chime, Japan, there are 8.8×10^{13} volts per centimeter in the ether, tachyon-field or energy bubble in which we live. This is a part of the life energy provided for us free of charge. Nikola Tesla proved and demonstrated in the late 1890s that this energy could be tapped to operate conventional electrical machines and could also be transmitted around the world without wires with a loss of less than one half of 1%. In 1931, Tesla invented and engineered an energy converter which he combined with an electric motor, installed it in a Pierce Arrow automobile and performance-tested it. The car performed comparably to gasoline powered autos and cruised at 90 mph, totally without pollution or fuel expense.

Dr. Henry Moray invented a free energy convertor and applied for a patent on July 13, 1931, only to have it rejected because the patent office did not understand its supposedly impossible principle of operation.

In 1948 Dr.Wilhelm Reich coupled a 0.5 volt exciter dynamo with an orgone energy accumulator to supply a 25 volt motor with a permanent energy supply. "Orgone" is the term Wilhelm Reich gave to the life force energy of the ether, or atmosphere. It is the primordial, mass-free energy out of which all matter manifests. More recently in free energy generation came the Permanent Magnet Motor, U.S. No. 4,151,432, April 24, 1979; the Kieninger N-Machine and the De Palma "Sunburst" N-Machine; and the Transistorized and Mobius Coils.

What does this have to do with growing plants or gardening? Everything. The same energy that Tesla, Moray, and Reich tapped to produce conventional energy is what plants and animals, including humans, live on.

We are usually taught that life on planet earth is directly or indirectly dependent on sunshine. The life cycle is typically depicted as starting with sunlight, water, and carbon dioxide, plus some essential nutrients. Matter is produced in the form of organisms called plants, which contain chlorophyll. Plants are then consumed by animals for food and sometimes the animals are consumed for food by other animals. This food is digested

by the consumer and the unusable portion is returned to the earth to be recycled. Many statistics and so-called factual conclusions have arisen from this hypothesis. Such statements as, ". . . it takes a given number of heat units to mature a crop" (heat units are defined as time in relation to temperature above a certain minimum temperature), or "plants must have sunlight to undergo photosynthesis." The dominant assertion is that life depends upon those things we can or choose to observe via our five senses, which we only use within an arbitrarily defined limit. Simply speaking, these conclusions are not incorrect. They just do not explain what is really happening in the fabulous wonders of nature.

Dr. T. Galen Hieronymus showed decades ago that plants did not necessarily need sunlight to grow normally. Dr. Hieronymus coined the term *eloptic energy*. He essentially observed and worked with the same energy that Reich termed orgone energy. The following is his account:

CHLOROPHYLL ENERGY OVER WIRES

About 1930, I decided to try an experiment of conducting chlorophyll energy over wires. I had been conducting eloptic energy over long distance via wire.

A wood platform was installed on the south side of the house about six feet above ground. Later experiments indicated that the platform must be at least six feet above ground in order to get the desired potential of energy which increases with distance above ground.

Having some wooden cigar boxes available, I cut boxes apart and cut pieces and made eight boxes that were 2 inches by 2 inches by 4 inches, although any size boxes will work.

Aluminum foil was placed on the bottom of seven boxes inside so as to be in contact with the soil. Similar pieces of foil were placed on the under side of the lid of each box. Wires were connected to each piece of foil, the wires from the lids were extended to the sun plates, the wires from the bottom foils were connected to the water pipe and thus grounded.

Refer to figure 1 which shows a "side" view of the installation.

Seven plates were placed on the platform so as to pick up energy from the sun and wire was connected to each plate and extended down into the basement, each box, having the top foil plate connected via wire to a plate out on the platform in the sunlight. The eighth box had no connection to the outside, it being the "control."

The plates placed on the platform were all different in size. The smallest was 2 inches by 4 inches, the next 4 inches by 8 inches, the largest was about 8 inches by 10 inches, and one plate was copper screen wire.

Some soil was screened and one half inch of it placed in each box. Oat seeds were selected, all of uniform size and planted in two rows of five seeds spaced in each row, then one half inch of dirt was placed on top in the box. The same amount of water was added to each box as needed from day to day.

All of the seeds sprouted about the same time. Then we noticed that there was no chlorophyll in the ten plants in the control box. All of the boxes connected to outside plates had plants with much chlorophyll.

We were quite surprised to note that the plants in boxes with large outside plates seemed to look as if they had been subjected to heat. Apparently, the large outside plates were bringing in an excess of energy compared with the effect of the small size outside plates.

Very soon the plants grew too tall for the small amount of head room in the boxes, so each box was equipped with a spacer to raise the top of each lid up about three-fourths of an inch.

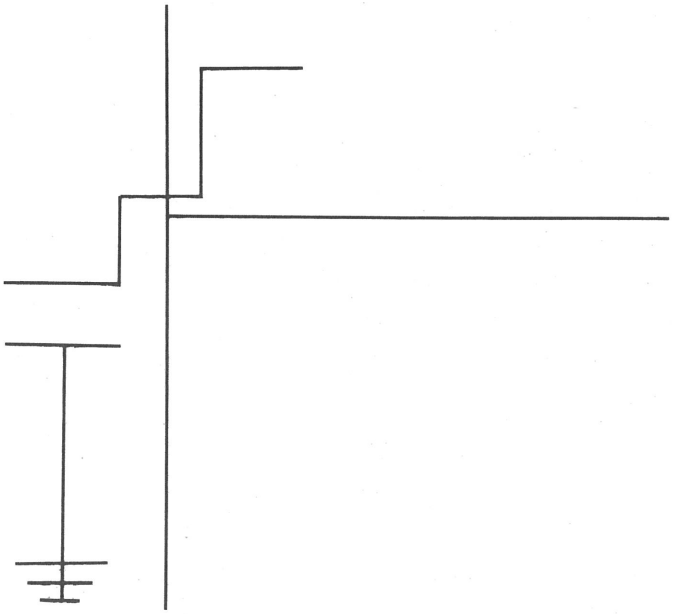
The boxes were placed on a shelf in the end of the basement where there was little light, with no windows at the end. Also, the shelf was kept dark by a board placed in front and another on top to exclude all light. The plants were dark all of the time except when they were examined by flashlight.

A friend tried to duplicate the experiment but did not follow all instructions. Their basement was only about three feet from basement floor to ground level outside. Thus they did not have the potential difference between outside collector and inside boxes and the experiment was a failure. Also, there was a

window nearby that let much light into where the boxes were placed.

Anyone who expects to duplicate an experiment should be sure they know all the factors and that they follow the instructions exactly without any substitution or change. And as to changes, if you are trying to get a special result and are trying out several methods or ideas, one of the cardinal points to doing good work is to make just ONE change at a time. Then you know just what the results are. If you make two changes and the result is failure, you do not know but that one of the changes may have been all right.

Figure 1



Dr. Wilhelm Reich also revealed that plants can grow without direct light by growing normal healthy plants inside his orgone accumulator.

Hans Nieper, M.D., an internist at the Paracelsus Silbersee Hospital in Hanover, Germany, is internationally renowned for his work in cancerous diseases, multiple sclerosis, mineral and electrolyte metabolism, aging, and the prevention of cardiac infarction, as well as his medical association activities, including

gravity field energy research. According to Dr. Nieper, every biologically active cell, including a human cell, represents a housing covered on all sides by an electrically charged membrane with double contortions. This is necessary for the conversion of orgone energy into heat.

An article from the University of New York at Buffalo that appeared in *Science*, August 3, 1984, stated, "In the nerve there is an electric shunt between the central axon fiber and the myelin, which is a multilayer wrapping of a double-contoured leaf of a cell membrane system." This finding means in essence that our nerves own a pure "Tesla function" and seem to extract a major part of their effector energy from space.

In over 60 years of agricultural research, Dr. Carey Reams showed that plants accumulate more energy (mass) than can possibly be accounted for from fertilizer and water, thus his conclusion that only about 20% of the energy is obtained from the soil, while about 80% is obtained from the air. This principle is compatible with the alkaline-to-acid ratio of nutrients in the human body. For optimum health, it is estimated that there needs to be 80% alkaline elements and 20% acidic elements.

H. H. Robertson, D.V.M., conducted studies with chickens that proved the chickens produced or expelled more calcium than could be accounted for in their diet, thus the conclusion that the balance is transmuted via, from, or with the air—orgone energy.

Does all of this energy information make you turn up your nose, elicit a doubt, or cause outright disbelief? Or does it tug at your mind and elicit curiosity or outright enthusiasm? We are peeking into that actual, real life miracle of which we are all a part and which is part of us all: CREATION. Prevailing science, especially agricultural science in this case, gives the impression that nature is primitive or at least less "intelligent" than man. Consequently, man can outsmart, overpower, and manipulate to his desires the creation of which he is a part. He boasts of increased production, insect and disease eradication, hybridization, specialization and every other "-ization" that pops up. But nature doesn't live by the law of greed. Man in his greed for power and dominance over his environment has

ensured an eventual day of reckoning. His claims of increased production mock the level of quality that has been sacrificed and the production levels that can be attained. In 1851 the Reverend John L. Blake wrote in the *Farmer's Everyday Book* about yields of 800 bushels of potatoes per acre on four acres and 100 bushels of corn per acre on 40 acres with yields as high as 145 and 180 bushels per acre on three and five-acre fields. How large was a four-acre field in 1851, when there were no tractors, commercial fertilizers, or chemicals?

According to the government's own figures, this country has lost about one-half of its topsoil since the turn of the century. Supposedly this has been the century of greatest technological advancement, yet the deprivation, degradation, destruction, and contamination of this planet worsens every day. Sympathizers contend that it cannot be blamed on technology for the intensity of farming has simply increased due to demand. Well, demand isn't going to decrease because the world population isn't going to decrease—quite the contrary. I agree, however, that technology is not the culprit, for true technology provides mankind with free unpolluting energy to light his lights, power his machines, heat his homes, propel his transportation systems, and most importantly, provide him with food that doesn't rot, carry contaminates, or require rescue chemistry for disease, insect and pest control.

Farming for the most part has actually become mining. The true farmer and caretaker of the land produces better and better crops, and leaves the soil in better shape each year while needing fewer inputs.

The life cycle of nature is an expanding spiral. At the base of this spiral is the soil.

2

PROGRESSIVE BIOLOGICAL LIFE

Soil is alive. It more than simply supports life. Living soil is healthy and healthful. It allows for the growth and development of healthy, healthful plants—plants that fulfill the nutritional needs of animals and people. Dead soil is dirt. It does not produce healthy animals and people. It does not produce healthy vegetation. It erodes. It compacts. It clods. It no longer carries an adequate electromagnetic charge.

This charge is the manifestation of the life force in the soil. It is a result of biological balance. As this balance is disturbed, the ability of the soil to sustain the charge diminishes. If the biological balance is disrupted by the misapplication of mineral elements, this causes electrical chaos, which leads to the degeneration of biologically active carbon. Finally, if mismanagement continues, degradation overwhelms regeneration, producing symptoms of erosion, compaction, pest infestations and plant diseases. This phenomenon is not exclusive to this decade. An article by Rex Beach published in the June, 1936 issue of *Cosmopolitan* indicates that this degradation started several decades ago.

The article, titled "Modern Miracle Men," discussed the first serious research in the field of human illness as it relates to soil

fertility. It quoted Charles Northern, M.D., was an Alabama physician who specialized in stomach diseases and nutritional disorders. He was the first to assert that soil-building is the basis of food-building, which is the basis of human building. "Bear in mind," wrote Dr. Northern, "that minerals are vital to human metabolism and health—and that no plant or animal can appropriate to itself any mineral which is not present in the soil upon which it feeds." Dr. Northern stated that the majority of our soils do not contain adequate minerals to produce healthful foodstuffs. Soil analyses, he pointed out, only reflect the content of the samples. He found that foods varied enormously in mineral content. Some of them weren't worth eating. Foods he tested varied in mineral content from more than six times the standards to nothing. He found that dietary mineral deficiencies caused everything from disrupted heartbeat to mental illness, and then traced these deficiencies back to the soil. He also proved that after reestablishing the mineral balance in the soil, plants were bigger, more vigorous, faster growing, disease and insect free, and contained minerals proportionate to those in the soil. He was able to double and redouble the mineral content of fruits and vegetables, increase the mineral levels of milk and eggs, and improve the shelf life of all foodstuffs simply by remineralizing the soil.

He was also able to successfully treat human disease by simply injecting highly mineralized foods into their diets. Dr. Northern stated, "Healthy plants mean healthy people. We can't raise a strong race on a weak soil." He encouraged the public to demand highly mineralized food to create the supply. "It is simpler to cure sick soils than sick people. Which shall we choose?"

Unfortunately, the public was timid then. There was more profit in drugs and farm chemicals than in mineralization. The public is less timid now but the basics of food production are unchanged.

The only difference between 1989 and 1936 (when that article was written) is that there have been 50 years of further mining and polluting of the soil.

It is not necessary to be a chemist to understand these prin-

ciples and successfully apply them. One needs only determination to have better health. It helps to become familiar with the terms of the trade, so it is recommended, then, that the reader commit to memory the major chemical symbols and product names. The most commonly cited elements of soil chemistry are carbon (C), hydrogen (H), oxygen (O), calcium (Ca), potassium (K) (usually called potash), iron (Fe), magnesium (Mg), nitrogen (N), phosphorus (P), sulfur (S), manganese (Mn), boron (B), zinc (Zn), copper (Cu), molybdenum (Mo), chlorine (Cl), cobalt (Co), and selenium (Se). These are not the only elements found in healthy soil, but they are a good list to begin with.

Freeing the flow of the magnetic field in the soil is basic to any soil fertility program. Balancing the minerals is the key to freeing the magnetic field. A compass verifies the existence of this magnetic field but does not, however, measure the field strength. The field strength varies by latitude. If you grow a variety of corn in Alaska in two months and take the same variety of corn to Mexico, it will take six to eight months for it to grow. This is due to the concentration of the magnetic field, assuming that the soil fertility is equal in both locations. A rule to remember is that plants, animals, and humans all live on energy, the energy released by the interaction of elements. This is the fuel that powers life processes.

To succeed we need a plan, materials, and some guidelines. Two rules have already been mentioned: 80% of a plant comes from the air and 20% of a plant comes from the soil; plants grow on the energy released from the interaction of nutrients. In addition: Nature always follows the lines of least resistance; like attracts like even though opposite charges attract; all nutrients should enter the plant in the phosphate form; if a nutrient is soluble it does not necessarily mean it is available to the plant; plant growth is not limited by time, only energy; some nutrient compounds produce growth, some nutrient compounds produce fruit; and see what you look at!

Next come the building materials. First and foremost is calcium. Calcium determines the volume of crop and is the major element against which other nutrients react to release energy. It

is a major constituent in all cell membranes. It is nature's detoxifier, meaning it has a great capacity for neutralizing toxicities either via transmutation or chemical/physical bonding. Ideally (since it is the foundation element upon which all else is built), when calcium is sufficiently present, the biological entity, whether it be a single cell, a plant, an animal or human, is able to discard toxins readily and does not have any magnetic attraction for environmental toxins such as pesticides, herbicides, or drugs. In addition, there will be sufficient energy to actually transmute the toxins in to alternate, harmless substances. And since calcium is the foundation element for all biological life, it is needed continuously. It is needed for all growth, whether in plants, foliage, or fruit.

It is usually argued that most of the calcium is taken into the plant early in the growing season and very little late in the season. This is correct, but the reason is that the plant does not have a great enough magnetic attraction late in the season. This is due to insufficient nutrition early in the growing season which is easily verified by electronic scanner evaluation or refractometer readings (which will be discussed in Chapter 6). Calcium is the most neglected nutrient in most current fertilization programs, and this neglect is the primary cause of soil demise. The reason calcium is overlooked centers around the lack of knowledge about pH. It is taught that the soil pH relates directly to the need for liming, which is the term given to the application of a dry calcium compound or product. People with important-sounding titles and degrees persuade farmers who do not know the technical jargon that the calcium requirements of the soil are determined by its pH. Since they seem to know what they are saying, their audience swallows it hook, line, and sinker. It is almost as pertinent to say that the volume of your automobile's engine coolant is determined by its temperature. Hardly. Under normal conditions, the thermostat determines the temperature. The coolant volume is determined by how much was originally put in minus how much was taken out, leaked out, or somehow evaporated.

pH is technically the negative logarithm of the hydrogen ion concentration. Hydrogen is the element, in this case the ion,

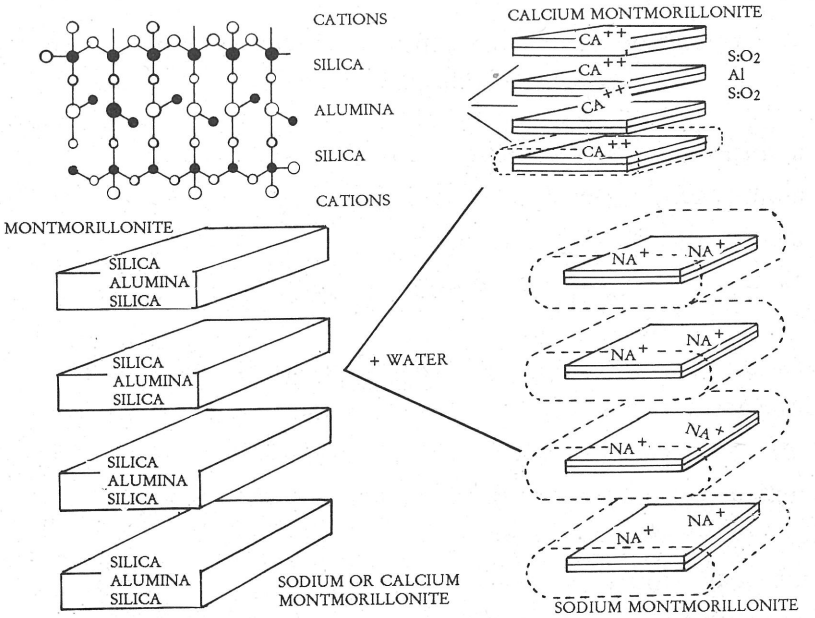
whose concentration is the standard by which solutions, elements, compounds, etc., are classified as to their acidity or alkalinity. Any competent professional chemist will explain that the pH of a solution is not a volumetric measurement. It is a relative state of acidity or alkalinity. Two examples come to mind. In the western United States the soil pH is often above eight yet the available and sometimes the total calcium content is very low and lime or calcium is added. In many southern soils that are high in bauxite the soil pH often runs below six yet there may be plenty of calcium available. Pure distilled water has a pH of about 6.8 to 7.0, yet there is no calcium present. I will let the reader contemplate the reasons for the misuse of the concept, but it is interesting to remember that calcium lime is one of the least expensive fertilizers or plant foods one can purchase. In most parts of the country, high calcium lime costs about $20-plus per ton. The common salt fertilizers range from $120 to $300 per ton. Lime is often applied one year out of several and the cost is amortized over these years while the salt fertilizers are applied seasonably. At lower the calcium levels, which we have in America today, greater amounts of salt fertilizers must be applied to achieve a given volume. The catch is that volume achieved via this practice is not synonymous with quality, as proven by the current use of chemicals for insect and disease control. There is obviously more room for profit margin in a $120 per ton fertilizer than a $20 per ton fertilizer, especially when the $120 fertilizer results in the followup with herbicides and pesticides to even achieve a crop, then further followup with preservatives to keep the crop from rotting; further followup with animal and human dietary supplementation with the nutrients which should have been in the food and further followup with health care needed for the nutritionally deficient animals and people. People and animals are starving to death on full stomachs.

Drs. Northern, Reams, and William A. Albrecht all insisted that calcium was the main staple nutrient for truly healthy plants and animals. These men proved this principle beyond any doubt, yet their teachings even today are not universally adopted and are often scorned.

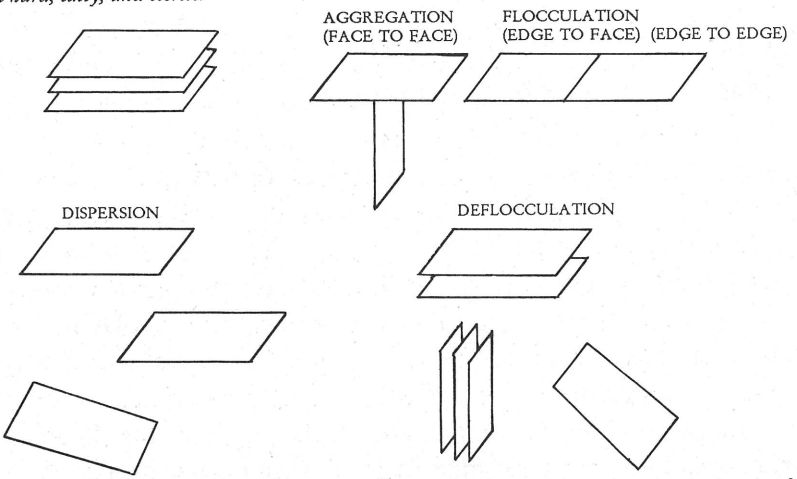
Calcium can be obtained from several sources. The following is a listing of commonly available forms:

Calcium carbonate (AG lime, hi-cal lime), $CaCO_3$
Calcium oxide (dehydrated lime), CaO
Calcium sulfate (gypsum), $CaSO_4$
Calcium Hydroxide (slake lime, hot lime, hydrated lime) $Ca(OH)_2$
Arogonite (ground seashells from Bermuda)
Soft rock phosphate
Paper mill lime (often contaminated—avoid)
Sugar beet lime (often contaminated—be cautious or avoid)
Basic slag (beware of contaminants, i.e. heavy metal)
Dolomite lime (contains magnesium—*do not use,* check for lead), CaOMgO
Tri-calcium phosphate (very insoluble)
Di-Calcium Phosphate (very insoluble)
Bone meal
Calcium nitrate, $CaNO_3$
Marl (check for Mg, contaminants)

Calcium does some very interesting things in the soil. In the study of soil particle chemistry, you can observe the physical configuration of soil particles under various conditions. In compacted soils, there is usually a high concentration of sodium and/or magnesium ions. This creates a parallel plating action. When calcium is added, these particles flocculate, creating the basis for desirable soil structure. If extreme excess amounts of calcium are added, the particles will disperse resulting in no structure. There is a balance in everything, but the point here is that calcium is a key element for desired soil structure and it is *unrelated* to pH. For further information concerning particle chemistry it is suggested one start by studying petroleum engineering.



The diagram (Figure 1) shows the structure of a typical clay particle. The comparison here is between calcium montmorillonite and sodium montmorillonite related to water absorption. The calcium will absorb only 1/4 as much water as the sodium. This is the problem with high sodium soils. they hold a great deal of water, yet the crop starves for water. Carbon is the key to moisture in biologically active soil for it will readily store and give up water for plant usage. As more and more acid fertilizers are used and the calcium is depleted, greater amounts of sodium accumulate rendering the soil hard, salty, and sterile.



The diagram (Figure 2) shows the various states of particle configurations. Aggregation is often the case in compacted soils. Flocculation is often the case in fertile, well-structured soils having adequate calcium biologically active. Deflocculation occurs when too much nonbiologically active calcium is present. Dispersion is the result of excessive deflocculation and results in no soil structure at all. This can be caused by excessive amounts of elements other than calcium, but only if there is a deficiency of biologically active calcium.

The next element that needs to be addressed is phosphorus, usually referred to in its phosphate (P_2O_5) form. Phosphate is also currently neglected in fertilization programs. It is needed for proper nutrient transport and assimilation, but its most important function is that of energy transformation in photosynthesis to produce plant sugars. In the compounds ATP (adenosine triphoshate) and ADP (adenosine diphosphate), phosphate plays an important role in the breakdown and formation of metabolic compounds.

A good rule of thumb is that the higher the phosphate content, the higher the sugar content, and, correspondingly, the higher the mineral content. The sugars are the plant's energy storehouse. Also, the reduced nitrogen groups NH_2 and NH_3 combine with the carbon frameworks formed during the oxidation of sugars to form amino acids. In other words, if there is a phosphate deficiency there will be a sugar deficiency, and thus, an amino acid deficiency. Phosphate is an integral part of all metabolic processes.

Possibly the most critical process is the formation of nucleoproteins, the source of genetic material. They are composed of proteins and nucleic acids. Nucleic acids are high-molecular-weight polymers of nucleotides, each formed from three constituents: a *sugar* (specifically ribose or deoxyribose), *phosphoric acid*, and a nitrogen base that has the structure of either a purine of crpyrimidine ring. So here we see that phosphate is critical for sugar production which plus more phosphate is needed to make basic living material. Most people know nucleoproteins as DNA and RNA.

Phospate is a relatively insoluble element, especially in the di- and tricalcium phosphate compounds. Here lies the irony. Many soils show a high level of phosphate, but in these insoluble forms. It requires rigorous biological activity to solubilize the calcium and phosphate, or strong reagent chemicals to break the bonding. Due to the nature of common phosphate fertilizers, 0-46-0 (triple super phosphate, which is highly reactive), greater and greater amounts of soluble calciums and phosphates are becoming insoluble due to chemical reactions between the highly acid fertilizers and the soil compounds, and as

a result insoluble compounds are formed. Most fertilizer specialists are either ignorant of this phenomenom, do not care, or deliberately ignore it, leading them to make recommendations which have resulted in widespread plant phosphate deficiency. Later, when food and crop quality is addressed, this will be covered in depth. The following is a list of phosphate sources:

Soft rock (colloidal clay) phosphate (contains 26-33% calcium, 4% iron and traces of many other nutrients, washings from phosphate ore) 14-28%
P_2O_5 Hard rock phosphate (basically cleaned phosphate ore) super phosphate 0-20-0 (rock phosphate reacted with sulfuric acid), 20.5%
P_2O_5 triple-super-phosphate 0-46-0 (super phosphate reacted with phospate acid—*avoid* dicalcium phosphated diammonium phosphate (DAP) (granular 18-46-0 *avoid*, water soluble crystal 12-52-0 for special cases only)
Monoammonium phosphate (MAP) (granular 11-52-0, water soluble crystal 12-62-0)
Liquid Phosphoric Acid 78-85%, P_2O_5
Bonemeal
Organophosphate (filtration byproduct, scrutinize closely)
Ortho and poly liquid phosphates (be sure they are "clean" not industrial byproducts)

There are many sources in the market place. The selection and factors to consider will be addressed in Chapter 5, the program section of this book.

Potassium. This element is normally thought of in reference to Potash (K_2O). Next to nitrogen, it is probably the most misused, overused, and abused element in agriculture. It is also the most profitable for the industry. Its basic function is to determine of the caliber or thickness of the stalk and leaves, fruit size, and number of fruit which sets. Used in excess, potassium will replace calcium in the cell structure, resulting in

a diseased cell, i.e. one that resonates at a discordant frequency. A sure indicator of potash excess is the occurrence of black spots on the leaves. This is a typical occurrence in alfalfa today, and the farmer is told it is a disease or insect problem and should be sprayed for. Modern agriculture has become addicted to nitrogen and potash. Like any drug addiction, the requirement for the drug increases constantly. The farmers are told that in order to get more yield, add more nitrogen and potash. As the soil degenerates, it requires more of these "drugs" to just sustain the crop yield. Potash does have its place in crop production, but it must be in balance with all other elements.

The following is a list of potash sources:

Potassium sulfate K_2SO_4, 45-52%, K_2O
Potassium nitrate K_2NO_3, 13-0-46 46%, K_2O
Chilean nitrate of potash, 15-0-14 14%, K_2O
avoid—high sodium content
Muriate of potash, KCl 0-0-60, usually 60%,
K_2O—most common source, *avoid like the plague*!
Sawdust Wood ashes—use with caution—ashes dehydrate the soil
Tobacco stems
Pecan hulls
Cotton burr ash—use with caution
Straw Rice hulls
Sul-Po-Mag—check for chlorine;
use only under prescribed conditions

Nitrogen. Nitrogen along with potash, is being overused, misused, and abused. It produces great profits for the fertilizer industry.

Nitrogen is the major electrolyte in the soil and living tissue. Without nitrogen there is no life. It is a primary component of protein and amino acids. Nitrogen is capable of entering the plant without phosphate, and given certain conditions it will carry potash with it. This condition, though typical of modern agriculture, creates a situation ripe for nitrate toxicity and nitrogen-funny protein formation (which occurs

when there is a deficiency of phosphate and sugars), calcium substitution in the cell membrane, potash burning, and low sugar production from photosynthesis. This causes an overall mineral deficiency. Mineral deficiencies result in plants that resonate at discordant frequencies, thus attracting rapacious insects; plants and soils infected with various diseases and stressed by environmental conditions. Finally, mineral deficiencies result in plants that have poor nutritional value, short shelf life, and lack of flavor. The air is about 78% nitrogen. Soil bacteria and plants have the capability of extracting much of their nitrogen needs from the air *if* they are allowed to do so.

Nitrogen is utilized by plants in two forms: Nitrate NO_3 and ammonia NH_4+. Both have distinct functions. The nitrate nitrogen is needed early in the growing season to stimulate growth of leaf crops throughout the season. The ammonia nitrogen is needed later in the season for fruit and seed production. Don't expect tomatoes to set fruit if the nitrate nitrogen is high and the ammonia low. The two forms will readily switch back and forth from one form to the other depending upon the other nutrients in the soil.

The following is a list of nitrogen sources:

AMMONIA NITROGEN SOURCES

Ammonia sulfate, NH_4SO_4, 20.5% N—Allied Chemical preferred
Manures, cattle, bird, horse; be careful of hog manure due to high salt
Millorganite
Sludge. Scrutinize closely for contaminants
Tankage Dried blood
Fish meal
Urea
UAN, 28% or 32% N—Urea-Ammonium Nitrate liquid blend
Household ammonia
Anhydrous ammonia; avoid like the plague!
Aqua ammonia
MAP—mono ammonium phosphate

DAP—diammonium phosphate
Ammonium nitrate, provides both nitrogens

NITRATE NITROGEN SOURCES

Sodium Nitrate, $NaNO_3$
Calcium nitrate, $Ca(NO_3)_2$
Ammonium nitrate—provides both nitrogeus NH_4NO_3
Chilean nitrate
Potassium nitrate
KNO_3
UAN,
28% or 30%, urea ammonium nitrate liquid blend

When purchasing nitrogen, know why it is being purchased. For example, usually you would *not* want ammonia nitrogen for lettuce. It may cause it to bolt and go to seed.

Carbon. Carbon is the element that makes anything organic. It is the primary buffer in the biological world. Without carbon there is no stabilization of nutrients. A carbon deficiency results in a carbon dioxide deficiency, which causes a carbohydrate and oxygen deficiency, harming the plant's primary functions. This in turn results in a decreased aerobic microbial life, reduction of the carbon cycle, and finally sterile soil. Carbon is a key element in the process of increasing the soil's magnetic field. When carbon is deficient, the nitrogens can form nitrogen-funny proteins, nitrites, and nitrous oxides, the latter two always toxic to biological life. Carbon is a key element for the formation of desirable soil structure, tilth, and water holding capacity. In the presence of excess boron relative to calcium, high salt, or sulfur conditions, a deficiency of carbon may allow ammonification to occur, which is fatal to aerobic life.

There are many forms of carbon. The form referred to as being vital to healthy soil is "biologically active," that carbon that is vital to the living processes. A diamond is a carbon compound but not biologically active. Biologically active carbon is not always that found in humus. Under sterilization fertility programs the humus also becomes sterile and actually forms a

carbon salt. Notice that many muck farms that have been intensely farmed using classical methods. Observe when the sun shines on them that the soil looks gray-white rather than a shiny black. Also notice how dusty they are, how often they must be irrigated, and that the soil is hard and compacted. Also notice the weed, insect, and disease war the farmers are fighting.

There are very few sources of carbon *per se*. It is an element best obtained by biological activity. Here are some good sources, depending upon your point of view:

Manures
Compost, excellent, generally speaking
Leaves, sawdust, garbage, grass clippings—best to compost first
Sugar
Molasses
Dry humates
Liquid humic acid
Peat—be careful!
Green manure crops, i.e. sweet clover, red clover, rye
Crop Residue

You can apply tons and tons of carbon to the soil and still not obtain a good condition. The key to carbon fixation is the aerobic bacteria. They do most of the work in the soil. These organisms are not the pathological type. They could possibly be compared to the baker who takes various ingredients and produces a desirable dish for us to eat. Aerobic bacteria such as *Sulfa ammonis*, *Nitrous ammonis*, and *Europa* put it all together in the soil. They convert elements and organics to usable forms. Without them all is for naught. Usually there is no need to add or apply these organisms to the soil, for if you simply provide a livable environment for them they will appear and proliferate on their own in good time.

The next several elements will be addressed only in passing, because once the foundation of calcium, phosphate, potash, nitrogen, and carbon is established the other elements can usually be supplied, if necessary, through fish and seaweed

products. On occasion an individual supplement may be required.

Manganese. Manganese can be termed the element of life. It brings the electrical charge to the seed. It is the key element for seed and offspring production.

Iron. Iron draws energy to the leaf by absorbing heat. This makes the leaf darker.

Copper. Copper is the key to elasticity in a plant as well as mold control.

Boron. Boron is the key element for the filling of center of stems and fruits. Hollow stemmed grains and alfalfa and hollow heart or black heart in potatoes is an indication of a boron deficiency.

3

THE AGRICULTURAL INDUSTRY

Adversity either brings more adversity or better conditions, depending on your point of view. Without adversity there would be no mechanics, no repair shops, no doctors or lawyers, no trouble shooters, no one pursuing better ways of doing things.

This section is intended to encourage the reader to evaluate his or her environment, see what he or she is really observing, and change one's conditions, situation, environment for the better. If the food you consume is of higher quality than before, then you have changed something for the better. By the way, high quality food *does* taste better. It is no wonder many people, especially children, do not care for many fruits and vegetables. There are very few nutrients and little flavor in those produced under most current commercial production practices. Children act by instinct. Their bodies crave sweets because under proper natural growing conditions the produce is naturally sweet, accompanied by all the minerals that should be there. Man defies this inherent natural quality by circumventing the correct fertility practices with nitrogen and potash. He follows this by adding extracted or synthesized salt and sugar to his food to fool the body's desire for minerals which would

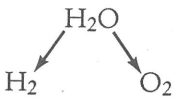
naturally accompany sugar. The result is a society of sugar addicts. To explore this further, let's investigate photosynthesis in a bit more detail.

Photosynthesis is the process whereby plants convert carbon dioxide and water into energy-rich organic compounds. All of the organic matter in living things is ultimately provided through photosynthesis.

PHOTOSYNTHESIS

Light Phase

Photolysis (split H_2O molecule)



This is called the Hill Reaction

NADP accepts electrons & H_2 forming $NADPH_2$

Next, "light" energy is trapped in the process called photophosphorylation
ADP + "light" energy form
ATP + PO_4
The next step is the "Dark Phase"

Dark Phase

$NADPH_2$ + ATP form the basic carbohydrate for energy

$C_6 H_{12} O_6$

Initially there are 2 molecules of phosphoglyceric acid, which finally give rise to a single, 6 carbon sugar and eventually starch grains in chloroplasts

NADP—nicotinamide adenine dinucleotide phosphate.
ADP—adenosine diphosphate
ATP—adenosine triphosphate

The reverse of photosynthesis is respiration. The useful energy is channeled into chemical work, initially as high-energy phosphates. This energy is later used as needed in the production of organic materials for growth and development. Understanding photosynthesis and respiration will help in understanding three key principles: the importance of phosphate; phosphate relationship to sugar; the relationship of true quality (mineral content) to phosphate and sugar.

The irony of the system is that the plant scientist under-

stands these principles (it is explained in detail in most science text books), but this understanding is not transferred to field application. Something happens to the information. Possibly the soil scientist misunderstands, though this is unlikely. Possibly there is a professional rivalry between plant and soil scientists that makes it feel deflating to acknowledge facts from research outside their specialty. Or the information is not profitable for certain special interest groups.

PRACTICES AND PONDERANCES

It is said that practice makes perfect. Actually, perfect practice makes perfect.

First of all, let's cover soil testing. Soil testing can be a very valuable tool if interpreted properly. It can also be a catalyst for destruction.

First you need to gather the soil sample. If the area in question, whether it be ten square feet or 80 acres, is going to be fertilized with the same materials at the same rate, then it is unnecessary to submit more than one composite sample for testing unless you are curious about specific areas. Gather the sample from the top four inches of the soil. Take several samples from around the area in question and mix these samples together. Take about one cup of this mixture as the composite, put it in a soil sample bag or some container that will maintain the soil's integrity. Label the sample as area number such-and-such, or garden or field. List the plants to be grown and previously grown, your name and address, and the type of test requested. In addition, it is recommended that your personal records include the date and type of volunteer vegetation (weeds, etc.) growing, earthworm abundance, etc., data that can be referred to later to check progress. I will cover three types of analyses. All three have their value. Again, interpretation is the key.

The first test is typically referred to as a general state or CEC test. It is done by the land grant universities via the cooperative extension service, or any number of private laboratories. These labs use acids stronger than those naturally present in the soil to extract the nutrients from the soil sample.

The quantities of each nutrient are recorded on a computer printout, and if recommendations have been requested they will be given according to the recommender's arbitrary interpretation system.

The greatest value of these tests is that they give a ball park estimate of what nutrient quantities are potentially available for plant growth. Since the extraction chemicals are stronger than those used by the plants, to assume the test results correspond to the availability of plant nutrient is erroneous. Plants cannot go to the nearest lab and get strong extraction solutions. The test helps you determine what you have to work with as a foundation. Sometimes these nutrients can be made available to the plant by triggering chemical reactions with fertilizers, but the best way is to establish rigorous microorganism activity that produces biological compounds easily assimilated by plants. An analogy could be made to a miner who calculates the output of his mine as if he were digging with a case of dynamite when all he really owns is a pick and shovel. The arbitrary recommendations from this kind of test are of little value to the progressive agriculturalist.

An article in the February 1983 issue of *New Farm Magazine* described an investigation of soil test recommendations from 70 prominent soil test laboratories all over the county, including several state university and private labs. Not one test result on one fertilizer recommendation was consistent with another. The labs were, however, consistent in one area. They recommended an average of $41.98 per acres of unneeded fertilizer. In all fairness to these labs, the writers of the article had their own arbitrary recommendation system, and it had the same void as the labs it criticized: no consideration for crop quality (mineral content) or the chemical and biological repercussions of the fertilizer materials used. The best advice is simply to take the soil test report for what it shows—nutrient quantity using certain extraction solutions—and discard the recommendations.

The following is a copy of a typical soil test report from Michigan State University.

The pH of 5.5 indicates the soil is on the acid side. As well as being a measure of acidity and alkalinity, pH is also a measure of resistance. The higher the pH, the greater the resistance and visa versa. Nutrients in all biological life, including soil, are transported via electricity. The resistance to that transport is important, yet pH is only a measurement of the result of the nutrient ratios in the soil. pH is not something to worry about changing. It changes as the nutrient ratios change, therefore, if you work at restoring proper nutrient balance in the soil, the pH will take care of itself.

Most university and private labs suggest an ideal soil pH of 6.5 to 6.8. The best way to approach this is to work on restoring the soil fertility and not be concerned with good or bad pH values.

The suggested pounds per acre for the various nutrients varies by lab and by crop. For this test and crop the suggested values for phosphorus, potassium, calcium, and magnesium are phosphorus are 100 pounds; 400 pounds; not applicable say extension agents because pH determines calcium levels; and 75 pounds per acre, respectively.

The cation exchange capacity (CEC) value of 8 corresponds to the soil texture of 3. The sandier a soil, generally the lower the CEC. The greater the clay content, the higher the CEC and the higher the humus content of any soil texture, the higher the CEC. The CEC indicates how much nutrient the soil can store.

The percentages of total exchangeable bases for potassium, calcium, and magnesium are 14.5, 82.6, and 2.8, respectively. These can be correlated to the pounds per acre figures mentioned above for deriving a ball park idea of what kind of soil potential you have to work with. Generally speaking, looking at this type of soil test we would like to see calcium above 80% exchangeable base and greater than 2,000 pounds per acre; magnesium at least less than 10% exchangeable base with no real pounds per acre figure; potassium between 10 and 20% exchangeable base and a pounds per acre ratio of one pound potash to two pounds phosphate. Please keep in mind that this type of

Table 1

MICHIGAN STATE UNIVERSITY, EAST LANSING, MICHIGAN 48824
SOIL TESTING LABORATORY

BRUCE ANDERSEN
2499 CANNONSVILLE NW STANTON48888
MONTCALM

DATE RECEIVED:04-03-85
DATE SENT: 04-10-85

TEST RESULTS

SAMPLE NO	1
SOIL PH	5.5
LIME INDEX	65
LBS. PER ACRE OF:	
PHOSPHORUS	268
POTASSIUM	183
CALCIUM	533
MAGNESIUM	11
PARTS PER MILLION OF:	
ZINC	
MANGANESE	
COPPER	
CALC CEC	8
PCT. ORG MAT	
PCT. OF TOTAL EXCHANGEABLE BASES:	
POTASSIUM	14.5
CALCIUM	82.6
MAGNESIUM	2.8

RECOMMENDATIONS

IF MANURE IS USED CREDIT 4# N, 2# P205, AND 8# K20 PER TON APPLIED

SAMPLE 1

PREVIOUS CROP: WHEAT / FUTURE CROPS:		EXP. YIELD	NIT. N	PHOS. P205	POTASH K20	B	ZN	MN	CU	NOTES
			----------LBS PER ACRE----------							
1ST YR	OATS + LEGUME	50-79	25	0	75	-	-	-	-	1 *
2ND YR	ALFALFA-TOPDRESS	5-6	0	0	200	2.0	-	-	-	
3RD YR	ALFALFA-TOPDRESS	5-6	0	0	200	2.0	-	-	-	

LIME NEEDED FOR PH 6.5= 4.3 T/A.
LIME NEEDED FOR PH 6.8= 4.7 T/A. ✓

1 MAGNESIUM TESTS LOW. USE DOLOMITE AND/OR A SOLUBLE MG SOURCE.

* MAXIMUM RECOMMENDATION FOR ACP COST SHARING 0 LBS P205/A, 150 LBS K20/A

Alfalfa will fail at this soil pH. Lime now and seed next spring, or, at earliest, this summer.

SAMPLE DATA

ACRES	10	LAB	19503
SOIL TEXTURE	3	PAID	
MANURE	0	TRAY	045
PLOWING DEPTH	9		

FOR FURTHER RECOMMENDATIONS
SEE YOUR CO[illegible]TY AGENT

test is closer to a mining survey as far as its relationship to what is biologically active and available for plant growth is concerned. This type of test is used extensively in agriculture today by universities and many private labs to recommend fertilizer programs, but that doesn't automatically mean those programs should be followed. The state of our soils and foodstuffs points up this fallacy.

Next, we look at the recommendations. The previous crop was wheat, and the future crop is to be oats seeded over a legume (alfalfa). Recommendations are given for three years, an arbitrary figure. The expected yield for oats is 50 to 79 bushels per acre with a recommended fertilizer application of 25 pounds of nitrogen and 75 pounds of potash per acre. For the second and third year, the expected yield is five to six tons per acre of alfalfa with a recommended fertilizer application of 200 pounds of potash per acre and two pounds of boron per acre. Next, the recommended lime application is 4.3 tons per acre to achieve a soil pH of 6.5 and 4.7 tons per acre to achieve a soil pH of 6.8. The special note mentions a magnesium deficiency; therefore, dolomite lime or a soluble magnesium source is recommended. Next, under the government's cost sharing program for fertilization, it will pay for no phosphate fertilizer and will share the cost for 50 pounds of potash. Finally, the local extension agent in his written comments states that alfalfa won't grow at the soil pH of 5.5 and recommends liming first and seeding (planting) later.

The unfortunate thing about this report and its recommendations is the damage this information inflicts on the soil and plants. To begin with, the first recommendation calls for combining oats and a legume (alfalfa), yet the extension agent says alfalfa won't survive under this soil condition. If a crop cannot survive, on what is the test recommendation based? Next it recommends top dressing the second and third year alfalfa with 200 pounds per acre of potash and two pounds of boron. As a feed alfalfa is a calcium supplier, yet potash is the nutrient recommended, perpetually. Alfalfa is a legume, which means it has rhizobium nodules on its roots for fixing nitrogen (taking nitrogen from the environment and supplying it to the plant).

Since there is a phosphate deficiency in this fertilizer program, there will be an excess of nitrogen. In the presence of excessive nitrogen, the unneeded potash will enter the plant as potassium nitrate. This creates a potash imbalance which makes it possible and probable that it will replace the already low amount of calcium—low due to the phosphate deficiency. The result is a weakened plant cell which resonates at a discordant frequency attractive to insects. In addition, the potassium nitrate creates a watery cell which shrinks greatly at harvest and causes nitrate toxicity in the consumer. The excess potash also produces black spots on the leaves due to its burnings, which the "experts" label, among other things, as bacterial leaf spot or common leaf spot for which the farmer can purchase a pesticide combating the *symptom* rather than correcting the cause, which is the excess potash he was originally advised to purchase.

This is very easily verified. Take a refractometer, an instrument used to measure the carbonhydrate content of liquids further discussed in Chapter 6, and check the sugar reading of the alfalfa. If the reading is below 12 or 14, there is a serious phosphate deficiency which allows for a potash excess. The real proof can be found by checking the growing number of alfalfa plantings where the farmers have ignored the "experts" and fertilized the alfalfa with calcium and phosphate. The refractometer readings are as high as 28-30. There are no black leaf spots, no insect pests, no hollow stems, no nitrate problems, no mold problems, and yields in excess of ten tons! And they are profitable farmers.

The next recommendation is for liming based upon pH. The type of lime suggested is dolomite. First, pH is not a measurement of quantity or volume, and certainly is not a measurement of calcium. (Check with any competent chemist.) Three tons of the high calcium lime were applied to this field during the previous fall, yet the test doesn't show any sign of it. So much for the test. The key is in making this calcium *available* to the plants. As for dolomite lime, it generally runs from 15 to 35% magnesium. Now, the recommended level of magnesium, according to the MSU extension service, is about 75 pounds per acre. Therefore, you need to add 64 pounds to achieve the

recommended level. If you apply the lesser recommended amount of 4.3 tons of lime per acre, you'll apply 4.3 tons x 2,000 pounds per ton x 15% to 45% magnesium carbonate = 1,290 pounds to 3,870 pounds of magnesium carbonate, or 374 pounds to 1122 pounds of elemental magnesium. This is five to fifteen times the needed recommended amount. Dolomite lime is more expensive than high calcium lime. Many people think if a little is good, a lot must be great. It is if it is love, but not fertilizer. High calcium lime which generally runs between 2 and 5% magnesium would provide adequate magnesium for this field.

Then there is the cost sharing program. The government will share the cost of one thing, potash. There is nothing like perpetuating a bad thing. Of course it's only bad for the soil. Consequently it is bad for the alfalfa grown on it, the consumers of the alfalfa, the farmer who is paying for this manipulation, and you, the consumer who pays in the end. It is great for the fertilizer and chemical company and the university which receives research money to perpetuate this vicious cycle. If the author sounds a bit perturbed about this circus, I am. The proof is in the results. The field in question, on which the soil test was done, was planted at the end of April 1985, with alfalfa and oats. The soil was sprayed before planting with a fertilizer solution formulated from scratch using an electronic scanner. One week after planting, prior to seed sprout, there was a severe wind storm. A neighboring field was eroded so severely by the wind that one could not see across the field, yet the field in question did not suffer even though it was bare. The oats grew wonderfully and were harvested green for cattle feed, and the alfalfa, which grew to 18 inches in height before winter, covered the field uniformly. The fertilizer mix was as follows:

4 ounces humic acid	$ .310
8 ounces bacteria water	.625
6 pounds potassium carbonate	3.000
5 pounds calcium nitrate	.375
3 pounds corn sugar	.780
1 ounce seaweed	.250
5 pounds mono-ammonium phosphate	3.500
1 ounce ascorbic acid	.500
	$9.340

All of it was mixed and applied in a solution of 25 gallons of water per acre. (Only two of these products are recognized as fertilizers by the experts, calcium nitrate and mono-ammonium phosphate.) The real difference is that this farmer truly cares about his soil, his animals, and the public who finally consume his product.

Included here is the 1986 soil test report from Michigan State University for the same field. The pH has jumped from 5.5 to 7.1, yet no lime was added since the first test. Also, no additional magnesium was added. The recommendations are consistent in priniciple—little or no phosphate and lots of potash—yet inconsistent in quantity per ton of alfalfa. As usual, no consideration for quality is mentioned. The main points about soil testing and the resulting recommendations are that testings are of little or no value in and of themselves nor relevant to quality plant feeding, because they are strictly laboratory oriented and unconcerned with the "living" aspect of soil fertility and plant growth. The recommendations are based on predetermined standards irrelevant to anything except fertilizer and chemical sales. The quality aspect—meaning the brix, which reflects the mineral content of the crop being grown—is never considered.

The "fertilizer prescription" which was formulated using an electronic scanner and applied to this alfalfa field on May 10, used the following per acre:

8 ounces humic blend	1 1/2 quarts calcium solution
12 ounces Clintose corn sugar	25 gallons water per acre

We often hear of people who slaughter the English language. But what about the people who slaughter basic chemistry and physics, and ultimately our soils? There is no argument, modern agricultural practices have cost us half our top soil and given us nightmares with toxic chemicals. No soil—no food. No food—no life!

A more worthwhile soil testing practice is being done by a few private labs and many individuals. This system utilizes the Le Motte testing equipment according to procedures developed by Dr. Carey Reams and Dr. Dan Skow. It uses an extracting

Table 2

MICHIGAN STATE UNIVERSITY, SOIL TESTING LABORATORY, EAST LANSING MI., 48824-1114

SERVICE PROVIDED FOR:

DATE RECEIVED: 05-02-86
DATE SENT : 05-12-86

SAMPLE 1
TRAY 164 - 18607
ACRES 12

SOIL MANAGEMENT GROUP :3
PLOW DEPTH: 8 INCHES
PREVIOUS CROP: OATS

1ST CROP: ALFALFA-SEEDING
YIELD GOAL: 3 TONS/A
MANURE: NO

2ND CROP: ALFALFA-TOPDRS
YIELD GOAL: 3 TONS/A
MANURE: NO

SOIL TEST RESULTS

SOIL PH: 7.1

LIME INDEX:

		PERCENT BASES	FERTILITY INDEX LOW MED HIGH
PHOSPHORUS...	107 LBS/A		**********
POTASSIUM....	88 LBS/A	2 %	********
CALCIUM.....	1676 LBS/A	84 %	**********
MAGNESIUM....	160 LBS/A	13 %	**********
ZINC.....			
MANGANESE....			
COPPER.....			

CATION EXCHANGE CAPACITY: 5 me/100g

FERTILIZER RECOMMENDATIONS

	1ST CROP LBS/A	2ND CROP LBS/A
NITROGEN.....	0	0
PHOSPHATE....	0	0
POTASH.....	230	350
ZINC.....	0.0	0
MANGANESE....	0.0	0
COPPER.....	0.0	0
BORON.....	0.0	(2)
LIME CROP TO PH.	6.8	6.8
RECOMMENDATION IS	0.0 TONS/A	
SEE FOOTNOTES	1 2	

FOOTNOTES

COMMENT:
1 ALTHOUGH PHOSPHORUS IS NOT REQUIRED TO OBTAIN THE PROJECTED YIELD, A PHOSPHORUS STARTER MAY IMPROVE EARLY PLANT GROWTH
2 MAXIMUM RECOMMENDATION FOR ACP COST SHARING 0 LBS P2O5/A 240 LBS K2O/A

You may want to add 25 lbs. P_2O_5 in starter to help in alfalfa establishment.

solution closer in strength to what plants possess. It also checks both the ammonia and nitrate nitrogens. Recommendations are generally consistent because they consider crop quality and fertilizer quality as part of the program. This test gives the client a better starting point from which to begin improving the living states of the soil in question. Unfortunately, as in all wet chemical testing, there is still an arbitrary interpretation of test results based on man-made parameters.

Here are the suggested values for nutrient levels using the Le Motte system for a healthy soil, in pounds per acre:

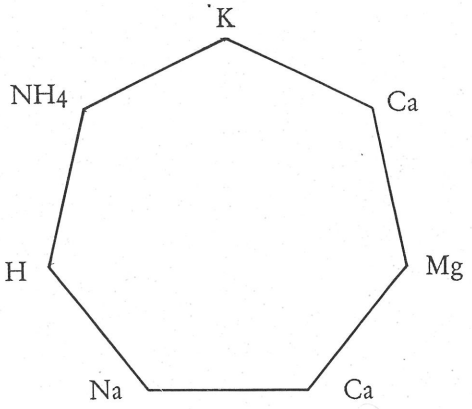
Calcium (Ca)	2000+
Phosphate (P_2O_5)	400
Potash (K_2O)	200
Sulfate (SO_4)	200
Nitrate nitrogen (NO_3)	200
Ammonia nitrogen (NH^+)	40
Iron (Fe)	40

This system, usually referred to as the Biological Theory of Ionization, is a grand step ahead of conventional theories. People who understand this system have obtained marvelous results to prove its validity. There are also many failures attributed to the program, but upon investigation every one was the result of hastiness, incomplete understanding of the program, incomplete application of the program, or the use of inferior or contaminated products, unbeknownst to the purchaser.

This brings us to the third method of testing. Like the second over the first, it is a step up. This method involves the use of an electronic scanner. The particular one used here is a type of spectrometer that measures biological and non-biological energies of the phi field, the electrostatic scaler potential. (For those readers who would like more technical information, I suggest investigating advanced level physics courses as well as reading the work of Thomas E. Beardon, available from the Tesla Book Company, 580 Magnolia Avenue, Millbrae, California 94030.) The net result of this testing program is that available fertilizer products can be checked with the soil for their

electrical compatibility before they are applied. The skilled technician or consultant can put together a soil fertility program based upon the soil's actual response to the fertilizer product. Those readers familiar with applied kinesiology can understand the process. It is an advance beyond the arbitrary, cook book, trial and error, "I hope it works, we did it last year," copycat system that has lost this country one-half of its top soil in the past 100 years, depleted the quality of its food, and polluted its environment—all in the guise of progress. Remember, plants and soils do not read books. One hundred years ago doctors were appalled at the suggestion of washing their hands between patients to prevent the transfer of little organisms one could not see (without a microscope) called bacteria. The doctors' disbelief that these organisms existed did not change the fact they did. Today you would be appalled if the doctor did not wash between patients.

There are two other practices related to testing that warrant a mention. Both are performed conventionally and have elicited a great deal of printed material. One is the CEC test in conventional soil test systems. A numerical value is calculated from the lab for the given soil sample. This figure is then used along with the soil pH to determine the theoretical amount of lime necessary to change the pH to a predetermined figure. It looks very nice on paper and sounds very sophisticated (and it is), but not in agriculture. The cation exchange capacity is a value relating to capacity of, particularly clay, particles to hold cations, i.e. Ca^{++}, Mg^{++}, Na^{+}, K^{+}, NH^{+}, etc.



This analysis was developed by the mining industry and is mainly used by petroleum engineers to formulate drilling muds that will carry the debris away from the drilling bit. It is basically a raw chemical/physical phenomena and is out of context when used in a biologically active soil and a progressive fertility program. Possibly it is a contributing factor in the mining of our soils.

The CEC, though used extensively, is of limited value in agriculture. The test was adopted by the agricultural industry as a tool to perpetuate the manipulative fertilization practices of modern agriculture that have led to the mining of the soil.

Also worth mentioning is the tissue test. Tissue analysis is the laboratory analysis of fresh plant vegetation. It is widely used. There are some very successful consultants and agriculturists who perform tissue analysis. It is done regularly throughout the growing season in an attempt to find nutrient deficiencies in the crop, followed by a foliar feed to correct it. It is correct in theory and it can work in practice. There are, however, two pitfalls. One, it often takes several days to several weeks for a report to return on the testing. By this time the plant's growth stage has changed and something else is also a problem now.

The other pitfall has to do with standards. Who decides what the nutrient levels should be? Most often these levels come from research analysis of healthy plants. Who decides what is healthy? If the crop required any chemical sprays to protect it from insects or diseases, it was not healthy! Since most publicized research is done by scientists who do not recognize the validity of the last statement, the values given as standards for tissue analysis only allow the farmer to produce more of the same and then buy a rescue chemical. Looks can be deceiving, especially if you do not see what you're looking at. Again, the two pitfalls of tissue analysis can be rectified with the use of an electronic scanner; the crop can be analyzed in the field immediately and a recommendation presented that will correct any deficiencies that are feasible to fix.

Time is of the essence. Problems are developing and growing at accelerated rates. It takes nature between 30 and 100 years to

replenish just one inch of soil. It is currently being lost at about five to eight times this rate. Why are the soils fading at all? Experts suggest it is due to increased production intensity, careless tillage practices, and improper ground cover. Though that sounds convincing, it is only toying with symptoms. It does take the monkey off the culprit's back, or seems to. The culprit is improper soil and plant nutrition. Conventional fertility practices have reduced the magnetic properties of the soil to the point where it cannot hold itself together. Try making some cookies without any flour. Once the magnetism of the soil is reduced then the elements—wind, rain and snow—can easily remove the soil. Following are some major culprits of magnetic degradation.

Muriate of potash. Often called red potash, white potash, kalium potash, 0-0-60, and 0-0-62, muriate of potash is potassium chloride (KCl). It is the most commonly used potash fertilizer in this country. Ironically, its chlorine content makes it one of the most detrimental products that can be applied to the soil. Muriate of potash contains an average of 40% chlorine. When this product comes in contact with acids or acidified fertilizers such as 0-46-0 (triple super phosphate—the most commonly used commercial phosphate fertilizer), the chlorine will form muriatic acid (commonly known as hydrochloric acid), which will destroy any bacteria it contacts and will acidify the soil, causing such minerals as calcium and iron to become less available in the soil solution should they contact the muriatic acid.

The chlorine that does not become muriatic acid combines with calcium, magnium, and especially sodium to form chloride salts that are also detrimental in the soil, as they cause dehydration, adverse pH changes, and salinization. When potassium chloride contacts nitrate nitrogen (NO_3) half the chlorine forms hypochlorous acid (HClO), the main chemical used as a swimming pool disinfectant. This compound is very hostile to bacteria, and thus inhibits their growth. The other half of the chloride forms chlorine gas which sifts into the air. Chlorine gas is also toxic to biological life, including people. It is a gas *heavier* than air, therefore it lies close to the surface of the land

and in low areas. When chlorine gas contacts water from high humidity or rainfall, some of it forms more hypochlorous acid and may fall as acid rain. The remainder recycles as chlorine gas. Unfortunately, potassium chloride is like a drug to the soil—the soil gets hooked on it. As with any drug addiction, increased amounts are required yearly to achieve the same "high," eventually causing the death of the user. The use of potassium chloride also leads to more compacted soil—due to the destruction of organics it causes—requiring more power for tillage, more chemicals for pest control. This chain reaction, begun by the destruction of the organics, leads to increased erosion.

Furthermore, the use of potassium chloride for fertilization leads to eventual desertification from salinization and then, most important of all, it leads to the production of poor quality—mineral deficient—crops. There are many alternatives to potassium chloride—potassium sulfate, potassium nitrate, potassium hydroxide, Chilean nitrate of potash, and several organic sources, including potassium carbonate, all of which do not contain chloride. It is imperative to purchase only products that do not contain chloride.

Ironically, farmers are told that potassium chloride is not detrimental to the soil, even though professional chemists and petroleum engineers insist that chloride is extremely harmful to the soil. The bottom line is that potassium chloride causes the demise of soil fertility, leading to the need for more and more fertilizer, greater amounts of pesticides, and larger and more powerful equipment. It is time for the farmer to become aware of the peril he is creating, take his own interests in hand, and turn the situation around. Only the farmer himself is truly concerned with his own interests.

It is argued that chlorine does not hurt anything because there is such a small amount of it actually applied, and "research" proves it. Anyone who is familiar with research and statistics knows that the parameters of a research project determine its universality. It is important to find out what those parameters are. How much chlorine does it take to do harm to a biological system? Municipal water supplies are normally chlorinated to kill bacteria, good or bad. The concentration of

chlorine is between one and two parts per million. At 10,000 drops per pound, eight pounds per gallon, that is one drop of chlorine in 12.5 gallons of water. If you have a swimming pool, you are familiar with chlorinating it to keep the organisms in check. Note that a pH test is included in swimming pool test kits. As the chlorine content increases, so does the pH. That says something for the value of using pH as a calcium (lime) indicator, especially if you consider how much chlorine is applied via fertilization.

Let's calculate just how small the amount of chlorine applied to the soil really is. Muriate of potash, KCl, contains about 40% chlorine or 40 pounds per 100 pounds of KCl. A one-acre slice of soil 43,560 square feet by six inches deep is generally said to weigh more or less 2,000,000 pounds. If a farmer applies 100 pounds of potassium chloride, he has applied 40 pounds of chlorine. To calculate the chlorine concentration, assuming the fertilizer is a dispersed evenly throughout the six inch slice of soil, you would take 40 pounds of chlorine divided by 2,000,000 pounds of soil and get 20 parts per million of chlorine, or about ten times that needed to kill the microorganisms. The truth is that most farmers apply several times that amount, some as much as 1,000 pounds per acre, of potassium chloride each and every year. Chemistry is chemistry whether it is in your swimming pool, the public water supply, or the soil. It is the aerobic microorganisms in the soil, alive and active, that make the soil fertile. Chlorinate the soil and you inevitably suppress them.

The use of muriate of potash or potassium chloride, is not the only degenerative practice commonly observed. Almost as detrimental is the use of industrial wastes. These include spent acids such as phosphoric or sulfuric acid that are first used by industry and then used to make fertilizers such as ammonium sulfate, liquid sulfur, liquid monoammonium phosphate and various other liquid blends. Not all fertilizer companies do this, but many do. These raw materials are cheaper than clean product because industry has already used it once. From their industrial use these products pick up any number of heavy metals like lead, cadmium, or aluminum. When these cheaper fer-

tilizers are applied to the soil, the heavy metals cause problems with the microorganisms and in many cases, contrary to cover-up reports, are taken into the crop, thus causing problems for the consumer. The intake of whole molecules by plants is a principal of science no longer under dispute.

Another possible problem product from industrial waste is by-product lime from processing plants and paper or pulp mills. This type of lime can be loaded with metals, but is more often full of resins or toxic chemical complexes. These chemicals can be extremely bad for the soil, yet they are widely used because the soil scientist says it will do such and such for the pH. He does not even consider checking its nutrient value or potential hazards.

The next practice involves the misuses of a potentially valuable product—anhydrous ammonia. This is one of the most popular and widely used forms of agricultural nitrogens. It is a very profitable product for its manufacturers. "Anhydrous" means the water is removed, leaving only ammonia. The product is fine if water is added to get what is referred to as aqua-ammonia. Anhydrous ammonia is extremely dangerous. It can severely burn the skin. It can also burn the lungs and rapidly suffocate a person by displacing oxygen. It is very effective in destroying organics—so good, in fact, that in 1942 the U.S. Army used it to make emergency air strips. When a farmer applies anhydrous, he uses a tool that knifes the ammonia several inches into the soil. It effectively reduces the usable oxygen in the soil needed by the aerobic microorganisms, burns the organics that include the microorganisms, creates an ash, and sets in motion the process by which formaldehyde and pathological organisms abound. Case in point: Dr. Dan Skow remembers when he first started his veterinary practice over 15 years ago, anhydrous ammonia use was as scarce in his area as chlamydia in hogs. As anhydrous ammonia usage became more and more popular, so did chlamydia in hogs on those same farms. Today it is a serious problem requiring regular vaccination on the farms that use anhydrous ammonia. Anhydrous is a cheap source of nitrogen, though. It looks monetarily good on paper in some programs, but again, chemistry is chemistry. Another

common practice of "modern" agriculture that degrades soil fertility is the use of dolomite limestone.

Dolomite lime. Dolomite lime is a compound of calcium carbonite and magnesium carbonate. It ranges in magnesium content from 15% to 35%. It is commonly used as a liming material when institutional soil tests indicate a soil magnesium deficiency. Magnesium is often overused in present day agriculture. There are many publications that profess magnesium deficiency, substantiated by the fact that the symptoms disappear after magnesium application. Unfortunately this is the same logic used to justify all the accepted fertilization and pest control practices that have resulted in the fiasco of modern agriculture. The main problem with dolomitic lime is that it contains too much magnesium. According to Michigan State University's soil tests, the recommended amount of magnesium per acre for fertile soil is in the range of 75 pounds. Using the pH logic for liming, they recommend using dolomite if there is a magnesium deficiency because dolomite will raise the pH and provide the needed magnesium as well. Let's assume your soil has zero pounds of magnesium by their test and pH logic recommends applying two tons of dolomite lime per acre. Using the value 25% magnesium as the lime's average magnesium content, you would be applying 2,000 pounds x two x 25% = 1,000 pounds of magnesium. By MSU's standard, the soil needed about 75 pounds of magnesium, or about 1/13 of that present in two tons of dolomite lime with 25% magnesium. Dolomite lime is 20% to 30% more expensive than high calcium lime, and the excessive magnesium creates a severe mineral imbalance in the soil. If you ask why the extreme excess is recommended, you will be told it is for reserve purposes. Fact: reserves are only useful and beneficial if they are in proportion with all other components. Any element in excess causes a toxicity. (Selenium is a very important trace element,) but apply 13 times the needed amount and the result will be fatal.

Magnesium carbonate will readily form magnesium nitrate salt ($Mg\{NO_3\}2 - 6H_2O$) which is strongly hydroscopic (has an affinity to water). The chemical reaction here has a dehydrating

effect. This reaction can also produce a nitrogen deficiency that requires the farmer to purchase more nitrogen. Also, this compound increases the salt content of the soil, increases the potential for root and crop dehydration (burning), and finally increases the possibility of both magnesium and nitrogen being leached out of the soil (magnesium nitrate is very water soluble). The so-called reserve is wasted and/or deleterious. Adequate magnesium is present as an impurity of high calcium lime, and most soils already contain adequate magnesium despite claims to the contrary.

An additional drawback of dolomite limestone is that it is often contaminated with lead. There is no nutrient value in lead. It is toxic. It adds additional stress to an already overstressed, undernourished soil. Before you swallow the argument that lead is found in such small quantities that it doesn't hurt anything, think about how much it takes to hurt the current U.S. fertility situation, and remember the adage "the straw that broke the camel's back." Do not use dolomite lime, period.

There are several other agricultural practices that seem to look good. One of these practices is what can best be termed the single nutrient fix. There are many publications with beautiful photographs of various plants with various nutrient deficiency symptoms. Ponder for a moment. Nature is much more complex than this. Deficiency symptoms are the result of a chain reaction of events that the current system does not take into account. If you have a rust spot on your car which has come through from underneath, does it correct the rust problem to say there is a paint deficiency and paint over the spot? People who live in areas where large amounts of road salt are used realize that the paint can often mask a growing rust problem but does not correct it. Here lies the major flaw in the single nutrient fix philosophy. Quality! When that nutrient is added to the crop, does the health and quality (mineral content) improve as well, or has the real problem been masked? Remember the rule: nutrients must be accompanied by phosphate to be properly assimilated by the plant. If there is a phosphate deficiency, there is a deficiency of all other nutrients.

Nitrogen can get in and can carry potash with it, but this is

not good because it results in less than optimum cell structure, watery plants, nitrogen toxicities and insect infestations.

The following four examples of the single nutrient fix philosophy are the ones promoted by soil scientists. The proclaimed deficiencies were taken from miscellaneous publication 47 of the Fertilizer Institute, Washington, D.C. *Be Your Own Corn Doctor,* by K. C. Berger.

A phosphate shortage makes reddish-purple marks on leaves, particularly on young plants. It is actually a copper and manganese deficiency that causes the plant leaves to turn these colors. The reason there appears to be a phosphate deficiency is due to the fact that all nutrients must be assimilated in phosphate form. Technically there is a phosphate shortage, when the phosphate is considered the carrier or escort of the copper and manganese. A deficiency of these two elements actually causes the visual symptoms.

Potash deficiency appears as a firing or drying along the tips and edges of lowest leaves. Here there is actually a carbohydrate and molybdenum deficiency. Since carbohydrates are products of photosynthesis and phosphate is the key element in photosynthesis, the carbohydrate deficiency can be technically attributed to a phosphate deficiency. As this is the case, then the molybdenum also does not have adequate phosphate to escort it. The reason potash appears to eliminate the symptom is that it is applied as muriate of potash (KCl), which will convert to potassium nitrate and then which move into the plant. Potassium nitrate readily carries a great deal of water containing carbon dioxide with it. This carbon dioxide temporarily supplies enough carbon to partially correct the symptom. The potassium chloride also creates a localized pH change in which more molybdenum is available, because the limited amount of phosphate will grab onto that which has the least resistance to movement in the solution. The pH here is the measurement of that resistance, thus a little more correction of the symptom. The nitrate nitrogen carried in with the potash corrects the rest of the symptom.

Hunger sign is yellowing that starts at tip and moves along the middle of the leaf. This is actually a carbohydrate and

boron deficiency under circumstances similar to the alleged potash deficiency. The nitrogen is carried in water, which contains some carbon dioxide, and it creates a localized pH change in which boron is more available for the phosphate to latch onto.

Magnesium deficiency causes whitish strips along the veins and often a purplish color on the underside of the lower leaves. This symptom is, loosely speaking, a magnesium deficiency. Technically, there is a nitrogen toxicity here and magnesium is the antidote for pulling out the nitrogen by forming magnesium nitrate that is then flushed out of the plant, making the symptoms disappear. Symptoms may disappear after single nutrient fixes, yet the cause behind them usually remains. Test: if the refractometer reading increases, you are on the right track. (Refer to Chapter 6 for further discussion on refractometers.)

NORMAL EAR, BIG EAR, SMALL EAR

Normal ear on well fertilized high-producing corn weighs about 2/3 of a pound. It has well-filled tips.

Big ears weighing up to one pound indicate that the plant population was too small for most profitable yields.

Small ears are usually a sign of low fertility. For better yields, boost fertilizer application.

These axioms are all based upon opinion and suboptimal standards. The question that needs to be asked is, "Normal, big, or small ear compared to what?" First of all, the size of the ear is directly proportional to the nutrition available during its development. Take two ears of equal size and weigh them. The heaviest one has the greatest mineral content. Commodities are measured by weight not volume, so if you have a 60-pound test weight corn, there will be less volume versus a 56-pound test weight corn.

When you base your observations on mineral content using a refractometer to evaluate crops, you will know that none of the ears pictured in this bulletin are very good compared to what they should be for feed or food. There is too much denting of the kernels. Not one of them would have a refractometer

reading of 12 or above. Another factor regarding these first three ear photographs is that you could possibly find all three on the same stalk.

EAR DEFICIENCY SYMPTOMS

Phosphate shortages interfere with pollination and kernel fill. The ears are often small, twisted and have undeveloped kernels.

Potash shortage shows up in ears with poorly filled tips and loose, chaffy kernels.

Nitrogen is essential throughout the growing season. If a plant runs out of nitrogen at a critical time, the ears will be small and have a low protein content. The kernels do not fill at the tip.

The true deficiencies are the same as those discussed for the plants.

Green silks at maturity may be caused by too much nitrogen in relation to other elements. Green silks are actually caused by deficiencies of calcium, phosphate, and manganese.

Regardless of what the soil test values are, or what some textbook may state as necessary level of phosphate, if there is a low level of sugar, then there is a deficiency of assimilated phosphate and other mineral nutrients. There may be something blocking the phosphate assimilation or an actual phosphate deficiency, but it is none the less a phosphate deficiency. Until it is corrected, no true picture of the other nutrient deficiencies is possible.

There are many factors that can contribute to a nutrient deficiency. The blocking of a nutrient creates a deficiency of that nutrient. This is quite common. Remember, all nutrient phenomena are related to electromagnetism. If there is too little current flow, the system is sluggish and some of the nutrients, especially the heavier atomic weight elements, will not move at all. If there is too much current flow, the system is hyper and burning often occurs or, so to speak, electrocution occurs. Picture a train on a schedule that is coordinated with other trains using the track. If the train is too slow, stoppages occur. If the train is too fast, there may be collisions or derailments. Too little current flow in the soil is caused by too much alkalinity,

often attributed to areas of high limerock or sodium concentrations. This is fairly easy to correct, especially using an electronic scanner for product selection. Too much current flow in the soil is not quite as quickly corrected because it is often caused by salt buildup in the soil; it can also be caused by too much acidity. High salt buildup also occurs in alkaline soils, a compound problem common to U.S. soils. Salt buildup has two major causes: the destruction of organics by toxic fertilizers and the use of high salt fertilizers, both of which destroy organics.

The use of materials such as muriate of potash and triple super phosphate adds salt to the soil. The salt dehydrates the soil, causes excess current flow, and therefore creates more salt by burning the soil. It also causes excess current flow, thus creating still more salt by burning out still more organics. As the organics are depleted, the soil becomes compacted and biologically inactive. The organics hold the magnetism that holds the soil together. This cycle perpetuates itself, especially with the annual addition of salt fertilizer. Also, when large amounts of chlorine are applied to the soil, the organics disappear and increasing amounts of soil nutrients form chloride salts that dehydrate the plant and are easily leached out of the root zone. More and more water is required to the point where eventually the soil can become saturated with water, even though the crop is starved for water. The next step is desert.

The bottom line concerning all these practices is that they directly or indirectly destroy the organics—biologically active carbons—that determine the soil's vitality and fertility. Just because the farmer applies manure or tills in large amounts of organic matter (crop fodder, residue, or cover crops) does not guarantee it will be converted to humus. Organic matter can take two pathways: anaerobic, resulting in organic salts, formaldehydes, and soil demise, or aerobic, resulting in humus, soil maintenance and rejuvenation. Once either cycle is in motion, it takes a tremendous countermeasure to change it. The present day phenomenon of erosion, nutrient leaching, environmental pollution, massive applications of chemicals to rescue the crops, storage problems of produce, nutrient deficiencies in con-

sumers, and most of the horrendous costs of production are all symptoms of misuse and abuse of the soil. It is not unique to this decade, as Dr. Charles Northern pointed out back in the 1920s. The situation has just intensified to the point where more people are starting to take notice and ask questions.

The counter response to the discussion in this chapter is similar to that of a person cursing a life boat destined to save him from a sinking ship, as if it showed weakness or insult toward the victim to be saved. It sometimes portrays the saying "Don't confuse me with the facts, I've already made up my mind." How sad! So many people see only the immediate profit of this self-destruction, which is a very short sighted view because even the "recognized" scientists agree that if it is not reversed there will not be a future in which to spend those illustrious profits!

Why do farmers get response and growth from some of the practices and products addressed previously? Remember that plants and all biological life lives and grows from energy. Anytime two substances react, energy is exchanged. There is no question the application of muriate of potash (KCl), dolomite lime, waste acids, salt fertilizers, anhydrous ammonia, and single nutrient fixes produce chemical reactions which net some energy that causes plant growth and often changes the visual appearance of the crop. But there is more to it than what meets the eye. Putting ether in a diesel engine will produce a response, but it's not a preferred practice. You can use airplane fuel in an automobile, but how long will the engine last? Unfortunately, we are not dealing with an engine here. We are dealing with the very sustenance that keeps this planet and its inhabitants alive. We are not playing games with politics, computer games, sporting events, or the stock market. We are dealing with our lives, our children's lives, and so on. One must consider more than the short term visual observation. If you truly see what you are looking at, you will observe that such phenomena as the crop turning dark green after an application of nitrogen is only a nitrogen green and not synonymous with a quality green. Farmers have often been heard saying they aren't concerned with quality, just volume, because they are

selling the crop anyway. What would you think of a doctor or pharmaceutical company with that attitude? If the facts are truly understood, you can get more volume from high quality crops than low quality, and much more economically. In response to the concern that U.S. farmers already produce too much, some light will be shed on that propaganda at the end of this book. What truly is a quality crop? What characteristics does it exemplify over what is currently, boastfully proclaimed as good quality crops?

4

DIVINE BLUEPRINT

Nature, the environment in which we live, is not haphazard and not without order and purpose. From the smallest single-celled organism to man, there is a purpose and a place for everything, and everything has its place and purpose. As you gain an understanding and appreciation of life, you will discover that there is no need for man's intervention. Only when man disrupts this balance and then proceeds to circumvent and overrule natural laws does there appear to be chaos and brutality in nature. Nature will triumph in the end whether man cooperates in harmony with it or plunders away into oblivion. Man does have the capability to help nature regenerate, however. This is a marvelous wonder to observe. Nature will more than take care of man if he simply allows her to do so. She will also protect man if left to her own devices.

There is a simple experiment that can be performed to show that electromagnetism is a key principle of nature. Take a sample of some fertile soil, preferably from a wild forest, flower patch, or some other area relatively free from human interference, and then take a sample of poor, infertile soil. Put each in a separate glass test tube and suspend each one by a thread so they hang freely. Then take a 2,000-gauss cobalt magnet and

move it close to each tube. The more fertile soil is paramagnetic and will be attracted to the magnet, and the less fertile, diamagnetic sample will be repelled. Use beach sand as the poor fertility sample to get the most distinct reaction. Since the more fertile a soil, the greater its paramagnetism, it only stands to reason that there is correspondingly less erosion.

There are distinct indicators in nature corresponding to the level of fertility—health and vitality—of the soil. Let's start with insects. Most people are taught to believe that insects are just pests, and as such are just there to be pests. Insects have a very distinct and important task: they devour. Each species of insect has in its genetic structure a specific food for it to devour, and that food is determined by frequency. Dr. Philip Callahan of the University of Florida, a USDA entomologist, explains that insect antennae are actually like small semiconductors, and, as they are coated with wax, are also paramagnetic structures. They receive various wavelengths in the infrared spectrum. Once the information is received, the insect's brain determines whether the frequencies correspond to a mate, food, water, or something else. Everything emits infrared radiation, and each thing has its own specific range of vibration. The vibrational frequency of all the component parts of a thing makes up its composite vibrational frequency. This is what the insect receives and processes.

If a plant is in perfect or near perfect health (mineral balance), it will vibrate at a given composite frequency. If there happens to be a mineral deficiency, it will vibrate at a slightly different composit frequency. If there is a serious deficiency or several deficiencies that make that plant unfit for animal or human consumption, it will vibrate at a significantly different frequency that the insects know as food, hence an insect infestation. This phenomenon is easily proven. Grow a plant, a potato for instance, according to the program that is laid out in the next chapter of this book, and also grow one according to conventional practices. Keep track of the sugar (brix) readings and notice which plant is devoured by insects and which is not. Once the quality of a crop surpasses a given level, there will not be an insect problem with it, because the crop will not

vibrate at a composite frequency corresponding to the insect's food.

Diseases are a self-destruct or red light mechanism with the same purpose—to signal a mineral deficiency or imbalance. Correct the deficiency and the disease disappears. You can prove this for yourself by the same method as for the insects, only this time monitor the potato plant for blight or some other malady. When you grow a vegetable of higher quality, notice the flavor, texture, color, shape, size, weight, density, storage life, aroma, and energy derived from eating it. High quality produce will not rot. It will only dehydrate.

The next so-called pest is the weed. Weeds seem to be everywhere—in the lawn, the garden, the flower box, alongside the road, in corn fields and hay fields. It is often said that fertile soil will grow weeds and crops equally well. That is only if you are growing weeds as a crop. Like insects and diseases, weeds have a distinct purpose—to replenish the soil. It may take nature decades or centuries to correct man's fiascos if left alone, but nevertheless it eventually will. Weeds are the best soil test you can use. Each weed species is genetically keyed to replace a specific deficiency. For simplicity's sake, they are divided into three categories: broadleafs, grassses, and succulants. Generally speaking, broadleaf weeds are present to correct the imbalanced ratio between phosphate and potash. The ratio should be two parts phosphate to one part potash for row crops and vegetables and four parts phosphate to one part potash for grasses. These values are based upon the use of the Le Motte testing equipment following the Biological Theory of Ionization procedures. Typically, you will find the ratios not only reversed but as bad as ten parts potash to one part phosphate. Also, the broadleaf weeds act to detoxify chemicals in the soil through metabolic processes.

Grasses such as foxtail and quackgrass are generally present to correct a calcium deficiency. In permanent crop areas such as orchards, grasses can be effectively used as a fertilizer simply by keeping them mowed and allowing the clippings to compost back into the soil. In areas where the clippings will not compost back into the soil but rather create a thatch buildup, there

is a lack of aerobic microorganisms, an excessive salt concentration, and poor aeration.

Succulants are usually present to replenish the carbonate ions in the soil as well as increase its water holding capacity. Succulants also act as a ground cover to protect the fragile soil from erosion and dehydration.

As you garden or farm, keep records, and truly observe things, you will notice the unfolding of some very interesting events. The use of fertilizer will determine what types of plants will be healthiest. If you fertilize for weeds, then weeds will be the healthiest plants growing. The laws of nature do not change simply because man writes a book of theories contrary to natural law. The electronic scanner has made it possible to perform some inexpensive evaluations which can then be verified by observation, brix readings, and wet chemical laboratory analysis. The following is a brief example, compliments of a good friend, of three different plants' responses to various fertilizer materials. Two are considered major weeds—buttonweed (or velvet leaf) and foxtail—while the third is Golden Glow Corn.

BUTTONWEED (VELVET LEAF)	VITALITY
Weed in field	660
Muriate of potash (KCl)	850
Magnesium sulfate ($MgSO_4$)	850
Potassium sulfate (K_2SO_4)	650
Bladex herbicide	540
Molasses	500
Cobalt sulfate ($CoSO_4$)	300
Phosphoric acid	200
Vinegar	180
Soft rock phospate	150
2,4-D	120
Lignite	110
Manganese sulfate ($MnSO_4$)	110
Lime (source A)	40
Molybdenum	0
Composted chicken manure	0
White corn sugar (Clintose A)	0

FOXTAIL	VITALITY
Weed in field	350
Muriate of potash (KCl)	600
Zinc sulfate ($ZnSO_4$)	500
Potassium sulfate (K_2SO_4)	290
Copper sulfate ($CuSO_4$)	250
Lignite	200
Manganese sulfate ($MnSO_4$)	190
Soft rock phosphate	130
Lime (source A)	60
Phosphoric acid	80
White corn sugar (Clintose A)	0

GOLDEN GLOW CORN	VITALITY
Corn in field	1400
White corn sugar (Clintose A)	5200
Manganesee sulfate ($MnSO_4$)	5100
Soft rock phosphate	4700
Molasses	3300
Lime (source A)	2600
Lignite	2100
Lime (source B)	1000
Zinc sulfate ($ZnSo_4$)	800

The way to interpret this data is first observe the weed or corn-in-field vitality. This is the scanner value for that plant, as it exists in the field. Next, as the various fertilizers are put with the weed or corn, the vitality of the weed or corn changes. For example, applying muriate of potash to velvet leaf raises its vitality to 850, meaning it is a very good, beneficial fertilizer for velvet leaf and will increase its growth. Note that the good weed fertilizers are the poor corn fertilizers. Remember, quality mineral balance is the standard. The function of every weed is to replenish the imbalance of minerals. Therefore, the greater the imbalance, the better the weed grows. As the imbalances are corrected or deficient nutrients replaced by proper fertilization, the weed is no longer needed and its growth and vitality fade.

Check manganese sulfate on all three plants. It reduces the

weed's vitality and increases the corn's. Notice that lime (source A) and soft rock phosphate are poor weed growers and good corn growers. Take special notice of the effect the organics—molasses, lignite, clintose A corn sugar, vinegar, and composted chicken manure—have on the corn versus the weeds. The organics provide the energy and carbon for the microorganisms to proliferate as well as for the corn to grow healthfully. None of these organics, except the manure by the way, are recognized nor registerable as fertilizers, yet muriate of potash, which is detrimental to corn and any fertile soil, is not only recognized and registerable as a fertilizer but portrayed as the best source of potash for the farmer to buy.

Another case worth mentioning is that of zinc. Zinc has become a highly recommended trace element by the experts and institutions. The response that follows the addition of this element is illusory. Zinc applications generally enhance weed growth and may cause a deceptive visual change in the desired crop, but zinc applications per se do not improve the quality of the crop. The supposed zinc deficiency symptoms are actually nitrogen deficiency caused by a phosphate deficiency. Nitrogen is an electrolyte and so is zinc. Therefore, its application "corrects" symptoms but not the cause behind the cause.

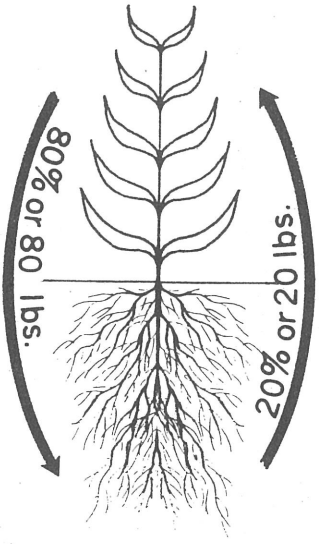
When walking through a garden or field, notice which plants seem the healthiest. Which ones are being devoured by insects and diseases, the weeds or the crop? As crop quality improves, the brix content will increase, the mineral content will increase, and the storage life will lengthen. Correspondingly, these values for the weeds in the same area will decrease. If you wish to investigate the effect fertilizers have on weeds in greater detail, observe plant and insect occurrences, keep notes, and experiment with your own plants. A further listing and explanation of the previous type of plant and fertilizer comparison can be found in a pamphlet *Weeds, Why?* by Jay McCamman, available through TransNational Agronomy in Grand Rapids, Michigan.

Once the balances of nature are restored or at least closely approximated, your soil will improve yearly with fewer and fewer inputs per output required. This is easily calculated.

Remember the rule of thumb: 80% comes from the air, 20% comes from the soil. This concept is a very important, especially when coupled with the fact that there is as much plant mass below the ground as there is above. Putting the two together, the picture looks as follows: If you are growing a corn plant and harvesting the entire plant, how is the soil gaining? Let's say we remove 100 pounds of dry matter in corn plants. Eighty percent (80%) or 80 pounds came from the air and 20%, or 20 pounds, came from the soil, so the soil is minus 20 pounds of nutrients. Since there is an equal amount of mass below the ground (the root system), then there is also 100 pounds there. Twenty percent (20% or 20 pounds) came from the soil and 80% or 80 pounds came from the air. Since the plant material below ground is not removed by harvest, the soil receives a new gain of 100 pounds minus another 20 pounds which was required from the soil to make up the underground portion. That 20 pounds remains, but is not a net gain, so the net gain to the soil is 60 pounds, or 60% of the quantity that was harvested. This is 60 pounds of organic material including, carbohydrates, enzymes, vitamins, and minerals, to add to the soil's fertility *provided* there is a living biological system to process it. If not, it becomes a salt or formaldehyde that will perpetuate degeneration of the soil. Nature will continue to exist and prevail either way. Man can either fight her and curse her to his demise, or he can peacefully co-exist with her to his health and well being, following the divine blueprint.

Most of the products that are good for the corn and bad for the weeds are not recognized by the experts, and in most states are not even registerable as fertilizers. So much for the consumer protection by state agencies and institutions.

We actually have 200 pounds of dry matter of which only 100 pounds are removed from above the ground. For every 100 pounds of dry matter removed above the ground, there will be a net gain over the above the 100 pounds of 60 pounds of dry matter added to the soil, provided the biological system is in order. This is true farming, being a caretaker of the earth. Present day agriculture is acutally mining, as proved by the continued demise of our soils.



Remove 100 pounds dry matter and there is equal dry matter above the ground as below. 80% of 10 pounds comes from the air. 20% of 100 pounds comes from the soil. Therefore, we have actually removed 20 pounds from the soil.

We have added 80 pounds below ground from the air. We have removed 20 pounds from the soil by removing 100 pounds above ground, therefore, we have a net *gain* below ground, in the soil of 60 pounds dry matter, provided the system is functioning properly.

5

THE GARDEN

At last we are at the beginning. Gardening, whether in a single clay pot or on a window sill or on 15,000 acres, is meant to be a joy, something you appreciate and take pleasure in doing. It is also a very important and serious undertaking. Anytime a person grows a plant for human consumption, directly or indirectly, they have taken the responsibility for the outcome of that undertaking. It is often said that the burgeoning computer age is making life impersonal and indifferent. Growing food does the opposite. It is a very personal activity. Do not grow food because it is a fad, because some health book demands it, or because a friend or spouse wants you to. Don't do it for any reason other than you choose to voluntarily and lovingly. Don't do it grudgingly because good quality food is difficult to find in a store. Do it joyously. Enjoy it genuinely and the rewards will come accordingly.

Soil. The better the soil is prepared at the beginning, the faster and easier your progress will be. First, the materials to be applied must be applied to the surface and tilled into the top two to three inches, only. Apply the following in order to start the building program:

PER ACRE	*PER 1000 SQ. FT.*	*PER SQ. FT.*
Soft rock phosphate, 2-500 lbs.	12 lbs.	1/5 oz.
High calcium lime, 1-2000 lbs.	23-46 lbs.	3/8-3/4 oz.
Ammonium sulfate, 100 lbs.	2.3 lbs.	4/10 oz.
Compost, 500-2000 lbs.	12-184 lbs.	2/16-3 oz.

If compost is unavailable, any good organic such as liquid or dry humates will work fine. Raw organics such as leaves, manure, grass clippings should be either composted first or applied in the fall so they can be digested by the soil. If they are applied in the spring, the energy required to digest them in the soil will be robbed from the growing crops thus stunting their growth. Soft rock phosphate, high calcium lime, and compost are the base ingredients necessary to begin establishing a stable, fertile soil. Please keep in mind that there are many ways to accomplish the same goal. It is good policy to walk before you run. Once these products are applied, till them into the top two to three inches of soil, preferably using a roto-tiller about three to four times in several different directions. However, do not attempt to substitute an alternate phosphate for the soft rock phosphate. If you are going to use the building program, use the products suggested. Substitutions and alternatives will be covered later. Also, in regard to ammonium sulfate, the one recommended is dark, grayish black material from Allied Chemical Company or a feed fermentation plant. This product is unique due to the carbon it picks up during the industrial process. This unique characteristic greatly helps regulate the temperature of the soil by keeping it warmer during cool periods and cooler during hot periods. As long as there is some calcium available in the soil, there is an interaction here. And for those who are worried about the use of commercial fertilizers, you have every right to be concerned. There are many detrimental commercial products on the market; likewise, there are some equally detrimental "natural" products such as potassium chloride, calcium chloride, wood ashes, dolomite lime, and certain manures and composts. It is similar to the human supplement industry, where regardless of the claim for purity

and "naturalness," some products are excellent, some are poor, and some are atrocious. Fertilizers are no different. Use the available products, commercial or not, that will increase the productive capacity and quality of the soil and crops as rapidly and without compromise as possible. Use the refractometer to verify changes in plant quality. (Refer to Chapter 6 for further explanation of refractometers.)

Once the tilling is complete, let the soil sit idle for two weeks. If it is powder dry, water once or twice during those two weeks. Till the soil once more to prepare the seed bed and begin planting. This may seem like excessive tilling, but remember we are building the soil, and therefore we need microorganism life. These organisms need oxygen to live and proliferate. Proper roto-tilling aerates the soil as well as mixes the nutrients evenly. To set up the best magnetic field for growth, you need a well dispersed nutrient base, not one in strips or with pockets and clumps. Thorough mixing of the nutrients into the soil is paramount.

Alternatives and substitutions. If you are just not able to obtain the products listed because of unavailability or financial distress, don't despair. There are alternatives and even a "no budget" program. If there is a will, there is a way. Collect all the egg shells, chicken, turkey, and other animal bones available. Take a hammer and crush them as finely as you can. Lay newspaper down to save the fine powder; it is most valuable. Then collect all the food scraps, meat scraps, grass clippings, leaves, and weeds you can find. Compost everything together. Work this compost into the top two to three inches of the soil at a rate of one ton (2,000 pounds) per acre, 46 pounds per 1,000 square feet, or one ounce per square foot minimum. You can hardly apply too much of this compost. If you have no soil, simply make some. Find some broken cement blocks or bricks (do not use asphalt). Crush them with a hammer as finely as possible. Mix one part compost and one part crushed cement. The result is excellent soil at no cash expense.

There are some good pre-mixed materials on the market that combine several materials in addition to the ones mentioned above. Accordingly, you should expect to pay for the con-

venience of pre-measurement and mixing. Be alert to ingredients that contain chlorine, such as potassium chloride. Many products say "all natural" and still contain this ingredient. Check the sources of the ingredients. Be sure there is no misunderstanding about what is being purchased. If there is doubt about chlorine content for example, either ask for a sample for analysis or a written guarantee that the product is chlorine free.

During the growing season additional fertilizer may be desired. One very good source is the weeds growing in the area. Incorporate them back into the soil or compost them. Remember, as the soil improves, there will be fewer and fewer "weeds." There are two ways that midseason plant foods can be applied, either foliar fed through the leaves or applied to the soil in liquid or dry form. On truck or commercial farms where large areas are planted to the same crop, there is little thought given to fertilizer interference. In small gardens or planetariums, however, it is of major concern. Interference can happen when you fertilize a fruit or seed-producing vegetable so it will set fruit, that is, tomatoes, pepper, peas, beans, melons, squash, egg plant, corn, cucumbers, etc., when there is a leafy or non-fruit vegetable close by or next to it, such as celery, lettuce, broccoli, cauliflower, radish, carrot, romaine, endive, onion, collards, or cabbage. What may happen is that the leafy vegetable will bolt and go to seed as well. The reverse can also happen. If you fertilize a leafy vegetable to encourage more growth, the possibility exists for the fruit producer to drop its fruit or blossoms or not set fruit. It is therefore recommended that leafy and fruit-producing vegetables not be intermixed within a garden where fertilizer interference may occur. Gardeners often have beautiful lush vegetation but very little or no vegetables at harvest. This doesn't have to happen. It has nothing to do with the seed or variety. If the products mentioned earlier are applied during the previous fall or early in the spring, there should be little need for additional fertilizer during the growing season for most vegetables. If you need to improve the vegetable quality even more, then foliar feeding (feeding nutrients through the leaves) is by far the best way to

go about it. Successful foliar feeding, like any other successful fertilization, should not be done randomly. It is *best* done during the quarter before full moon, worst done during the quarter before new moon. First, there must be adequate calcium in the soil, and if there is not, it has nothing to do with pH. Foliar feeding will not remedy a major calcium deficiency. Calcium is the foundation upon which the rest of the plant is built and needs to be in the soil. Some relief can be had by foliar feeding.

You might as well try building a house without a foundation or frame. Secondly, you must have a good fertilizer product, meaning no industrial waste acids, no chlorine, and no chemicals or heavy metals. Starting with the least sophisticated method, you can use a shotgun approach to foliar feeding by simply spraying a diluted solution of hydrolized fish or seaweed or both. Follow the label directions for mixing. Mix in a small misting bottle and lightly mist the desired plants. It is not necessary to soak or wash the plants with this spray; a light mist will suffice. This kind of spray is generally beneficial to all vegetable and crop plants, some more than others and some areas or times more than others. It is important to monitor the results with a refractometer.

The next, more sophisticated step, is to pre-test various solutions on a single plant using a refractometer to determine what product or combination or products are best at that given moment. This allows for more specialization and quality improvement. Check the brix value of a plant in the row or field in question using the refractometer. Next, lightly mist the plant or area with a spray solution. Wait 30 to 45 minutes and recheck with the refractometer. If the value is less than or equal to the original value before spraying, then do not spray the remainder of the plants or field at this time. If the refractometer values have increased, then the spray is beneficial. If one has several different sprays, use the one that raises the refractometer value the greatest. These may and probably will change from day to day or week to week. Always keep records so patterns can be observed.

The most sophisticated method currently practiced is the use

of an electronic scanner, covered in Chapter 9, to formulate a specific prescription from scratch for the plant(s) in question. This allows for maximum efficiency and quality improvement. One very important rule to remember is that the symptoms of a specific nutrient deficiency, such as manganese, copper, or potash, may or may not mean that specific nutrient is deficient. The symptoms often indicate a phosphate or complimentary nutrient deficiency. Usually fish or seaweed products provide sufficient trace nutrients. Once the foundation nutrients of calcium, phosphate, carbon, potash, and nitrogen are balanced, then the others will usually fall into balance. There are exceptions to the rule. If the addition of a trace element raises the brix value of the plant in question, then it was needed.

Fall fertilization should follow the same quidelines recommended at the beginning of this section. Roto-till five to six inches deep or plow first. Apply soft rock phosphate, high calcium lime, compost, and ammonium sulfate. Roto-till two to three inches deep two to three times for thorough mixing, and finally spread some type of cover crop for the winter, such as oats, rye grass, wheat grass, red clover, etc. When spring arrives, you will only need to roto-till a few times to incorporated the cover crop and plant. It is best to do the major tillage in the fall with minor tillage in the spring. This will reduce weed presure. It is also recommended that you repeat the fall program for several years. Compost and cover crops should be applied indefinitely. The application of fertilizer materials should be regulated by the quality status of the crop growing. As the crop improves in quality and you use scraps from the crop for compositing, then the quality of the compost will also improve accordingly, thereby reducing the need for supplemental fertilizer.

Composting. This process is the key to all the life cycles on this planet. It is the process that enables elements and nutrients to be recycled for use by growing plants. Composting puts nutrients into to the biologically active organic forms essential to self-sustaining soil. As a rule of thumb, every pound of carbon in compost has the capacity to hold four pounds of water. Composting is the natural process of converting organic matter

to humus. It is a simple, worthwhile operation. Just gather all the organic scraps available from leaves, grass clippings, and table scraps to animal manures, if available. Then some agricultural lime (calcium carbonate or calcium oxide, not calcium hydroxide, which is also called hydrated lime because it is too caustic) or bone meal and soft rock (colloidal clay) phosphate. Mix about three pounds of lime and two pounds of soft rock phosphate to each 100 pounds of organic material. Thoroughly mix and turn the compost pile once a week. For best results, keep the rain and sunlight off the compost. The compost must reach approximately 144 degrees Fahrenheit; add some water to cool it. There will usually be no problem with excess heat if you avoid horse and hog manure. By incorporating the lime and soft rock phosphate into the compost, those materials will be much more available for plant growth when applied and you generally won't need to add them later. If the temperature of the compost pile gets too high, then the organic material will turn to ash, and in extreme situations it will look like wood ashes. If you purchase compost, be alert to this and check to make sure the organic matter is completely composted. If it is not, then you will be able to identify the organic material as grass, leaves, or whatever. Once the compost is complete, you can add 50% sand to make an excellent potting soil. Or you can purchase good potting soil and then add the lime and soft rock phosphate to it. If you do this, do not start seeds for at least two weeks. If you choose to be a little more sophisticated with the potting soil, then the following recipes may be appropriate:

Recipe 1

10 pounds composted cow pen manure
10 pounds sphagnum peat moss
80 pounds garden soil
8 pounds calcium carbonate
4 pounds soft rock phosphate
2 pounds saw dust

Recipe 2

10 pounds compost
30 pounds sphagnum peat moss
60 pounds white sand
8 pounds calcium carbonate
4 pounds soft rock phosphate
2 pounds saw dust

Recipe 3

70 pounds white sand
25 pounds sphagnum peat moss
5 pounds chicken manure
8 pounds calcium carbonate
4 pounds soft rock phosphate

Let these mixes set for two weeks before planting seeds. The reaction of the soft rock phosphate with the soil is energy intensive and excessive for seed sprouting. If you are planting young plant sets, there will be no problem.

Before planting seeds, put the seeds in a glass of distilled water. The best, most highly mineralized seeds will sink to the bottom of the glass while the poorer ones will float. Do not use the floaters. However, if they are the only seeds you can obtain, then use them. Next, purchase some Seed Soak and soak all seeds for two and half hours. Plant according to the specific recommendations from the seed company. Keep the potting soil moist, and water once or twice a week with Nutri-Feed or another product that does not contain chlorine. This product may also be used as a foliar for the young plants. Some crops you might consider starting early from seed are cucumbers, watermelon, tomatoes, green peppers, celery, cauliflower, and broccoli.

When you transplant these plant sets to the garden or field,

put one half teaspoon of soft rock phosphate in the bottom of the hole, along with some water. And if you are transplanting fruit trees, berry plants, or shade trees, dip the roots in a mixture of three parts soft rock phosphate with one part chicken manure and enough clean water to make the mixture fluid. Another dip for dipping roots is:

(100 ounce batch)

85 ounces water
2 ounces humic blend
8 ounces calcium solution
2.5 milligrams iron sulfate
5 ounces corn sugar (dry)
5 millligrams copper sulfate (dry)

Mix all components in order. Iron sulfate is a liquid and is best used as the product Ferro Tonic. Mix the two dry materials (corn sugar and copper sulfate) and then add as one.

Also be sure that the side of the stem or stump with the most roots is planted facing north. This will prevent many plant deaths. Lastly, add several drops of the homeopathic solution Rescue Remedy to every dipping solution for the shock of transplanting.

Plant layout. Though there is no "carved-in-stone" right way and wrong way for laying out a garden or truck farm, there are some general guidelines and practices that can help assure success. Avoid interplanting fruit producing vegetables with leaf or foliage producing vegetables, avoid interplanting watermelon and cantaloupe due to cross pollination, and avoid planting tomatoes next to zucchini squash—the squash will get sick and die. Never plant gourds in or near the garden, because they can cross pollinate and taint the flavor of edible vegetables.

To make the maximum use of space, install a wire fence and firmly anchor it. Beside it plant tomatoes, beans, and cucumbers. Train these plants to grow, prune the lower branches or any growing below eight to ten inches above the ground as well as about one quarter of the intermediate branches. This

enables the plant to produce larger fruit right up to frost time due to less competition. Remember, a lush growth of foliage does *not* automatically mean there will be a bumper harvest of fruit. Often the opposite is true. It is also advisable to place the crops according to maturation time, squash next to corn, pickles next to peas, etc. Match the maturity dates.

Again, there are no really definite right and wrong practices. Each person will prefer a slightly different plant layout. The goal is healthy produce and personal enjoyment. Have fun at it.

There are a few helpful hints to keep in mind while growing food. Avoid applying chicken manure compost on strawberries because it will make them taste woody from the high boron content of that particular waste product. Apply 100 to 200 pounds per acre, two and one half to five pounds per 1,000 square feet, one-twentieth to one-tenth ounce per square foot of Sul-Po-Mag between July 15 and September 15 to the garden, especially orchards and trees, to increase sap flow.

Avoid all chlorinated products and water. If you must use city water, then apply it through a find mist sprinkler. This will help evaporate some of the chlorine that will then hopefully be blown away by the wind. One may have a fungus problem even in the city water for chlorine will not eradicate fungus. Purchase a small hose injector unit and inject four ounces per 100 gallons water of 3% household hydrogen peroxide into the water. This practice will curb fungus and many disease contaminations that are fungal in nature. Avoid using wood ashes. They are high in potash, and most soils have already had excess potash applied due to typical fertility recommendations. Ash will dehydrate the soil and further interfere with the soil's improvement.

Generally do not till or cultivate tree crops or orchard plantings. This injures the roots and creates tremendous stress on the trees and vines. Plant grass and mow, mow, mow.

One more helpful hint: diatomaceous earth is an effective product with which to dust pets for the control of fleas, ticks, and lice, as well as for dusting plants and plant beds to control many insects. Diatomaceous earth is a non- toxic and beneficial material.

An interesting potato growing project is to take a large wooden barrel, remove one end and put a hole in the other for water movement. Put a two-inch layer of sand on the bottom then add two inches of soft rock phosphate and a five and one half-inch layer of a compost mixture. Then add two inches of a 50/50 mix of soft rock phosphate and sand. Plant potato pieces, each having two eyes, in the soft rock phosphate sand mixture both preferably facing north. Cover this layer with four inches of compost, then two inches of straw. When the sprouts peak through the straw, cover with four more inches of straw and repeat this until the sprouts protrude out the top of the barrel. Allow the potato plant to grow in the barrel, watering and foliar spraying as needed, until harvest, when the barrel will be full of clean potatoes. Experiment with picking off the blossoms from the growing plants. This may increase tuber size. Oat straw is ideal, but wheat or rye will do nicely.

This next section is intended to give the reader a general overview of how commercial fertilizers are labeled and what the labeling means. When you purchase a bag of fertilizer, there will be analysis numbers on the bag. These numbers may be 18-3-3, 12-12-12, 20-3-15, etc. They refer respectively to the percentages of nitrogen (N), phosphate (P_2O_5), and potash (K_2O). Occasionally, there are more than three numbers on the bag; the fourth number refers to some other nutrient like calcium or sulfate. For example, ammonium sulfate has a label analysis of 21-0-0-26, meaning 21% nitrogen, 0% phosphate, 0% potash, and 26% sulfur. Calcium nitrate is 15-0-0-19 Ca, meaning 15% nitrogen, 0% phosphate, 0% potash, and 19% calcium.

Farmers and gardeners are sold fertilizers primarily on numbers or analysis with no consideration at all for quality. Consumers are told that fertilizer is fertilizer. This is as true as saying all gasoline and oil is the same, all steel is the same or all cloth is the same.

The most common source of nitrogen in dry, bagged fertilizers is urea (46-0-0). It's cheap, but not generally preferred for progressive fertilization. Use the form of nitrogen best suited to the growth stage, such as nitrate or ammonia, in a form such as calcium nitrate, potassium nitrate, ammonium sul-

fate, household ammonia, or ammonium thio sulfate. The most common source of phosphate in dry bagged fertilizers is triple super phosphate (0-46-0). It's also cheap, and not preferred for progressive fertilization. It is too highly acidized and will quickly form insoluble compounds in the soil, thus rendering it useless. The most common source of potash in dry bagged fertilizers is muriate of potash, potassium chloride, 0-0-60 or 0-0-62, which has already been covered in detail. It is extremely deleterious to progressive fertilization.

All three of these products are inexpensive and have a high numerical analysis. It is argued that they supply the most plant food units for the dollar. To the uninformed purchaser this can be very convincing. Most states require a minimum of 24 total N-P-K units in order for the product to be registered for sale, that is, an analysis figure at or above 8-8-8. Anything less than a total of 24 units is usually not registerable as a fertilizer. The purpose of this regulation is to prevent many "organic" fertilizers and less concentrated products from being marketed. Consider the following comparison. A typical dry blend fertilizer with the analysis of 12-12-12 can be purchased for about $170 per ton. This product is made with the following materials:

523 pounds urea (46%N)
522 pounds triple-super-phosphate (46% P_2O_5)
400 pounds muriate of potash (60% K_2O)
556 pounds sand or dolomite filler

2000 pounds (rounded)

Here are 1,444 pounds of plant food and 556 pounds of a filler which is of no value or is a detriment as is dolomite, for it is high in magnesium. (Note: The magnesium here will combine with the nitrogen, forming a magnesium nitrate salt that dehydrates and leaches the nitrogen out of the available nutrient system, thus, under this type of N-P-K system, creating a need for the purchaser to buy still more nitrogen.) In any event, 1,444 pounds of plant food at $170 per ton is $.118 per pound of plant food. Next, here is a typical "organic" fertilizer with the analysis of 4-4-2 that sells for $200 per ton. This

product is made with the following materials:

81	pounds ammonium sulfate
364	pounds soft rock phosphate
80	pounds sulfate of potash
1,475	pounds compost blend
2,000	pounds

What is unique about this product is that all 2,000 pounds of this ton is usable plant food. Therefore, the cost of $200 per ton amounts to only $.10 per pound of plant food. The greatest difference is that this product is beneficial and the first one is not. State agencies and universities are totally sympathetic to the chemical and fertilizer industries. The fertilizers on the market are designed to create an increased dependency on them, and on rescue chemicals to fight insect and disease infestations.

Fertilizer labeling is a political game. Though there are some basic guidelines and consistencies, by and large each state makes up its own rules. The basic affinity the states share is that they seek to protect the system and squelch true progress.

When a product does not fall into their definition of a fertilizer, it can possibly get registered as a soil amendment. The catch here is that the state's university must have first researched the product to show it has "merit," a costly process that eliminates the smaller companies. Chemistry has no bearing here. A prime example is humic acid. It is a proven fact that humic acid is eminently useful for solubilizing soil and plant nutrients, as any competent chemist can attest. There are several chemical companies that add humic acid to their herbicides to buffer the damage done to the crop it is used on, such as soybeans. Humic acid is not registerable as a soil amendment because ". . . our university hasn't researched it and proven its value." The companies, then, must adulterate the product by adding a random trace element and the registering the product as a trace element in fertilizer such as calcium, manganese, or sulfur. This creates a facade. Another problem in marketing good products is that many state agencies will not recognize university research data from another state because

they contend that their soil is different, as if biochemistry changes as soon as you cross a state line. Of course the soil conditions may vary, yet the principles of biochemistry and biophysics are the same whether you study at the University of Michigan or Stanford. If they weren't, how could you get an undergraduate degree in one state and a graduate degree in another?

DISEASES AND INSECTS VS. NUTRIENT DEFICIENCES

Diseases and insect infestations are nothing more than nature's way of saying there is a nutrient deficiency in the plants which make them nutritionally unfit for higher forms of life to consume. Billions of dollars are spent every year on chemicals to fight diseases and insects, and consequently billions of dollars are spent on drugs and supplements for the consumers of this minerally deficient food. It is indeed a degenerative merry-go-round, but it is being rectified in many isolated areas by simple, common-sense fertilization. These practices could save billions in wasted expenditures, not to mention the health benefits that would be derived by all concerned.

The following is by no means an exhaustive list, yet it will give the reader an understanding of the cooperative structure of natural laws. The reader will also, upon reading, become more competent at understanding problems in his own back yard.

The bottom line is that until the cause behind the cause of the symptom is corrected, the symptom will return. The fungi, viruses, bacteria, and insects, are only the garbage crew. You can correct the problem by eliminating the nutrient deficiency, beginning with the first nutrient listed and proceeding sequentially thereafter. Keep in mind that the rules of nature mentioned in this book remain constant throughout. Often when the first one, two, or three nutrients listed are supplied, the remaining nutrient deficiencies will follow suit without their actual application because the plant's magnetism and transmutative energy is usually sufficient to carry out the process. Remember the one key rule that all nutrients must be in phosphate form in order to be properly assimilated into a healthy biological system. Next is a list of these same crops with the

corresponding brix readings, at or above which there will be no disease, insect, nor malady infestation. They are the same for the plant as well as the fruit.

INSECTS	SEQUENTIAL NUTRIENT DEFICIENCIES
	Celery Insects
Aphids	Ca, P, Fe, Cu
Varigated Cutworm	Ca, P, Cu, Mn, vitamin C, vitamin E
Cabbage Looper	P, Ca, vitamin C, Fe
Carrot Weevil	Ca, P, vitamin A
	Rose Insects
Aphids	Ca, P, Fe, Cu
Rose Chafer	Ca, P, Mn
Rose Midge	Ca, vitamin C (medium level deficiency)
Rose Stem Borer	Ca, vitamin C (high level deficiency)
Spider Mites	Ca, P, Fe/Cu
Thrips	Ca, P, Co
Leaf-Cutter Bees	Ca, P, Fe, Cu, Co/B (they will only nest in deficient plants)
Rose Galls	Ca, P, Fe/Cu, Co/B (they will only nest in deficient plants)
Rose Scale	Ca, P, vitamin C
Rose Slugs	Ca, P, Fe
Japanese Beetle	Ca, Cu
	Strawberry Insects
Strawberry Weevil/Clipper	Ca, P, Fe, Cu
Strawberry Sap Beetle	Ca, P, Mn
Tarnished Plant or Lygus Bug	Ca, P, vitamin C, Mn
Spittlebugs	Ca, P, vitamin C, Fe
Strawberry Leafhopper	Ca, P, vitamin C, Co, Se
Flea Beetle	Ca, P, Fe/Cu

Strawberry Insects (continued)

Aphids	Ca, P, Fe/Cu
Mites	Ca, P
White Grubs	P, Ca, vitamin C, Mn, Co, Cu
Strawberry Rat Weevil	Ca, P, Se
Strawberry Rootworm	Ca, P, Fe/Cu, Co
Nematodes	Ca, P

Raspberry Insects

Fruitworm	Ca, P, vitamin C
Crown Borer	Ca, P, Co, vitamin C
Sawfly	Ca, P, Fe/Cu, vitamine C, Se
Cane Borer	Ca, P, vitamin C, vitamin E
Aphids	Ca, P, Fe, Cu
Mites	Ca, P

Potato Insects

White Grub	P, Ca, vitamin C, Mn, Co, Cu
Wire Worm	Ca, Co, vitamin C
Colorado Potato Beetle	Ca, P, vitamin C, Cu, Mn
Potato Leaf Hopper	Ca, P, Mn, Cu, Fe
Cabbage Looper	P, Ca, vitamin C, Fe
Variegated Cutworm	Ca, P, Cu, Mn, vitamin C, vitamin E
Green Peach Aphids	Ca, P, Cu, Fe
Potato Flea Beetle	vitamin C, Ca, P, Fe, vitamin E, Cu, Mn

Lettuce & Onion Insects

Aster Leaf Hopper (6-spotted)	Ca, P, Se
Green Peach Aphids	Ca, P, Cu, Fe
Onion Thrips	Ca, P, vitamin E
Onion Maggot	Ca, P, Co, vitamin C

Cucumber, Melon, Squash, & Pumpkin Insects

Seed Corn Maggot	Ca, P, carbohydrate, Cu
Spotted Cucumber Beetles	Ca, P, Fe, Cu
Onion Thrips	Ca, P, vitamin E
Striped Cucumber Beetles	Ca, P, vitamin C, Co
Green Peach Aphids	Ca, P, Cu, Fe

Tomato, Eggplant, & Pepper Insects

Black Cutworm	Ca, P, Fe
Pepper Mosaic Disease	Ca, P
Flea Beetle	Ca, P, Se
Tomato Hornworm	Ca, P, Cu
Tobacco Hornworm	Ca, P, Co
Tomato Fruitworm	Ca, P, Se, Co
European Corn Borer	Ca, P
Corn Ear Worm	Ca, P, Mn

DISORDER OF DISEASE NAME	SYMPTOMATIC PATHOLOGY	SEQUENTIAL NUTRIENT DEFICIENCIES
	Tomatoes	
Damping off	Fungi	Carbohydrate, Mn (sugar near see, soak seed)
Collar Rot	Fungi	Ca, Cu
Anthracnose	Fungi	Ca, P, Cu
Septoria Leaf Spot	Fungus	Ca, P, vitamin C
Early Blight	Fungus	P, vitamin C
Late Blight	Fungus	P, vitamin C
Buckeye Rot	Fungus	Ca, P, Cu
Verticillium Wilt	Fungus	P, Cu, Mn
Fusarium Wilt	Fungus	P, Cu, Mo
Walnut/Butternut Wilt	Tree Excretion	P, Cu, vitamin C
Bacterial Canker/Wilt	Bacteria	P, Ca, Fe/Cu
Bacterial Speck	Pacteria	Ca, P, Mn, Fe/Cu (low level)
Bacterial Spot	Bacteria	Ca, P, Mn, Fe/Cu (high level)
Tomato Viruses	Viruses	Ca, P, vitamin C, Co, Se, vitamin E
Blossom End Rot	Moisture Stress	Ca, P, Mn/Cu (equally)
Catface	Abnormal Growing Conditions	K, P, Co
Sunscald	Excessive Sun	Ca, carbohydrate, beta carotene, vitamin C
Leaf Roll	Irregular Water Supply	Carbohydrate, Fe, Cu (salt excess)
Lightening Injury	Not considered	Soil has a lefthand noxious vortex caused by major soil imbalance which nature attempts to correct with lightening
Growth Cracks	Rapid Growth	Carbohydrate, Cu, vitamin C
Blotchy Ripening	Adverse, Climate, Cultural and Nutritional Balances	Ca, P, K, Mn
Zippers	Anther malfunction cold weather	Mn, Cu, Ca, P
Blossom Drop	Climate Conditions, Weather, Poor Fertilization of Ovary	P, Ca, Mn (nitrate nitrogen excess)

DISORDER OF DISEASE NAME	SYMPTOMATIC PATHOLOGY	SEQUENTIAL NUTRIENT DEFICIENCIES
	Potatoes	
Leak	Fungus	Ca, P, B
Black Scurf	Fungus	Carbohydrate
Late Blight	Fungus	P, vitamin C
Common Scab	Bacteria	P
Silver Scurf	Fungus	Cu, Mo
Wilt	Fungus	P, Cu
Blackleg	Bacteria	Cu, B
Ring Rot	Bacteria	Ca, P
Soft Rot	Bacteria	Ca, K, B
Dry Rot	Fungus	Ca, Co
Early Blight	Fungus	P, vitamin C
Potato Leaf Roll	Virus	P, Ca, Cu
	Alfalfa	
Common Leaf Spot	Fungus	P, Ca, (spots from potash excess, yellow due to either magnesium excess or nitrogen deficiency which excess magnesium causes)
Yellow Leaf Blotch	Fungus	P, Ca, N
Letophaerulina Leaf Spot	Fungus	P, Ca, vitamin C, vitamin E
Stemphylium Leaf Spot	Fungus	P,Ca, Co, vitamin C, vitamin E
Summer Black Stem & Leaf Spot	Fungus	P, Ca, carbohydrate, Cu, Fe/Zn
Rust	Fungus	P, Ca, vitamin A, Co
Downy Mildew	Fungus	P, Ca, vitamin C, Cu, Fe
Alfalfa Mosiac	Virus	P, Ca, vitamin C, iron, Co
Bacterial Leaf Spot	Bacteria	Ca, vitamin C, N, P (2nd is potash excess)
Spring Black Stem	Fungus	P, Ca, Fe, Co, vtiamin C
Cerospora Leaf Spot	Fungus	P, Ca, carbohydrate, Cu, Fe/Zn
Bacterial Wilt	Bacteria	P, Ca, vitamin C, Fe/Cu, Se/Co, vitamin A

DISORDER OF DISEASE NAME	SYMPTOMATIC PATHOLOGY	SEQUENTIAL NUTRIENT DEFICIENCIES
	Alfalfa (continuued)	
Phytophthora Root Rot	Fungus	P, Ca, B, vitamin C
Anthracnose	Fungus	P, Ca, vitamin C
Fusarium Crown Rot	Fungus	P, Ca, Cu, Fe, Mo
Mycoleptodiscus Crown Rot	Fungus	P, Ca, carbohydrate, vitamin C
Sclerotina Crown & Stem Rot	Fungus	P, Ca, vitamin C, Cu, Fe
Fusarium Wilt	Fungus	Ca, Cu, P, Fe, Mo
Rhizoctonia Stem Canker	Fungus	P, Ca, vitamin C, Fe/Cu
Violet Root Rot	Fungus	P, Ca, Co
Crown Warta	Fungus	P, Ca, vitamin C, vitamin E
Dodder	Parasitic Weed	P, Ca, Fe
	Raspberries	
Mosaic Virus	Virus	Ca, P, Fe, Cu
Leaf Curl Virus	Virus	Ca, P, vitamin E
Toabcco Streak Virus	Virus	Ca, P, Fe, Mo
Tomato Ringspot Virus	Virus	Ca, P, vitamin C, Fe, vitamin A
Anthracnose	Fungus	Ca, P, Fe
Spur Blight	Fungus	Ca, P, vitamin C, Se
Cane Blight	Fungus	P, vitamin C, Se
Orange Rust	Fungus	Ca, P, vitamin C (early season deficiency)
Late Leaf Rust	Fungus	Ca, P, vitamin C (late season deficiency)
Verticillium Wilt	Fungus	Ca, P, Co
Phytophthora Root Rot	Fungus	Ca, Se, P
Betrytis	Fungus/Mold	Ca, P, Co, vitamin C
Pennicillium	Fungus/Mold	Ca, P, Se
Crown Gall	Bacteria	Ca, P, Fe/Cu, vitamin C
Cane Gall	Bacteria	Ca, P, Mo

DISORDER OF DISEASE NAME	SYMPTOMATIC PATHOLOGY	SEQUENTIAL NUTRIENT DEFICIENCIES
	Blueberries	
Mummyberry	Fungus	Ca, P, Mn
Fusicoccum Canker	Fungus	Ca, P, Co, Se
Phomopsis Canker	Fungus	Ca, P, vitamin C, Co
Botrytis Blight	Fungus	Ca, P, vitamin C (early season deficiency)
Anthracnose	Fungus	Ca, P, Co, Mn (early season deficiency)
Alternaria Fruit Rot	Fungus	Ca, P, Co, Mn (late season deficiency)
Red Leaf Disease	Fungus	Ca, P, Co, Fe/Cu, Se
Powdery Mildew	Fungus	Ca, P, vitiamin C (mid to late season deficiency)
Crown Gall	Bacteria	Ca, P
Shoestring	Virus	Ca, P, Fe/Cu, Co
Necrotic Ringspot	Virus	Ca, P, carbohydrate
Blueberry Leaf Mottle	Virus	Ca, P, Fe/Cu, Se
Mosaic	Virus	P, Ca, Fe
Red Ringspot	Virus	Ca, P, Co, Se
Stunt	Virus	Ca, P, carbohydrate, Co
	Roses	
Black spot	Fungus	Ca, Cu, Fe
Cankers	Fungus	Ca, sulfate (Gypsum Lime $CaSO_4$)
Crown Gall	Bacteria	Ca, P, vitamin C, Co
Powdery Mildew	Fungus	Ca, vitamin A
Rust	Fungus	Ca, vitamin C, Se
Viruses	Virus	Ca, P, Mn

DISORDER OF DISEASE NAME	SYMPTOMATIC PATHOLOGY	SEQUENTIAL NUTRIENT DEFICIENCIES
	Strawberries	
Verticillium Wilt	Fungus	P, Cu, Mn
Red Stele	Fungus	P, Cu, Fe
Black Root Rot	Unknown	Ca, P, vitamin C
Grey Mold	Fungus	Ca, P
Stem End Rot	Fungus	Ca, P, vitamin C, Mn
Leather Rot	Fungus	Ca, P, Mn, Co
Leaf Scorch	Fungus	Ca, P, Co, Se
Leaf Blight	Fungus	Ca, P, N, vitamin C
Leaf Spot	Fungus	Ca, P, Se
Powdery Mildew	Fungus	Ca, P, vitamin C, Co
Viruses	Virus	Ca, P, vitamin C, Co, Se, vitamin E
	Cucumber, Melon, Squash, Pumpkin	
Bacterial Wilt	Bacteria	Ca, P, vitamin C
Cucumber Mosaic	Virus	Ca, P
	Celery	
Late Blight	Fungus	P, vitamin C
Early Blight	Fungus	P, vitamin C
Bacterial Blight	Bacteria	P, Cu/Fe, vitamin C
Sclerotina Rot	Fungus	Ca, P, vitamin C, Fe, Co
Damping Off	Fungus	P, Ca, vitamin C, Mo
Crater Rot	Fungus	Ca, P, Se, Fe, vitamin E
Fusarium Yellows	Fungus	Ca, P, Cu, Fe
Cucumber Mosaic	Virus	Ca, P, vitamin C, vitamin E, Se
Common Celery Mosaic	Virus	Ca, P, vitamin C, Co, Se

DISORDER OF DISEASE NAME	SYMPTOMATIC PATHOLOGY	SEQUENTIAL NUTRIENT DEFICIENCIES
	Celery (continued)	
Aster Yellows		Ca, P, vitamin E, Fe, Cu
Black Heart	Rapid Growth	Ca, P, B, Co
Cracked Stem	Boron Deficiency	Ca, P, vitamin A (Boron acts as a growth inhibitor and by slowing the growth the plant uses and requires less of the three nutrients thus the symptom of cracked stem disappears)
	Corn	
Corn Smut	Fungus	Ca, P
Yellow Leaf Blight	Fungus	Ca, P, Se
Northern Corn Leaf Blight	Fungus	Ca, P, Fe
Kernel Red Streak	Wheat Curl Mite Toxin	Genetic, not detrimental, reverting back to native gene
Diplodia Ear Rot	Fungus	Ca, P
Anthracnose	Fungus	Ca, P, Fe/Cu, Co (testimony)
	Apples	
Northwestern Anthracnose or Bull's Eye Rot	Fungus	Ca, P, vitamin C, Co
Bitter Rot	Fungus	Ca, P, vitamin C
Botrytis Rot	Fungus	Ca, P, Co, vitamin C
Black Rot or Frogeye Leaf Spot	Fungus	Ca, P, Co

DISORDER OF DISEASE NAME	SYMPTOMATIC PATHOLOGY	SEQUENTIAL NUTRIENT DEFICIENCIES

Apples (continued)

Scoty Bloth & Fly Speck	Fungus	Ca, P, Fe/Cu
Soft Rot or Blue Mold Rot	Fungus	Ca, P, Se, Co
Internal Breakdown	old age	Ca, P, vitamin C, Fe/Cu
Apple Scab	Fungus	Ca, Fe/Cu, P
Soft Scald	poor conditions	Ca, P, Mo
Cedar Apple Rust	Fungus	Ca, P, Fe/Cu, Co
Quince Rust	Fungus	Ca, P, Mn
Nectria Canker	Fungus	Ca, P, vitamin C, Fe/Cu (high level deficiency)
Papery Bark Canker	Fungus	Ca, P, carbohydrate, Co
Botryosphaeria Rot	Fungus	Ca, P, Co
Bitter Pit or Jonathan Spot	water supply	Ca, P, Mn, Co
Powdery Mildew	Fungus	Ca, P, Fe/Cu
Phytophthora Collar Rot	Fungus	Ca, P, Se, Mo
Water Core	environment	Ca, P, Fe/Cu, Mn
Fire Blight	Bacteria	Ca, P, vitamin C
Brown Rot	Fungus	Ca, P, Co, vitamin C
Apple Mosaic	Virus	Ca, P, Se
Trunk Twisting & Flattening	Virus	Ca, P
Russet Ring	Virus	Ca, P, Fe
Leaf Pucker	Virus	Ca, P, Mo
2,4-D Injury		P, if the brix reading is high enough (14+), the tree won't "pick up" the 2,4-D to begin with.
Brown Heart or Core	cold storage	Ca, P, often corresponds with trunk twisting and flattening.

Minimum Brix Reading

(At which and above *no* disease, insect, or malady will infest.)

Strawberries	16
Raspberries	15
Blueberries	14
Alfalfa	14
Roses	15
Tomatoes	18
Potatoes	13
Cucumbers	13
Melons	16
Squash	15
Pumpkin	15
Lettuce	12
Onion	13
Celery	15
Apples	16
Field Corn (Yellow)	12
Field Corn (White)	13
Sweet Corn (Yellow)	23
Sweet Corn (White)	24
Sweet Cherries	16
Sour Cherries	14
Beans	14
Peas	14
Eggplant	12
Pepper	12

After reading the disease and insect charts, you should notice several patterns. The insects carry the same deficiencies regardless of the plant infested. Even though the pattern is similar, however, the diseases indicate slightly different specific deficiencies for each plant infected. Also, many diseases indicate the same mineral deficiencies. The difference is that one disease manifests itself early in the season while the other manifests itself late in the season, depending on whether the deficiencies appear early or late.

Notice how often calcium and phosphate show up as num-

ber one or two deficiencies, yet are the least recommended nutrients by conventional soil scientists. Notice also how infrequently nitrogen and potash show up as deficiencies even though they are the nutrients most frequently recommended by conventional soil scientists.

You will recall that typical soil scientists recommend calcium by pH and recommend phosphate according to a standard norm rather than refractometer readings. The conventional correction of all infestations is to spray with a poisonous chemical rather than correcting the nutrient deficiency. There is more money in this approach for the chemical petroleum syndicate, because the infestations will always reappear later that season or during the next year, warranting more poisonous chemicals.

Look at the chart on blueberries and note that all the disease symptoms list calcium and phosphate as the first two nutrient deficiencies. It is interesting that the experts almost always scorn calcium and phospate use on blueberries, especially calcium. They mouth the pH argument and contend that blueberries won't thrive unless the soil is sour (has a low pH). The actual situation is that because there is a deficiency of available phosphate, the nutrients, especially the heavy trace elements, are in competition for the phosphate carrier. When the pH is lowered, the resistance in the soil is lowered. Therefore the heavier traces can better compete for the limited phosphate at the expense of other elements. Nature always follows the line of least resistance. If it were not for some of these heavier elements getting into the plant, no blueberry plant would ever grow, precisely the case in mid to high pH soils, due to the phosphate deficiency. Again, the answer is simple. Provide adequate calcium and especially phosphate to achieve the minimum brix readings listed on the chart and no pathologies or insect infestations will occur. With ideal nutrient balances, the ideal soil pH for all soils and all crops is 6.4. Remember that natural laws remain constant and consistent; pH is a trailing indicator, an effect, not a cause. Balance the nutrients and let the pH fall where it may.

Another interesting phenomenon indicated by these charts is a frequent deficiency of cobalt and selenium. Michigan and

other states have long been known for their deficiencies in these elements, yet they are not recognized as fertilizer components and are almost never recommended for plant feeding. There is more profit in adding these elements continuously to animal feeds and drugging the animals and people for the symptom developed as a result of the nutrients.

One will also notice frequent vitamins deficiencies, especially of vitamin C. Vitamin C is extremely important for calcium assimilation, as well as several other functions in living organisms. Vitamins are also not recognized by the "experts" as valid fertilizer components.

Carbohydrates are deficient during seed maladies or whenever the system runs out of energy. Carbohydrates are manufactured during photosynthesis for energy storage, and their manufacture is dependent upon phosphate. Often molasses or Clintose corn sugar are applied to boost the carbohydrate balance. Again, this strategy is not recognized by the experts, yet it works.

Fortunately, we live in a country where the spirit of independence still exists, and there are those who not only question the system, but are proving it false by exemplifying the truth.

This is done by growing plants at or above minimum brix values and observing that they are completely free of all the maladies and infestations that plague the conventional system. The problem is that the system sets standards according to perceived norms, and its definition of normal assumes that weeds, diseases, and insects attack regardless of quality. This observation is correct only within the parameters of the spray and kill system.

When foods and crops are passed off as being "disease free" after they have been bombarded by poisonous chemicals to kill the symptomatic pathogen, the mineral deficiency that attracted the pathogen in the first place still exists. When the food is deficient, the consumer will be correspondingly deficient.

An analogy could be made to an automobile engine. Engines are equipped with a gasoline filter and an air filter. One can remove both and the engine will continue to function. But for how long, and at what efficiency will it function? How many

nagging problems will develop along the way and what condition will the engine be in at trade-in time, if it makes it that long? It is doubtful that it would be worth overhauling.

Insects and diseases are the filter system in the food chain to keep the junk and garbage away from the consumers. Modern agriculture has substituted poisonous chemicals for this natural filtering system. How ingenious! You need not investigate long to realize that the magnitude of the danger caused by agricultural chemicals is enormous. Chemicals such as Parathon and Temik (aldicarb) are highly toxic and used frequently by vegetable growers. These chemicals are lethal and are polluting the water, soils, and food chain. Electronic scanner analysis proves this beyond any doubt. Of course, the chemical syndicate and the universities deny this. What people don't know won't hurt them, right? The crucial fact is that these lethal chemicals are not needed to begin with because the problem is deficient soil fertility. Correct it and not only will the need for chemicals disappear, but nature will then have the capacity to clean up what has already been applied. When analyzed by electronic scanners, plants that have high brix readings do not contain detectable levels of toxic chemicals, nor do the soils they are grown in, despite the fact that chemicals were previously applied. Likewise, plants that have low brix readings do contain detectable levels of toxic chemicals, as do the soils they were grown in/on, in some cases even if no toxic chemicals were applied.

In fairness it is important to mention that not all university research and teaching is as wasteful or as futile as this aspect of agriculture. The guilty party is mainly that part of the system tied to the chemical fertilizer syndicate and kingpinned by the petroleum industry. There are people like Dr. Philip Callahan, who is a retired USDA entomologist, who have proven that insects and diseases are indicators of mineral deficiencies. As more of these true scientists appear, and as the public demands quality in its foodstuffs, a copacetic situation free of pollution, dangerous chemicals, and toxic waste accidents will evolve.

6

QUALITY PRODUCE

Have you ever purchased what looked like good quality fresh vegetables, put them in your refrigerator only to throw them in the garbage three days later because they had spoiled? Have you purchased fresh vegetables or fruits and discovered that several weeks later they were only slightly dehydrated yet perfectly good to eat? High quality produce, in the true sense of the word, will not rot. It will simply dehydrate with age. For some, this is a very difficult statement to acknowledge, since the majority of the produce in this county does rot if not consumed a few days after purchase. We are told that the quality of produce can be verified by its looks (apples are coated with wax so they shine, lettuce is coated with sulfide so it remains green, meat is treated with nitrates so it remains red) and the lack of visual signs of insects and diseases, Little is said about the spectrum of rescue chemicals applied to produce the false visual perfection. The culprit here is the myth that insect and disease infestation is indiscriminate as to crop quality. Conventional agricultural scientists contend that crops, weeds, insects, and diseases are all competitive. In a balanced biological system this could not be further from the truth.

Weeds grow where the soil is balanced for them rather than

for the cultivated crops. Insects and disease infect those plants that are of such poor quality that they aren't fit for higher life forms to eat. Unfortunately, modern agriculture has opted to ignore this is basic biological law and flood the market with produce of false quality.

How can you determine, then, the true quality of produce? You need a method or tool, and then a standard with which to make comparisons. Currently the refractometer is the most practical tool that the average person can use to evaluate produce quality.

The refractometer is a tool which measures the refractive index of a liquid. When light rays shine through the liquid they strike the carbohydrate, salt and other molecules depending upon the type of calibration used. When the light rays strike the molecules, they bend or refract. The greater the calibrated molecular concentration of the liquid in question, the greater the refraction.

Refractometers are used extensively in industry and research fields for measuring the concentration of all kinds of aqueous solutions, such as pharmaceuticals, tissue fluids in plants, and urine and blood protein. It is also used for checking the concentration of medicines, cosmetics, battery solutions, antifreeze, and processing solutions for plating, and quenching oils.

The food processing industry uses the refractometer extensively for measuring the sugar concentration of soft drinks, juices, colas, nectars, and lactic acid beverages. The device is also used for checking flavoring solutions of canned foods, sugar concentration of jams, marmalades, honeys, syrups, extracts, concentrates, and other sweet liquids. Refractometers are used in the brewing and wine-making industry as well.

The refractometers to use for quality control in crop field production should be calibrated from 0 to 30 or 32 brix, to measure sucrose. The irony here is that the use of refractometers has been known and practiced by industry for decades, and yet if you were to inquire at the local cooperative extension service about using a refractometer for monitoring crop quality and selecting various feeds and fertilizers, you would get something between a blank stare and arrogant dis-

missal of your question. In certain parts of the country refractometers are used by farmers to check the ripening stage of fruit and the sugar content of fruits and grapes, but for various reasons very few farmers have adopted the extensive use of these instruments for improving the crop quality, not just measuring its status. Even fewer users of the device have noticed and correlated its readings to insect and disease, infestations, mineral content, shelf life, crop vigor, palatability, and chemical contamination.

Checking produce with a refractometer is quite simple and can be done in a matter of minutes.

First, check the refractometer's calibration. This is done by placing a drop or two of distilled water on the glass prism. Close the plate and look through the eyepiece. Focus, if possible so that a clear distinction can be seen between the white field of view and the colored, usually blue, field. The distinct edge between the two colors is where the value on the scale is read. It should be at zero for distilled water. Adjust the calibration screw accordingly.

It is not imperative that you carry around distilled water just to calibrate the refractometer each time you use it, unless you plan to compare the readings with readings taken after calibration. In other words, if you are selecting produce from a farm market and plan to purchase the best of three samples, the actual reading can be plus or minus several points due to calibration error and still give accurate comparative information because all three sample tests would have the same error. You should simply purchase the produce with the highest reading between the three.

To test the produce, place one or two drops of juice on the glass prism, close the plate and look through the eye piece. It may be necessary to point the refractometer toward a light so the field of view is more distinct.

As a broad generalization, produce over 12 brix is considered good because crops above this value are usually not bothered by insects or diseases, so the produce will be fit for human and animal consumption according to the law of natural selection. Also, if an item reads greater than 12, and if the distinction be-

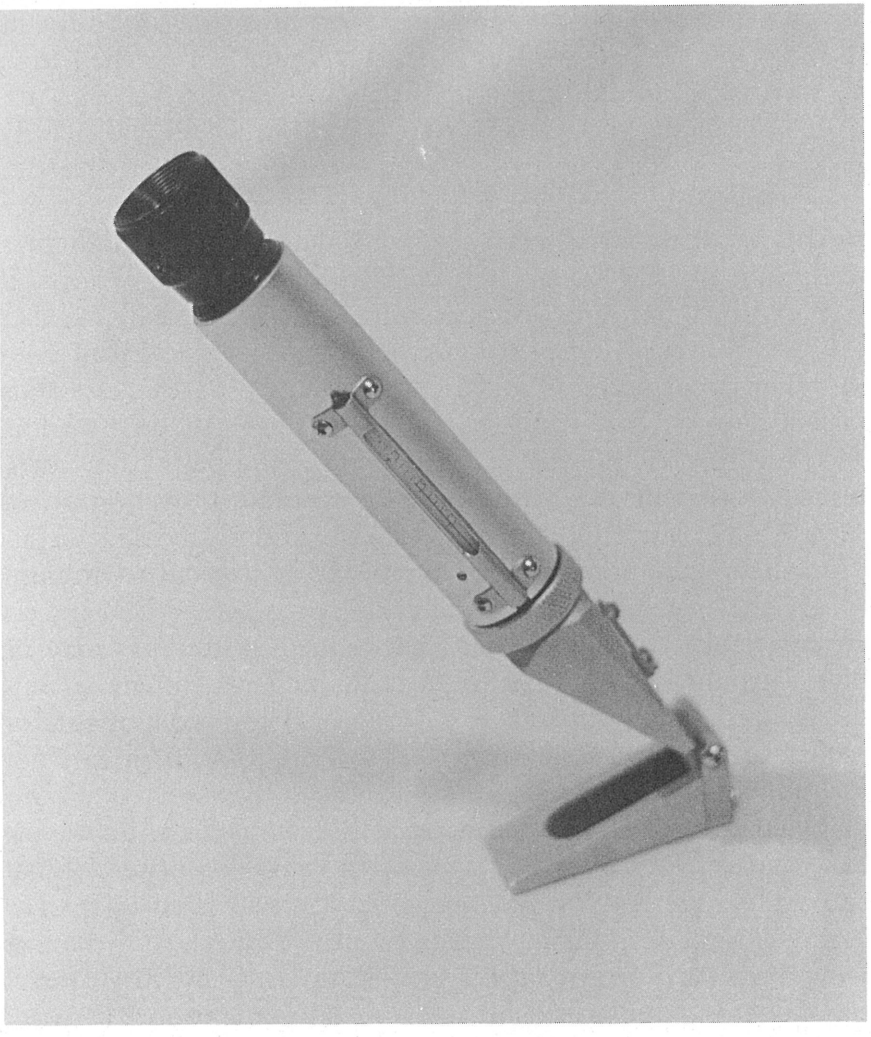
tween the two colors in the field of view is unclear and difficult to pinpoint, it is an indication that this item is relatively high in calcium, a desirable condition.

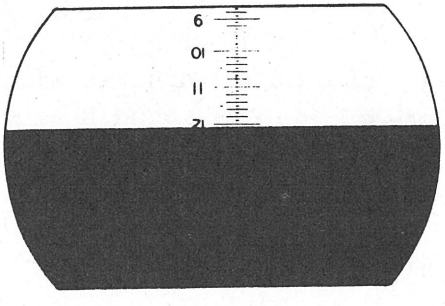
It is possible, though not very common, to get a relatively high brix reading with the refractometer and not have a premium quality item. Probably the most common occurrence of this is when sweet corn ready for harvest has a high brix reading in the ear though it is infested with corn ear worms. If you monitor this corn for the entire season, you will see that the brix reading is low and only at the end of the season does the plant translocate as much sugar as it can to the ear, thus raising the ear brix reading. However, since the brix reading was low throughout the growing season, the plant was nutritionally deficient and despite the last minute translocation of sugar to the ear, the mineral did not accompany this sugar. This phenomenon has been bred into many crops in an attempt to get the frosting without the cake, so to speak. The insects are not fooled at all. Another time when brix readings may be high without really indicating a high mineral content is in a dehydrated condition such as a drought. If the produce rots or requires rescue chemicals to protect it from pests, then it is not really minerally enriched.

Evaluating produce with a refractometer is an enlightening experience. Cosmetic visual signs often crumble in the wake of real evaluation. As you practice at it, you will learn to discern cosmetic signs and signs of true natural quality. And parents will notice that fruits and vegetables shunned by fussy eaters are suddenly popular when the brix readings fall into the good to excellent range.

The refractometer has virtually unlimited uses. The key to its value is keeping records and references. Record when and where a very poor or exceptionally good item is obtained, what it looks and tastes like, how it stores and cooks, and how it satisfies your hunger.

The refractometer can be used for fertilizer selection, large or small scale food evaluation (even milk), food processing, and a variety of other uses. Use it whenever and wherever the occasion arises.

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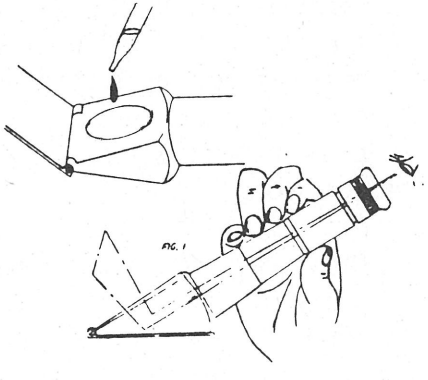


FIG. 1

The refractometer is only a tool. It must be used to be of any value, and the values you obtain from the instrument are only as good as their application. When it is used to compile trivial information, that will be its value. But when it is used as a tool to select the most nutritious produce to eat, then its value is priceless because good health is priceless, especially once it has escaped us.

Discussion of a tool is futile unless you are able to obtain one, so here are the names of three brands I am familiar with: Atago Model N1, American Optical, and Extech. There are many others of equal quality and comparable price. Plan to spend between $100 and $175 for a refractometer that should last indefinitely with proper care. If you are unable to locate a refractometer in your area, one can be purchased from Pike Lab Supplies, RFD #2, Box 92, Strong, Maine, 04983, (207) 684-5131, or TransNational Agronomy, 450 Market Street, Grand Rapids, Michigan, 49503, (616) 456-6878. I am not associated, but simply provide the contacts for the reader's convenience. I wish you successful shopping and improved health as a result.

In addition to refractometer readings, there are visual characteristics you can look for when selecting produce. Pears, for example, should be squarish rather than conical in shape. Oranges should have a five star caylix on the blossom end. Citrus should have thin skins. Potatoes should *not* have sunken eyes. Corn should *not* dent at maturity. Again, the most important aspect of produce quality is that the produce should *not* spoil or rot. Purchase items that are the heaviest per unit volume. Your scrutiny will be rewarded by more nutrition per dollar spent.

REFRACTIVE INDEX OF CROP JUICES

Calibrated in % Sucrose or degree Brix

	Poor	*Excellent*
FRUITS		
Apples	6	18
Avocados	4	12
Bananas	8	14
Cantaloupe	8	16
Casaba	8	14
Cherries	6	16
Coconut	8	14
Grapes	8	24
Grapefruit	6	18
Honeydew	8	14
Kumquat	4	12
Lemons	4	12
Limes	4	12
Mangos	4	14
Oranges	6	20
Papayas	6	22
Peaches	6	18
Pears	6	14
Pineapple	12	22
Raisins	60	80
Raspberries	6	15
Strawberries	6	16
Tomatoes	4	18
Watermelon	8	16

REFRACTIVE INDEX OF CROP JUICES

Calibrated in % Sucrose or degree Brix

	Poor	*Excellent*
VEGETABLES:		
Asparagus	2	12
Beets	2	12
Bell Peppers	4	12
Broccoli	6	12
Cabbage	6	12
Carrots	4	18
Cauliflower	4	12
Celery	4	12
Corn Stalks	4	20
Corn, young	6	24
Cow Peas	4	12
Endive	4	12
English	8	14
Escarole	4	12
Field Peas	4	12
Green Beans	4	14
Hot Peppers	4	12
Kohlrabi	6	12
Lettuce	4	12
Onions	4	13
Parsley	4	12
Peanuts	4	12
Potatoes, Irish	3	7
Potatoes, Red	3	7
Potatoes, Sweet	6	14
Romaine	4	12
Rutabagas	4	12
Squash	6	14
Sweet Corn	6	24
Turnips	4	12

For reference, pure water has a reading of "O."

Within a given species of plant, the crop with the higher refractive index will have a higher sugar content, higher mineral content, higher protein content, and a greater specific gravity or density. This adds up to a sweeter tasting, more minerally nutritious food with a lower nitrate and water content and better storage characteristics. It will produce more alcohol from fermented sugars and be more resistant to insects, thus resulting in a decreased insecticide usage. Crops with a high sugar content will have a lower freezing point, and therefore be less prone to frost damage. Soil fertility needs may also be ascertained from this reading.

	POOR	AVERAGE	GOOD	EXCELLENT
Alfalfa	4	8	16	22
Apples	6	10	14	18
Asparagus	2	4	6	12
Avocados	4	6	8	12
Bananas	8	10	12	16
Beets	6	8	10	12
Bell Peppers	4	6	8	12
Broccoli	6	8	10	12
Cabbage	6	8	10	12
Carrots	4	6	12	18
Cantalope	8	12	14	16
Casaba	8	10	12	14
Cauliflower	4	6	8	12
Celery	4	6	10	12
Cherries	6	8	14	16
Coconut	8	10	12	14
Corn Stalks	4	8	14	20
Corn, young	6	10	18	24
Cow Peas	4	6	10	12
Cumquat	4	6	8	12
Endive	4	6	8	12
English Peas	8	10	12	14

	POOR	AVERAGE	GOOD	EXCELLENT
Escarole	4	6	8	12
Field Peas	4	6	10	12
Grains	6	10	14	18
Grapes	8	12	16	20
Grapefruit	6	10	14	18
Green Beans	4	6	8	14
Honeydew	8	10	12	14
Hot Peppers	4	6	8	12
Kohlrabi	6	8	10	12
Lemons	4	6	8	12
Lettuce	4	6	8	12
Limes	4	6	10	12
Mangos	4	6	10	14
Onions	4	6	8	13
Oranges	6	10	16	20
Papayas	6	10	18	22
Parsley	4	6	8	12
Peaches	6	10	14	18
Peanuts	4	6	8	12
Pears	6	10	12	14
Pineapple	12	14	20	22
Raisins	60	70	75	80
Raspberries	6	8	12	14
Romaine	4	6	8	12
Rutabagas	4	6	10	12
Sorghum	6	10	22	30
Squash	6	8	12	14
Strawberries	6	10	14	16
Sweet Corn	6	10	18	24
Sweet Potato	6	8	10	14
Tomatoes	4	6	8	12
Turnips	4	6	8	12
Watermelon	8	12	14	16

7

CONSUMER NUTRITION

Nutrition. Is nutrition a state of health, a state of nutrient balance, a fact or an opinion? There are volumes and volumes of printed material on nutrition. Often this information is contradictory even though it is founded on numerous test cases and years of research. As with statistics in all fields, statistics on nutritional research can be arranged and emphasized to support numerous contentions and positions even if they are contradictory. It is possible and common practice to research, test, and record statistical information on a given topic to support a predetermined position or contention to sell a given product, a belief, or a service, or to discredit another person's position. The important thing is to avoid the junk that detracts from health and to pursue the blessings that perpetuate health.

The modern food production system carries out quality control using a cosmetic approach. Crops are sprayed systematically to ward off insects and diseases. The crop is then harvested, processed with preservatives, injected, sprayed, or covered with wax for marketing purposes. The consumer is blasted with the idea that he is consuming high quality food. It is analogous to purchasing a car that is rusted out but painted over, has a worn-out engine and interior, but, since the outside looks nice

from a quick paint job is passed off as a good buy. It is often argued that if you eat a balanced diet, with something from all the food groups, then you will be healthy. Unfortunately there is no way to make something from nothing. If the food does not contain the proper nutrients, then the consumer will not receive those nutrients no matter how much he eats. Nutritional programs are not so bad in and of themselves. The primary problem with most is that they do not consider the fact of nutritionally deficient food that often contains many things it should not. The lower the brix measurement, the greater the chance that the foodstuff contains something it should not, such as chemicals, drugs, heavy metals or pathogens. An article in *Energy Healing* discussed the drug stilbestrol. This drug is used to accelerate the fattening of beef animals. It is now banned in this country but not in many of the countries that export beef to the United States. According to the article, this drug has been traced to people who suffer from obesity.

There have been many investigations of the repercussions from using antibiotics in animal feeds. A September 6, 1984 article in the *New England Journal of Medicine* says that the transmission of resistant bacteria to consumers is a topic of major concern. Private research has shown that agricultural chemicals are being passed to consumers through the water, crops, and drift. These chemicals in and of themselves are extremely toxic and inflict stress on biological life. And when two or more combine the result in some cases is an even more toxic compound. Often it is claimed that contamination of the environment, especially the crops themselves, is insignificant. The risk of contamination is easily glossed over when the lower limit of the test measurement is so high that low levels of toxins are not discovered. You won't find something you're not looking for. The whole situation boils down to this: Improve the quality of the crops and toxic chemicals will be totally unnecessary. Then, when you eat a truly balanced diet, you will obtain the nutrients necessary for health. No one disputes that the incidence of terminal diseases is growing. It does not help the problem to bicker over trivial causes such as chemicals or pollution when they are only symptoms of the problem. You are

only as nutritionally sound as the food you consume. Spraying a crop to kill a disease does not mean the crop is free of disease. It only means that the disease symptom will disappear until the chemical wears off. Correct the soil fertility imbalance and the disease problems of this planet will take care of themselves along with the pollution problems.

8

LET'S EAT!

Eating is meant to be a blessing and a joy. You need not feel guilty nor fearful. Food is meant to enhance your health, not detract from it. The following are a few recipes that you may choose to use. Enjoy!

CAROB CANDY

3 Tbsp sesame seed
3 Tbsp sova powder
corn oil
1/2 tsp vanilla
3 Tbsp rice polish
1-3 Tbsp carob powder
honey

Mix thoroughly the dry ingredients. Add enough oil and honey to sweeten and knead into a large ball. Form into small balls and roll in nuts, sunflower seeds, or coconut. Optional additions: 1 Tbsp fresh wheat germ, 1 Tbsp brewer's yeast, 1 Tbsp whey, 1 Tbsp bone meal powder, 1 Tbsp rosehip powder, 1 Tbsp papaya powder, 1 Tbsp molasses. This recipe is very delicious and beneficial. Make only enough to eat at one time, for it does not store well. Leftovers are not usually a problem, however.

EGGPLANT CASSEROLE

Start by peeling the eggplants just under the skin and cut into 1" pieces. Soak in 1/4 cup salt to 1/2 gallon of distilled water for 20 to 30 minutes. The water will get dirty and should be discarded after soaking. Use non-iodized salt. Rinse with fresh water after soaking to remove any excessive salt or debris. Next put into a blender with enough water so pieces will blend. Do not completely liquefy, rather chop finely. Add remaining ingredients and simmer for 20 to 30 minutes, cool and serve.

5 eggplants
1/8 cup molasses
1 tsp Cornocopia "All Spices and Herbs"
1 finely chopped green pepper
1 can creamed corn
1/4 tsp baking soda
1/2 cup canned evaporated milk or soy milk
1/2 cup honey
1/2 cup corn oil
1/2 cup cornmeal
1 to 3 eggs
1 can mushroom soup and/or chopped mushrooms
You may dice an onion or chives or sprinkle with wheat germ over the top.

HOLIDAY DRESSING

This can be stuffed into a chicken, turkey, squash or served by itself.

1 cup diced apples
2 cups crumbled cornbread
1/4 to 1/2 cup pinoli nuts
2 cups dried bread crumbs
1/4 tsp Cornocopia "All Spices and Herbs"
1 cup diced celergy
1 diced green pepper
1 cup tree chestnuts or water chestnuts

Mix thoroughly, stuff and bake in oven. If stuffing in a bird, the following preparations are recommended: Soak the bird overnight in 1/4 cup of salt per 1/2 gallon distilled water. Rinse thoroughly in fresh water then bring to a boil or just before. Notice the debris floating to the top. Rinse thoroughly. Baste inside and out with a mixture of 1 tsp thyme, 1 to 2 drops of mint and sufficient olive oil. Stuff with Holiday Dressing and bake.

GRITS

Soak about 24 hours in distilled water. Start with 3 to 3 1/2 cups of water per cup of grits. They will need to be cooked at least 2 hours or until they are creamy. Start with the following ingredients:

2 cups white corn grits
1/4 cup corn oil
1/2 tsp molasses
1/2 Tbsp salt (optional)
1/8 cup honey
1/2 Tbsp tarioki
1/4 tsp Cornocopia "All Spices and Herbs"
1/2 to 1 can of creamed corn to be added after 1 hour of cooking
Stir regularly and add water as needed to maintain creamy state.

FRENCH STYLE GRITS

Pour cooked grits onto a sheet cake pan and spread out evenly. Put into the refrigerator overnight. The next morning, cut the solidified grits into 3 inch squares and dip into the following dip, fry in frying pan with corn oil, and serve as is or with syrup or whatever suits your taste.

Dip: (will dip 2# grits)
6 eggs
1 Tbsp honey
1/4 large chopped onion (fine)
1/2 tsp molasses
pinch of Cornocopia "All Spices and Herbs"
1/2 tsp salt (optional)
1/2 Tbsp relish
pinch of paprika
1/4 tsp worchestershire sauce
Enough flour and cornmeal in a one-to-one ratio to thicken.

There are thousands of excellent recipes and methods of preparing food. Use those that best suit your tastes and needs. Remember, the higher the natural quality of any food, the better it tastes and the fewer condiments necessary to make it palatable.

Here are some helpful, healthful hints you may choose to adopt. When a sweetener, particularly white sugar, is called for or desired, use *Clintose "A"* corn sugar, distributed through

Archer Daniels Midland of Decatur, Illinois. Although it is dextrose *"A", do not* substitute another dextrose. Use the Clintose.

White corn is better than yellow corn, therefore select white corn whenever possible. When comparing white corn and yellow using laboratory analysis, remember that the brix readings must be equal in order to arrive at a valuable conclusion. In any event, select the corn with the highest brix reading.

Select sugar cane molasses over beet molasses. The mineral content and palatability of the sugar cane molasses are usually better.

When canning fruits and vegetables, first juice some of the produce to use as the canning liquid rather than adding any water. You'll be pleased with the results.

Use molasses and herbs liberally as condiments to increase the spectrum of nutrients in the food.

If you eat meat, it is greatly beneficial to first soak the meat in 1/4 cup of *non*-iodized salt per 1/2 gallon distilled water for 12 hours (two hours for hamburger). After soaking, rinse two or three times with distilled water and after the last rinsing leave the meat in the water and bring the water just to a boil. Agitate the water slightly, dump and rinse once more. You will notice the great amount of off-color material and debris that comes out of the meat. This detritus is not conducive to health. The meat is now ready to be cooked or prepared as usual. If well-prepared, you will notice a sharp improvement over uncleaned meat.

Stay alert to practices that follow biological reasons and improve your health, vitality, and attitude.

9

TECHNOLOGY ON THE HORIZON

It is said that planet earth is in the midst of an information explosion. Computers, robots, and fiber optics are commonplaces. Despite all of man's fabulous technology, and also as a result of it, he has created an environmental situation that is on the cutting edge of destruction. He has missed the most obvious phenomenon of all: there is no phenomenon that man has invented or made use of that is not already found in nature. The sophisticated antennae of space age technology can be found on certain insects. The sophisticated navigation systems used by airplanes are surpassed by migrating animals and birds. The phenomenal and sometimes atrocious architecture of modern man is put to shame by ancient civilizations and far exceeded in beauty by nature herself.

Man brags about new genetic strains of crops that resist diseases and insects, bring higher yields, are better all around because of man's ingenuity. Man has been on an ego trip for a long time. The new technology on the horizon is man's cooperative progression with nature herself. Nature has the capacity to produce perfect crops that are completely disease and insect free, do not rot, yield far beyond man's wildest expectations, need no rescue chemicals or preservatives, and are

perfectly mineralized.

An operation that grows plants from seed to harvest in just a few hours will be perfected and the complete revitalization in a single growing season of sterilized soils and deserts will be unfolded both *completely without* the slightest need for toxic chemicals. The latter is pretty well established fact. Additionally, electromagnetic instruments to control insects like mosquitoes and flies will be commercialized.

There are many things the average farmer or layman can do to advance this technology. First, get out of the rut, whether it is junk food 21 times per week or the "natural all organic" movement. All organic is great but without mineralization it is no better than chemical. The technology of the future involves biological measurements not just physical and chemical measurements. Everything emits an energy field. Dr. Philip Callahan has proved that insects communicate and find food using these energy emissions. Each species of life has its unique whole frequency that comprises an infinite number of component frequencies. When these energies are properly evaluated, it is possible and practical to set optimum conditions for growth and proliferation according to natural laws, not man-made standards. Often man's physical observations are made through such a narrow lens that the true picture remains unseen. When subtle biological energies are evaluated, a more complete picture emerges, and thus a more progressive plan of action can be made. Tesla was able to tap into some of these energies to produce "free" electrical power at the turn of the century. He was ahead of his time and his inventions were suppressed. The tide has turned in favor of progressive coexistence rather than accelerating demise. Learn about the subtle biological energies, use them to grow healthful food, and rest assured this planet will be inhabitable for your progeny.

The sequel to this book is already in the works. It will relate the technical scientific facts and verifications that explain how this glorious nature of ours functions, evolves, and correlates to man's conscious and physical health. Special attention will be given to explaining how plants can grow and mature in hours; how deserts can become fertile; and how certain biological

phenomena are overlooked by science. The system that governs biological transmutation, and how it can be monitored, influenced, and proven will be outlined as well. It will tell how all of biological life fits together, including the significance of colors, shapes, energy grids, and vortexes, and much else besides. I will also correlate thought, word, and emotional patterns to the physical environment.

NICE TO KNOW INFORMATION

Mosquitoes. Mosquitoes are tuned to parasitic thought forms. Their purpose is to bring or call attention to parasitic thought forms of the person they "bite." Parasitic thought forms are those thoughts that "eat away at" or "sap" energy from a person such as hate, unworthiness, low self-esteem, self-criticism, etc. As well, areas with left hand noxious vortexes attract and "feed" mosquitoes because this energy pattern is parasitic.

Bark Splitting. Bark splitting on trees is due to a plugged vascular system. It is caused sequentially by the following nutrient deficiencies: calcium, phosphate, selenium, cobalt/copper. Sul-Po-Mag applied between July 15 and September 15 acts as a cathargis (laxative) for the vascular system but it is only a symptomatic correction and the nutrient deficiencies must be corrected to *solve* the problem.

Dandelions. Dandelions are a common weed in lawns and fields. They are a red light signal of the following sequential nutrient deficiencies: calcium, phosphate, vitamin A, iron. Correct these deficiencies and dandelions will disappear.

Nature has a wondrous way of talking to us. When a nutrient deficiency first begins to manifest itself at a low level, the bacteria arrive on the scene. This can be termed a first degree deficiency. As the deficiency worsens, at a certain point the fungi show up. This can be termed a second degree deficiency. The third degree level attracts the viruses and the fourth degree level attracts the insects and parasites.

POSTWORD

The saying goes that time is only relative. Your experience of time is measured by your action or inaction. This is a time for action. Every individual is personally responsible, and no one is an island. Improve the quality of your food now and your health, vitality, and attitude will improve along with it. If you can only obtain produce from the local grocer, then select the best and regularly request better quality and greater variety. If you can grow produce yourself, do so! If you can only add condiments to change the quality, do so! All citizens can write to their congressman and demand that government learning institutions research and teach quality fertilization and non-destructive agricultural practices.

This is everyone's country. Find out why this government proclaims we have a glut of agricultural commodities, and yet imports more than it exports of many of these commodities. Find out why the government will not allow farmers to export commodities directly when foreign buyers beg for the commodities and offer much higher prices for them. Find out why the U.S. government is selling millions of tons per year of our phosphate to the Soviet Union when the U.S.S.R. has a much larger and more accessible phosphate reserve. Find out why the U.S. government allows thousands of acres per day of the South American rain forests to be stripped for grazing beef cattle that are imported to this country and labeled domestic beef. Find out why the U.S. government suppresses the development and marketing of non-polluting free energy machines. This is

still the greatest country in the world. Only enlightened action toward the implementation of free energy usage and high quality, nondestructive food production will keep it that way. You may hear the principles presented in this book rebutted with the statement, ". . . if these are so good and correct, why doesn't everyone practice them?" Education is good, too, so why doesn't everyone get it?

You probably notice that the following statistics quite drastically contradict the propaganda repeatedly broadcast by the news media which is that the American farmer produces enough food for the entire world and that this country possesses tremendous surpluses. There are two motives behind this propaganda. One is for control, manipulation, profit, and possession of the land. When the farm is broke, the government takes the land. Private ownership of the land is the foundation of democracy. The other motive is a coverup. The powers that be do not want the general public to learn of the serious degenerative status of the soils in this country. If the public knew, changes would occur.

Summary of Parity From U.S.D.A. Publications

Table 160—Price Per Hundredweight Received By Farmers, Parity and Price Received as Percentage of Parity Meat Animals, United States, 1970-85

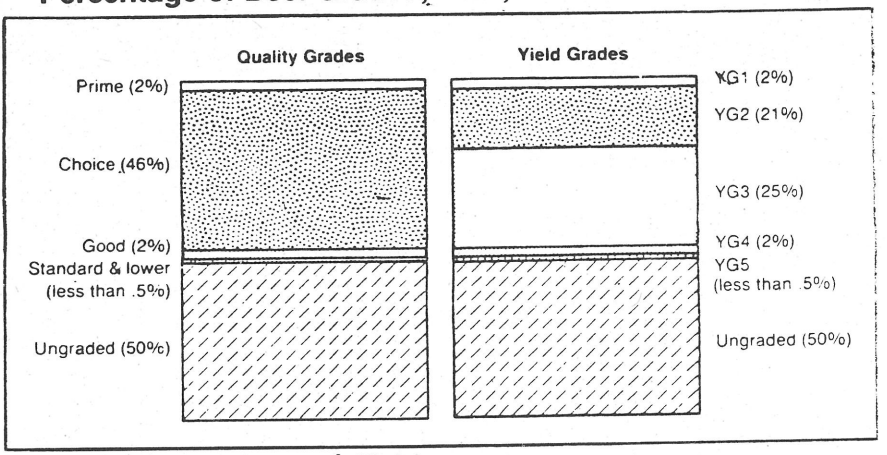
Year	Beef Cattle			Calves		
	Price Received By Farmers 1/	Parity Price 2/	Percentage of Parity	Price Received By Farmers 1/	Parity Price 2/	Percentage of Parity
	DOLLARS		PERCENT	DOLLARS		PERCENT
1970	27.10	32.50	83	34.50	37.90	91
1971	29.00	34.40	84	36.10	40.60	89
1972	33.50	36.80	91	43.90	44.10	100
1973	43.00	43.00	100	57.00	52.00	110
1974	35.80	51.00	70	38.60	62.80	61
1975	32.20	55.30	58	26.90	67.50	40
1976	33.90	57.00	59	34.50	67.40	51
1977	34.50	58.30	59	36.80	68.10	54
1978	48.50	62.30	78	58.40	72.00	81
1979	66.30	71.90	92	89.70	83.30	108
1980	62.50	83.10	75	77.50	99.00	78
1981	58.50	92.00	64	64.50	110.00	59
1982	57.00	95.00	60	60.20	112.00	54
1983	55.80	97.50	57	62.10	112.00	55
1984	57.60	101.00	57	60.20	114.00	53
1985	54.00	101.00	54	62.40	114.00	55

1/ Unweighted calendar-year average price.

2/ Unweighted average of parity prices published monthly.

3/ Annual average is for the 12-month period beginning December previous year through November of current year.

Percentage of Beef Graded, 1984, From U.S.D.A. Source



Compiled by Mike Toner, Stuarts Draft, Virginia.
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USE GREATER THAN PRODUCTION
U.S. Wheat and Coarse Grains (Million Metric Tons)

YEAR	BEGINNING STOCKS	PRODUCTION	TOTAL USE	IMPORTS	ENDING STOCKS	USE AS % OF PRODUCTION
60/61	105.6	178.8	166.7	0.6	118.3	93%
61/62	118.3	161.0	175.5	0.5	104.3	100%
62/63	104/3	159.3	170.8	0.3	93.2	107%
63/64	93.2	171.5	175.0	0.4	90.1	102%
64/65	90.1	157.5	172.9	0.4	76.5	109%
65/66	76.5	179.1	197.8	0.3	58.2	110%
66/67	58.2	180.7	189.7	0.3	49.5	104%
67/68	49.5	203.9	191.0	0.3	62.7	93%
68/69	62.7	197.6	188.9	0.3	71.8	95%
70/71	72.8	182.9	201.6	0.4	54.6	110%
71/72	54.6	233.6	215.1	0.4	73.4	92%
72/73	73.4	224.1	250.0	0.5	48.0	111%
73/74	48.0	233.3	250.5	0.3	31.1	107%
74/75	31.1	199.4	203.7	0.6	27.3	102%
75/76	27.3	243.3	235.7	0.5	35.5	96%
76/77	35.5	252.8	228.4	0.4	60.3	90%
77/78	60.3	261.4	248.6	0.4	73.5	95%
78/79	73.5	270.5	272.7	0.3	71.6	100%
79/80	71.6	296.5	291.2	0.4	77.2	98%
80/81	77.2	263.1	279.1	0.3	61.6	106%
81/82	61.6	322.4	244.6	0.4	99.8	88%
82/83	99.8	326.0	287.7	0.6	138.7	88%
83/84	138.7	203.0	272.7	0.8	69.8	134%
84/85	69.8	307.6	294.8	0.9	83.5	95%
25 years		5610.3	5645.1	11.0		

Notes: Coarse grains include corn, sorghum, barley, oats, and rye. Average Annual Production-224.4 Million Ton. Average Annual Total Use-225.8 Million Ton. Total usage of wheat and coarse grain is greater than total production for this 25 year period. Total use is 100.6% of total production. These figures do not represent a surplus! They show government supply management. The same necessary pipeline inventory and reserve accumulated from all past years is used to keep grain cheap. Ending stocks are less than in the early 1960s even though annual usage has increased 76%. Ending stocks as a percent of annual use has dropped form 71% to 28% in 1985. Source: USDA, World Grain Situation and Outlook, February 12, 1985.

BEEF FACTS ANALYSIS. . . .

by Mike Toner & Harold D. Beyeller

Source of Material USDA Bulletins	Agr. Statistics USDA 1984 Pg. 310 Tab 455	Agr. Statistics USDA 1984 Pg. 310 Tab 455	Food Consumption Bulletin #736 Pg. 47 Tab 34A	Agr. Statistics USDA 1984 Pg. 311 Tab 456	Summary Columns 1-2-3-4	Agr. Statistics USDA 1984 Pg. 311 Tab 456	Food Consumption Statistical Bulletin #736 Pg. 47 Tab 34A	FATUS Economic Research USDA-1984 Pg. 139	FATUS Economic Research USDA 1984 Pg. 139	FATUS Economic Research USDA 1984 Pg. 139	These Animals show up in our Domestic Beef Production
	Food Consumption Bulletin #736 Pg. 47 Tab 34A	Food Consumption Bulletin #736 Pg. 47 Tab 34A		Livestock & Meat Statistics Bulletin #715 Pg. 158 Tab 183		Livestock & Meat Statistics Bulletin #715 Pg. 158 Tab 183	Average of 4 Bulletins USDA	Livestock & Meat Statistics Bulletin #715 Pg. 155 Tab 180	Livestock & Meat Statistics Bulletin #715 Pg. 155 Tab 180	Livetock and Meat Statistics Bulletin #715 Pg. 155 Tab 180	Column #1
Applied Use	Domestic Beef Production (million lbs.) 1	Domestic Beef Consumption (million lbs.) 2	Domestic Production for Military Consumption (million lbs.) 3	Domestic Beef Production for U.S. Territories (million lbs.) 4	Shortage of U.S. Beef Production Cols. 2-3-4 compared to col. 1 (million lbs) 5	Beef Exports to Foreign Countries (million lbs.) 6	Imports of Foreign Beef (million lbs.) 7	Live Beef Animals Imported Under 200 lb. (No. animals) 8	Live Beef Animals Imported 200 to 699 lbs. (No. animals) 9	Live Beef Animals Imported over 700 lbs. (No. animals) 10	Total Animals Animals Per Year (No. Animals) 11
1970	21685	22926	465	65	1791	40	1792	168933	906992	66,975	1,142,900
1971	21904	23086	407	68	1657	53	1734	158689	748873	61,523	969,085
1972	22413	23956	302	62	1907	62	1960	173336	939168	56,531	1,169,035
1973	21278	22814	229	61	1826	91	1990	143851	783851	95,742	1,023,444
1974	23137	24488	195	67	1613	63	1615	77602	413777	64,810	556,189
1975	23975	25397	278	71	1771	54	1758	10145	220851	151,932	382,928
1976	25969	27539	231	80	1881	90	2073	119814	562707	290,098	972,619
1977	25279	27048	151	78	1998	103	1939	133067	731247	263,325	1,127,639
1978	24241	25998	237	58	2052	163	2297	154972	873542	214,548	1,243,062
1979	21477	23522	170	51	2266	170	2405	146133	430726	144,095	720,954
1980	21643	23320	189	48	1914	176	2064	135937	382325	154,004	672,266
1981	22389	23756	195	37	1599	221	1743	145653	370056	135,295	651,004
1982	22536	23998	135	57	1654	254	1939	159606	605768	231,379	996,753
1983	23243	24710	121	41	1629	272	1931	88564	587669	235,082	911,315
1984	23598	24900	112	47	1461	328	1823	77845	406921	262,180	746,946
1985	23728	25331	126	51	1780	328	2068	34749	573368	221,601	829,718

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U.S. MILK PRODUCTION AND USAGE

(in billion pounds)

YEAR	CONSUMPTION	PRODUCTION	DIFFERENCE	IMPORTS
1974	119.5	115.6	(3.9)	2.9
1975	120.6	115.4	(5.2)	1.7
1976	121.7	120.2	(1.5)	1.9
1977	122.9	122.7	(0.2)	2.0
1978	124.8	121.5	(3.3)	2.3
1980	127.0	128.4	1.4	2.1
1981	130.4	132.8	2.4	2.3
1982	136.5	135.5	(6.3)	2.7
1983	138.7	139.7	1.0	2.6
1984	141.7	135.4	(6.3)	2.7
Total	1,410.6	1,390.6	(20.0)	25.3

Average for 11 years—(1.82) Billion Pounds

Consumption includes actual military donation and actual on-farm usage.

These figures come from *Dairy Outlook and Situation Year Book*, DS 401, Pages 28 and 34.

Note: The figures encased in parenthesis have a minus value.

1. *Revolution in Technology, Medicine and Society*, Hans A. Nieper. Druchhaus Neue Stalling, Oldenbur, F.R.G., 1983.

2. *Plant Science*, Janick, Schery, Woods, Ruttan. W.H. Freeman and Company, San Francisco, California, 1974

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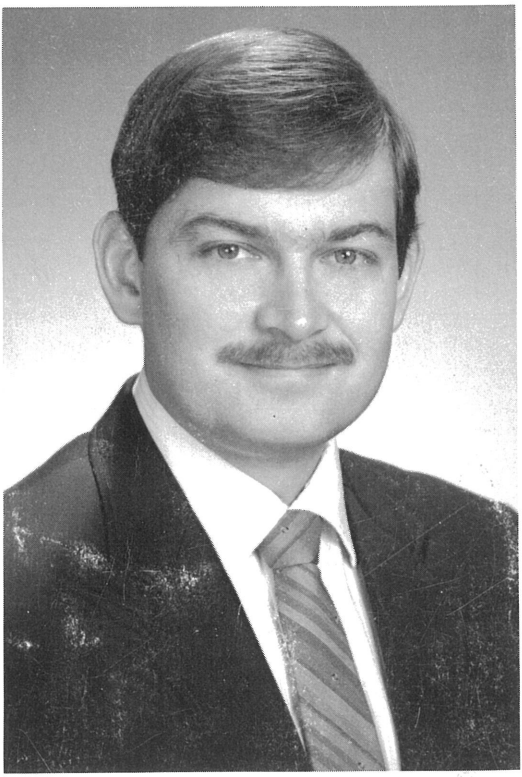

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Arden B. Andersen grew up on a dairy farm in Michigan. He holds a B.S. degree in agriculture from the University of Arizona, and a Ph.D. in biophysics from Clayton University, St. Louis, Missouri. He was a work exchange student on a dairy/potato/sugar beet farm in The Netherlands through the FFA. He is a former vocational agriculture instructor. He has worked and studied personally with Dr. Carey Reams, Dr. Dan Skow and currently with Dr. Philip Callahan. Arden is an independent consultant to biological fertilizer companies and farmers as well as private individuals. He has traveled widely and teaches seminars on several subjects ranging from agriculture to building biology (baubiologie).